UNIVERSITY OF ARKANSAS

2000-2001 Graduate School Catalog

Contents

2000 Academic Calendar

2000

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SUMMER SESSION I 2000 (29 CLASS DAYS)

May 18 - 25	Open Registration
May 22	Classes begin
May 25	Last day to register, add a course, or change from audit to credit
May 26	Last day to drop without a mark of "W" or change from credit to audit
May 29	Memorial Day Holiday
June 19	Last day to drop a Session I class
June 30	Last day to officially withdraw from Session I
June 30	Last day of classes for Session I

SUMMER SESSION II 2000 (29 CLASS DAYS)

May 18 - July 5	Open Registration
July 3	Classes begin
July 4	Independence Day Holiday
July 5	Last day to register, add a course, or change from audit to credit
July 10	Last day to drop without a mark of "W" or change from credit to audit
July 31	Last day to drop a Session II class
August 11	Last day to officially withdraw from Session II
August 11	Last day of classes for Session II

SUMMER SESSION III 2000 (58 CLASS DAYS)

May 18 - 26	Open Registration
May 22	Classes begin
May 26	Last day to register, add a course, or change from audit to credit
May 29	Memorial Day Holiday
June 5	Last day to drop without a mark of "W" or change from credit to audit
July 4	Independence Day Holiday
July 18	Last day to drop a Session III class
August 11	Last day to officially withdraw from Session III
August 11	Last day of classes for Session III

FALL 2000 (74 CLASS DAYS; 44 MWF, 30TT)

May 18 - August 11	Open Registration for currently enrolled students
August 24 - Sept. 1	Open Registration
August 28	Classes begin
September 1	Last day to register, add a course, or change from audit to credit
September 4	Labor Day Holiday
September 11	Last day to drop without a mark of "W" or change from credit to audit
November 3	Last day to drop a fall semester class
November ?? - ??	Priority Registration for Spring 2001 NOT FINALIZED YET
November 23-24	Thanksgiving Holiday
December 12	Last day to officially withdraw from fall classes
December 12	Last day of classes for fall semester
December 13	Dead Day
December 14 - 20	Final Exams

2001 Academic Calendar

SPRING 2001 (73 CLASS DAYS; 44MWF, 30TT)

January 11 - 12	Open Registration
January 15	Martin Luther King Holiday
January 16	Classes begin
January 22	Last day to register, add a course, or change from audit to credit
January 29	Last day to drop without a mark of "W" or change from credit to audit
March 19 - 23	Spring Break Week
March 23	Last day to drop a spring semester class
May 3	Last day to officially withdraw from all classes
May 3	Last day of classes
May 4	Dead Day
May 5 - 11	Final exams
May 12	All-University Commencement
May 19	Law School Commencement

SUMMER SESSION I 2001 (29 CLASS DAYS)

May 21	Classes begin
May 28	Memorial Day Holiday
June 29	Last day of classes

SUMMER SESSION II 2001 (29 CLASS DAYS)

July 2	Classes begin
July 4	Independence Day Holiday
August 10	Last day of classes

SUMMER SESSION III 2001 (58 CLASS DAYS)

May 21	Classes begin
May 28	Memorial Day Holiday
July 4	Independence Day Holiday
August 10	Last day of classes

FALL 2001 (74 CLASS DAYS; 44 MWF, 30 TT)

August 27	Classes begin
September 3	Labor Day Holiday
November 28 - 29	Thanksgiving Holiday
December 11	Last day of classes
December 12	Dead Day
December 13 - 19	Final exams

2001

JANUARY

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UNIVERSITY OF ARKANSAS

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UNIVERSITY OF ARKANSAS

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[2] Member, Graduate Curriculum Committee
[3] Member, Committee on Program Review
[4] Library Committee

Table of Graduate Degree Programs and Degrees

Degree Programs	Department	Degree	Test Required for Admission GRE	MAT	GMAT	Letter of Recommend.	Dept. Appl. & Admission Requirements	Dissertation or Thesis Required	For. Lang. Required for Graduation
Accounting[1]	ACCT	M.Acc.	N	N	Y	3B	B	N	N
Adult Education[2,3]	VAED	M.Ed.	N	N	N	N	Y	N	N
Agricultural & Extension Education	AEED	M.S.	Y or	Y	N	Y	N	Y	N
Agricultural Economics	AEAB	M.S.	Opt	Opt	Opt	3	N	Opt	N
Agricultural Education	AEED	M.A.T.	N	N	N	N	Y	N	N
Agronomy	CSES	M.S.	N	N	N	3	N	Opt	N
		Ph.D.	N	N	N	3	N	Y	N
Animal Science	ANSC	M.S.	N	N	N	3	N	Y	N
		Ph.D.	Y	N	N	3	N	Y	N
Anthropology	ANTH	M.A.	Y	N	N	3	B	Opt	N
Applied Physics	PHYS	M.S.	N	N	N	3	B	Opt	N
Art	ARTS	M.F.A.	N	N	N	3	B + slides	Y	N
Biological & Agricultural Engineering[4]	BAEG	M.S.B.A.E.	N	N	N	A	N	Y	Opt
Biology	BISC	M.A.	G,S	N	N	3	Y	Y	N
		M.S.	G,S	N	N	3	Y	Y	N
		Ph.D.	G,S	N	N	3	Y	Y	N
Business Administration[1]	BADM	M.B.A.	N	N	Y	3B	B	N	N
		Ph.D.	N	N	Y	3B	B	Y	N
Cell and Molecular Biology	CEMB	M.S.	Y	N	N	Y	Y	Y	N
Chemical Engineering[4]	CHEG	M.S.Ch.E.	G,	N	N	3	N	Y	N
Chemistry	CHBC	M.S.	Opt	N	N	3	N	Opt	N
		Ph.D.	Opt	N	N	3	N	Y	N
Childhood Education	CIED	M.A.T.	N	N	N	N	Y	N	N
Civil Engineering[4]	CVEG	M.S.C.E.	Y	N	N	3	N	Y	N
Communication	COMM	M.A.	N	N	N	Opt	N	Opt	N
Communication Disorders	RHAB	M.S.	Y	N	N	3B	Y	N	N
Comparative Literature	CPLT	M.A.	Y	N	N	3	B	Opt	N
		Ph.D.	Y	N	N	3	B	Y	Y
Computer Science	CSCE	M.S.	Y	N	N	N	N	Opt	N
		Ph.D.	Y	N	N	N	N	Y	N
Computer Engineering[4]	CSCE	M.S.C.S.E.	Y	N	N	N	Y	Y	N
Counseling	ELCF	M.S.	Y	Y	N	3B	Y	Opt	N
Counselor Education[2]	ELCF	Ph.D.	Y	N	N	3B	Y	Y	N
Creative Writing	ENGL	M.F.A.	Y	N	N	3	Writing Sample + B	Y	N
Curriculum & Instruction	CIED	Ph.D.	Y	N	N	3	Y	Y	N
Drama	DRAM	M.A.	Y	N	N	3	Y	Opt	N
		M.F.A.	Y	N	N	3	Y	Y	N
Economics[1]	ECON	M.A.	Y	N	N	3B	B	Opt	N
		Ph.D.	Y	N	N	3B	B	Y	N
Education	EDUC	M.Ed.	N	N	N	Y	Y	N	N
Adult Education	VAED	Ed.S.	Y	Y	N	3B	Y	N	N
		Ed.D	Y	Y	N	3B	Y	Y	N
Counselor Education	ELCF	Ed.S.	Y	Y	N	3B	Y	N	N
Educational Administration	ELCF	Ed.S.	Y	Y	N	3B	Y	N	N
		Ed.D.	Y	Y	N	3B	Y	Y	N
Elementary Education	CIED	Ed.S.	Y	Y	N	3B	Y	N	N
Higher Education	ELCF	Ed.S.	Y	Y	N	3B	Y	N	N
		Ed.D.	Y	Y	N	3B	Y	Y	N
Recreation	HKRD	Ed.D.	Y	Y	N	3B	B	Y	N
Secondary Education	CIED	Ed.S.	Y	N	N	3B	Y	N	N
Vocational Education	VAED	Ed.S.	Y	Y	N	3B	B	N	N
		Ed.D.	Y	Y	N	3B	B	Y	N
Educational Administration[2,3]	ELCF	M.Ed.	N	N	N	N	N	Opt	N
Educational Technology	ELCF	M.Ed.	N	N	N	N	N	Opt	N

Degree Programs	Department	Degree	Test Required for Admission GRE	MAT	GMAT	Letter of Recommend.	Dept. Appl. & Admission Requirements	Dissertation or Thesis Required	For. Lang. Required for Graduation
Electrical Engineering[4]	ELEG	M.S.E.E.	N	N	N	N	N	Opt	N
Elementary Education[2]	CIED	M.Ed.	N	N	N	N	N	Opt.	N
Engineering	ENGR	M.S.E.	Opt	Opt	N	N	B	N	N
Biological & Agricultural Engineering	BAEG	Ph.D.	N	N	N	A	N	Y	Opt
Chemical Engineering	CHEG	Ph.D.	G,	N	N	3	N	Y	Y
Civil Engineering	CVEG	Ph.D.	Y	N	N	3	N	Y	Opt
Computer Systems Engineering	CSEG	Ph.D.	Y	N	N	N	Y	Y	Opt
Electrical Engineering	ELEG	Ph.D.	N	N	N	N	N	Y	Opt
Industrial Engineering	INEG	Ph.D.	Y	N	N	3	N	Y	N
Mechanical Engineering	MEEG	Ph.D.	G,S,A	N	N	Y	N	Y	Opt
English	ENGL	M.A.	G	N	N	3	B	N	Y
		Ph.D.	G,S	N	N	3	B	Y	Y
Entomology	ENTO	M.S.	Y	N	N	3	N	Y	N
		Ph.D.	Y	N	N	3	N	Y	Opt
Environmental Dynamics	ENDY	Ph.D.	Y	N	N	3	N	Y	Y
Environmental Engineering	CVEG	M.S.En.E.	Y	N	N	3	N	Y	N
Food Science	FDSC	M.S.	N	N	N	2	N	Y	N
		Ph.D.	N	N	N	2	Stmt of Goals	Y	N
French	FLAN	M.A.	N	N	N	N	N	N	N
General Agriculture	AFLS	M.S.	Opt	Opt	N	N	N	N	N
Geography	GEOS	M.A.	N	N	N	3	Y	Y	N
Geology	GEOS	M.S.	N	N	N	3	N	Y	N
German	FLAN	M.A.	N	N	N	N	N	N	N
Health Science	HKRD	M.S.	Opt	Opt	N	N	N	Opt	N
		Ph.D.	Y	N	N	3	Y	Y	N
Higher Education[2,3]	ELCF	M.Ed.	N	N	N	3B	Y	Opt	N
History	HIST	M.A.	Y	N	N	N	N	Opt	N
		Ph.D.	Y	N	N	3	B	Y	Y
Horticulture	HORT	M.S.	Opt	N	N	3	N	Y	N
Human Environmental Sciences	HESC	M.S.	N	N	N	3	N	Opt	N
Industrial Engineering[4]	INEG	M.S.I.E.	Y	N	N	3	N	Opt	N
Information Systems[1]	CISQ	M.I.S.	N	N	Y	3B	B	N	N
Journalism	JOUR	M.A.	G	N	N	3	N	Y	N
Kinesiology	HKRD	M.S.	N	N	N	N	N	Opt	N
		Ph.D.	Y	N	N	3	Y	Y	N
Mathematics	MASC	M.S.	N	N	N	N	N	Opt	N
		Ph.D.	N	N	N	N	N	Y	Y
Mechanical Engineering[4]	MEEG	M.S.M.E.	G,S,A	N	N	Y	N	Opt	N
Microelectronics-Photonics	MEPH	M.S.	N	N	N	3	B	Y	N
Middle-Level Education	CIED	M.A.T.	N	N	N	N	Y	N	N
Music	MUSC	M.M.	N	N	N	Opt	Dept Plcmt Tst	Opt	Opt
Operations Management	INEG	M.S.	N	N	N	N	N	N	N
Operations Research	INEG	M.S.O.R.	Y	N	N	3	N	Y	N
Philosophy	PHIL	M.A.	N	N	N	3	Y	Y	N
		Ph.D.	N	N	N	3	Y	Y	Y
Physical Education	HKRD	M.A.T.	N	N	N	N	Y	N	N
		M.Ed.	Opt	Opt	N	N	N	Opt	N
Physics	PHYS	M.A.	N	N	N	3	B	N	N
		M.S.	N	N	N	3	B	Y	N
		Ph.D.	N	N	N	3	B	Y	N
Plant Pathology	PLPA	M.S.	N	N	N	3	Y	Y	N
Plant Science	PTSC	Ph.D.	Y	N	N	3	Y	Y	N
Political Science	PLSC	M.A.	Y	N	N	3	Writing Sample	Opt	N
Poultry Science	POSC	M.S.	Y	N	N	3	N	Y	N
		Ph.D.	Y	N	N	3	N	Y	N
Psychology	PSYC	M.A.	Y	N	N	3B	Y	Y	N
		Ph.D.	Y	N	N	3B	Y	Y	N
Public Administration	PLSC	M.P.A.	Y	N	N	3	Writing Sample	N	N
Public Policy	PUBP	Ph.D.	Opt	N	N	3	Y	Y	N
Recreation[3]	HKRD	M.Ed.	Opt	Opt	N	N	N	Opt	N
Rehabilitation	RHAB	M.S.	N	N	N	3	Y	Opt	N
		Ph.D.	Y	N	N	3	Y	Y	N
Secondary Education[2]	CIED	M.A.T.	N	N	N	3	Y	N	N
		M.Ed.	Y	Y	N	N	Y	Opt	N
Secondary Mathematics	MASC	M.A.	N	N	N	N	N	Opt	N
Sociology	SOCI	M.A.	N	N	N	N	Y	Opt	N
Spanish	FLAN	M.A.	N	N	N	N	N	N	N
Special Education[5]	CIED	M.A.T.	N	N	N	N	Y	N	N
		M.Ed.	Y	Y	N	N	N	N	N
Statistics	MASC	M.S.	N	N	N	N	N	N	N
Translation	TRAN	M.F.A.	Y	N	N	3	B	Y	Y
Transportation and Logistics Management[1]	MKTT	M.T.L.M.	N	N	Y	3B	B	N	N
Transportation Engineering	CVEG	M.S.T.E.	Y	N	N	3	N	Y	N
Vocational Education[2,3]	VAED	M.A.T.	N	N	N	N	Y	N	N
		M.Ed.	N	N	N	N	Y	N	N

[1] Non-departmental students must obtain permission from department to register for courses in these fields.
[2] An undifferentiated Educational Specialist degree in Education is available in this area of study. See Education.
[3] An undifferentiated Doctor of Education degree in Education is available in this area of study. See Education.
[4] An undifferentiated Doctor of Philosophy degree in Engineering is available in this area of study. See Engineering.
[5] Special Education is not currently accepting students.

Summary of Procedures

(It is the student's responsibility to ascertain that all requirements have been met and that every deadline is observed. Degree programs may establish requirements in addition to those included in this listing.)

Procedures for Master's & Specialist Degrees

PROCEDURE	RESPONSIBLE PARTY	ACTION DATE
Formation of program advisory committee and submission of Program Advisory Committee form[1]	Major Adviser/ Department Chair/Head	Immediately following admission to degree program
Changes in program advisory committee by memorandum	Major Adviser/Member Leaving Committee	As soon as change occurs
Request transfer of credit by submitting Request for Transfer of Graduate Credit form[1] (master's degrees only)	Major Adviser	Before Graduation
Graduation Application Card[1]	Student	By end of semester in which the degree is to be awarded
Inclusion of name for commencement exercises, regalia, and announcement orders	Student	Deadlines indicated in "Instructions to Graduates"
Removal of incompletes (Change of Grade form)	Student/Instructor	When course requirements have been met
To avoid an incomplete becoming "F"	Student/Instructor	Change of grade form must be submitted 12 weeks in the next major semester of enrollment
Final comprehensive examination (Certified by submission of Record of Progress form[1] with original signatures)	Advisory Committee	Must be completed by graduation

Additional Requirements for the Thesis Option

Selection of thesis title and formation of thesis committee and submission of Master's Thesis Title and Thesis Committee form[1]	Thesis Director	At least three months prior to the date of the defense
Obtain Guide for Preparing Theses and Dissertations from Union Bookstore	Student	Before 1st draft of thesis is typed
Defense of thesis	Thesis Committee	Specific deadline. One week before graduation[2]
Registration for at least six hours of thesis	Student	Before graduation
Submission of preliminary copies to each thesis committee member	Student	At least three weeks before graduation
Preliminary editorial check of thesis	Student	Before final copies of thesis are made
Final copies of thesis to Graduate School and to Mullins Library	Student	Specific deadline. One week before graduation[2]

[1]Forms are available in the Graduate School or on the Graduate School web site (www.uark.edu/depts/gradinfo).

[2]Specific deadlines are available in the Graduate School.

Procedures for Doctoral Degrees

PROCEDURE	RESPONSIBLE PARTY	ACTION DATE
Submission of Declaration of Intent form[1]	Department Chair/Head	Before any requirements can be satisfied
Formation of program advisory committee and submission of Doctoral Program Advisory Committee form[1]	Major Adviser/ Department Chair/Head	Immediately following admission to degree program
Changes in program advisory committee by memorandum	Major Adviser/Member Leaving Committee	As soon as change occurs
Foreign Language Requirement (if required)	Advisory Committee	Determined by committee
Satisfaction of residence: Ph.D., enrollment in two consecutive semesters as a full-time student; Ed.D., enrollment as indicated on an approved Residence Plan form[1]	Student/Adviser	Before graduation
Admission to candidacy	Advisory Committee	At least one year before completing all other degree requirements
Enrollment in at least one hour of dissertation following passing of candidacy exams	Student	Each semester (including summer) until graduation
Selection of dissertation title & formation of dissertation committee and submission of Doctoral Dissertation Title and Dissertation Committee form[1]	Dissertation Director	At least three months prior to the date of the defense
Registration for at least 18 hours of dissertation	Student	Before graduation
Graduation Application Card[1]	Student	By end of semester in which the degree is to be awarded
Inclusion of name for commencement exercises, regalia, and announcement orders	Student	Deadlines indicated in “Instructions to Graduates”
Removal of incompletes (Change of Grade form)	Student/Instructor	When course requirements have been met
To avoid an incomplete becoming “F”	Student/Instructor	Change of grade form must be submitted 12 weeks in the next major semester of enrollment
Obtain Guide for Preparing Theses and Dissertations from Union Bookstore	Student	Before 1st draft of dissertation is typed
Submission of Announcement of Defense by memorandum	Dissertation Director	At least two weeks prior to defense
Defense of dissertation (Certified by submission of Record of Progress with original signatures[1])	Dissertation Committee	Specific deadline. One week before graduation[2]
Submission of preliminary copies to each dissertation committee member	Student	At least three weeks before graduation
Preliminary editorial check of dissertation	Student	Before final copies of dissertation are made
Final copies of dissertation to Graduate School and to Mullins Library	Student	Specific deadline. One week before graduation[2]

[1]Forms are available in the Graduate School or on the Graduate School web site (www.uark.edu/depts/gradinfo).

[2]Specific deadlines are available in the Graduate School.

University Profile

The University of Arkansas, organized under provisions of the Federal Land-Grant Act, was instituted by the General Assembly of Arkansas, March 27, 1871. Fayetteville was chosen as the site, and first students were enrolled January 22, 1872. The purpose of the Land-Grant Act was to provide a system of public higher education which would offer college opportunities to all qualified persons, regardless of their economic or social status. The University of Arkansas, as a land-grant institution, is committed to this policy. Its basic aim is to provide the finest educational opportunities to all students, regardless of race, color, or creed.

The Fayetteville campus covers approximately 420 acres and is situated in the Ozark Mountains of northwestern Arkansas at an elevation of 1,400 feet.

Seven separate institutions make up the University of Arkansas System: The University of Arkansas, Fayetteville; the University of Arkansas at Little Rock; the University of Arkansas for Medical Sciences (in Little Rock); the University of Arkansas at Pine Bluff; the University of Arkansas at Monticello; University of Arkansas Community College at Hope; and Phillips Community College of the University of Arkansas.

The Graduate School was established in 1927. Before that year, graduate work in the University was under the supervision of a Graduate Committee. In addition to the Graduate School, the following colleges and schools are a part of the University of Arkansas, Fayetteville: the Dale Bumpers College of Agricultural, Food and Life Sciences; the Sam M. Walton College of Business Administration; the College of Education and Health Professions; the College of Engineering; the J. William Fulbright College of Arts and Sciences; the School of Architecture; the School of Law; and the Division of Continuing Education. The University of Arkansas Division of Agriculture includes, in addition to the Dale Bumpers College of Agricultural, Food and Life Sciences, the Agricultural Experiment Station and the Cooperative Extension Service.

The University of Arkansas is a member of the North Central Association of Colleges and Schools. In 1997, North Central continued accreditation through the doctoral level for the University of Arkansas, Fayetteville, and recommended that the next comprehensive evaluation be made in 2006-07.

A MESSAGE FROM THE CHANCELLOR

I invite you to share in our vision for the University of Arkansas as we work to emerge as a nationally competitive, student-centered research university serving Arkansas and the world. It is a vision that comes closer to realization with each passing year, thanks to an enormously talented faculty, bright and hard-working students, a dedicated staff, and a network of enthusiastic alumni and devoted friends across the state, nation and world.

And it is a vision that's contingent upon making rapid progress toward our five institutional goals:

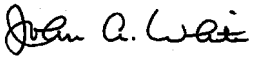
- Enhancing and developing programs of excellence in teaching, research and outreach;
- Increasing the size and quality of our student body;
- Enhancing diversity among our faculty, students, and staff;
- Increasing public financial support, particularly that provided by the state;
- Increasing private gift support from our alumni and friends.

To be sure, the University of Arkansas already is one of the nation's great public flagship universities. It has a proud legacy of internationally significant scientific and intellectual accomplishment in many academic fields. It also has cachet as a great teaching university and has produced 112,000 graduates over its nearly 130-year history who have provided leadership in professions and occupations across our state and world. The University creatively harnesses its intellectual capital to reach out to Arkansans and others through myriad outreach and public service programs, making life better for everyone.

Notwithstanding, this proud record of accomplishment, the University of Arkansas is not content to stand still. We are in the process of profound and far-reaching change as we build an institution that serves ever more effectively as both an economic engine and cultural and intellectual resource to Arkansas and the world.

I invite you to use this catalog of the University Arkansas and become better acquainted with who we are and where we're going. On behalf of the University of Arkansas community, I also invite your support and involvement as we create a better future for the people we serve.

Sincerely,



John A. White
Chancellor

Colleges, Schools, Departments, and Degree Programs

Below is a listing of colleges, schools, and departments with their corresponding graduate degree programs. Interdisciplinary degree programs are also included in a separate section.

Department of Accounting (ACCT)
- M.Acc. in Accounting (ACCT)
- Ph.D. in Business Administration (BADM)

Department of Agricultural & Extension Education (AEED)
- M.A.T. in Agricultural Education (AGED)
- M.S. in Agricultural & Extension Education (AEED)

Department of Agricultural Economics & Agribusiness (AEAB)
- M.S. in Agricultural Economics (AGEC)

Dale Bumpers College of Agricultural, Food and Life Sciences
- M.S. in General Agriculture (GNAG)

Department of Animal Science (ANSC)
- M.S. in Animal Science (ANSC)
- Ph.D. in Animal Science (ANSC)

Department of Anthropology (ANTH)
- M.A. in Anthropology (ANTH)

Department of Art (ARTS)
- M.F.A. in Art (ART)

Department of Biological & Agricultural Engineering (BAEG)
- M.S.B.A.E. in Biological & Agricultural Engineering (BAEG)
- M.S.E. in Engineering (BAEG)
- Ph.D. in Engineering (BAEG)

Department of Biological Sciences (BISC)
- M.A. in Biology (BIOL)
- M.S. in Biology (BIOL)
- Ph.D. in Biology (BIOL)

Graduate School of Business (GSB)
- M.Acc. in Accounting (ACCT)
- M.A. in Economics (ECON)
- M.B.A./J.D.
- M.I.S. in Information Systems (INSY)
- M.T.L.M. in Transportation and Logistics Mngt. (TLOG)
- M.B.A. in Business Administration (BADM)
- Ph.D. in Business Administration (BADM)
- Ph.D. in Economics (ECON)

Department of Chemical Engineering (CHEG)
- M.S.Ch.E. in Chemical Engineering (CHEG)
- M.S.E. in Engineering (CHEG)
- Ph.D. in Engineering (CHEG)

Department of Chemistry & Biochemistry (CHBC)
- M.S. in Chemistry (CHEM)
- Ph.D. in Chemistry (CHEM)

Department of Civil Engineering (CVEG)
- M.S.C.E. in Civil Engineering (CVEG)
- M.S.E. in Engineering (CVEG)
- M.S.En.E. in Environmental Engineering (ENEG)
- M.S.T.E. in Transportation Engineering (TREG)
- Ph.D. in Engineering (CVEG)

Department of Communication (COMM)
- M.A. in Communication (COMM)

Department of Computer Information Systems and Quantitative **Analysis (CISQ)**
- M.I.S. in Information Systems (INSY)
- Ph.D. in Business Administration (BADM)

Department of Computer Science and Computer Engineering (CSCE)
- M.S. in Computer Science (CSCE)
- M.S.C.S.E. in Computer Systems Engineering (CENG)
- M.S.E. in Engineering (CENG)
- Ph.D. in Computer Science (CSCE)
- Ph.D. in Engineering (CENG)

Department of Crop, Soil, & Environmental Sciences (CSES)
- M.S. in Agronomy (AGRN)
- Ph.D. in Agronomy (AGRN)

Department of Curriculum & Instruction (CIED)
- M.A.T. in Childhood Education (CHED)
- M.A.T. in Middle-Level Education (MLED)
- M.A.T. in Secondary Education (SEED)
- M.A.T. in Special Education (SPED)
- M.Ed. in Elementary Education (ELED)
- M.Ed. in Secondary Education (SEED)
- M.Ed. in Special Education (SPED)
- Ed.S. in Education (ELED)
- Ed.S. in Education (SEED)
- Ph.D. in Curriculum & Instruction (CIED)

Department of Drama (DRAM)
- M.A. in Drama (DRAM)
- M.F.A. in Drama (DRAM)

Department of Economics (ECON)
- M.A. in Economics (ECON)
- Ph.D. in Economics (ECON)

College of Education and Health Professions
- Ed.S. in Education
- Ed.D. in Education

Department of Educational Leadership, Counseling and Foundations (ELCF)
- M.Ed. in Educational Administration (EDAD)
- M.Ed. in Educational Technology (ETEC)
- M.Ed. in Higher Education (HIED)

M.S. in Counseling (CNSL)
Ed.S. in Education (CNED)
Ed.S. in Education (EDAD)
Ed.S. in Education (HIED)
Ed.D. in Education (EDAD)
Ed.D. in Education (HIED)
Ph.D. in Counselor Education (CNED)

Department of Electrical Engineering (ELEG)
M.S.E.E. in Electrical Engineering (ELEG)
M.S.E. in Engineering (ELEG)
M.S.Tc.E. in Telecommunications Engineering (TCEG)
Ph.D. in Engineering (ELEG)

College of Engineering
M.S.E. in Engineering (ENGR)
Ph.D. in Engineering (ENGR)
Certificate in Electronics Management (nondegree)

Department of English (ENGL)
M.A. in English (ENGL)
M.F.A. in Creative Writing (CRWR)
Ph.D. in English (ENGL)

Department of Entomology (ENTO)
M.S. in Entomology (ENTO)
Ph.D. in Entomology (ENTO)

Department of Finance
Ph.D. in Business Administration (FINN)

Department of Food Science (FDSC)
M.S. in Food Science (FDSC)
Ph.D. in Food Science (FDSC)

Department of Foreign Languages (FLAN)
M.A. in French (FREN)
M.A. in German (GERM)
M.A. in Spanish (SPAN)

Department of Geosciences (GEOS)
M.A. in Geography (GEOG)
M.S. in Geology (GEOL)

Department of Health Science, Kinesiology, Recreation, & Dance (HKRD)
M.A.T. in Physical Education (PHED)
M.Ed. in Physical Education (PHED)
M.Ed. in Recreation (RECR)
M.S. in Health Science (HLSC)
M.S. in Kinesiology (KINS)
Ed.D. in Education (RECR)
Ph.D. in Health Science (HLSC)
Ph.D. in Kinesiology (KINS)

Department of History (HIST)
M.A. in History (HIST)
Ph.D. in History (HIST)

Department of Horticulture (HORT)
M.S. in Horticulture (HORT)

School of Human Environmental Sciences (HESC)
M.S. in Human Environmental Sciences (HESC)

Department of Industrial Engineering (INEG)
M.S. in Operations Management (OMGT)
M.S.E in Engineering (INEG)
M.S.E. in Engineering (ORES)
M.S.I.E. in Industrial Engineering (INEG)
M.S.O.R. in Operations Research (ORES)
Ph.D. in Engineering (INEG)

Walter J. Lemke Department of Journalism (JOUR)
M.A. in Journalism (JOUR)

Department of Management (MGMT)
Ph.D. in Business Administration (BADM)

Department of Marketing & Transportation (MKTT)
M.T.L.M. in Transportation and Logistics Mngt (TLOG)
Ph.D. in Business Administration (BADM)

Department of Mathematical Sciences (MASC)
M.A. in Secondary Mathematics (SMTH)
M.S. in Mathematics (MATH)
M.S. in Statistics (STAT)
Ph.D. in Mathematics (MATH)

Department of Mechanical Engineering (MEEG)
M.S.M.E. in Mechanical Engineering (MEEG)
M.S.E. in Engineering (MEEG)
Ph.D. in Engineering (MEEG)

Department of Music (MUSC)
M.M. in Music (MUSC)

Department of Philosophy (PHIL)
M.A. in Philosophy (PHIL)
Ph.D. in Philosophy(PHIL)

Department of Physics (PHYS)
M.A. in Physics (PHYS)
M.S. in Applied Physics (APHY)
M.S. in Physics (PHYS)
Ph.D. in Physics (PHYS)

Department of Plant Pathology (PLPA)
M.S. in Plant Pathology (PLPA)

Department of Political Science (PLSC)
M.A. in Political Science (PLSC)
M.P.A. in Public Administration (PADM)
JD/M.P.A. dual degree

Department of Poultry Science (POSC)
M.S. in Poultry Science (POSC)
Ph.D. in Poultry Science (POSC)

Department of Psychology (PSYC)
M.A. in Psychology (PSYC)
Ph.D. in Psychology (PSYC)

Department of Rehabilitation Education & Research (RHAB)
M.S. in Communication Disorders (CDIS)
M.S. in Rehabilitation (RHAB)
Ph.D. in Rehabilitation (RHAB)

Dept of Sociology, Social Work, & Criminal Justice (SOCI)
M.A. in Sociology (SOCI)

Department of Vocational & Adult Education (VAED)
M.A.T. in Vocational Education (VOED)
M.Ed. in Adult Education (ADED)
M.Ed. in Vocational Education (VOED)
Ed.S. in Education (ADED)
Ed.S. in Education (VOED)
Ed.D. in Education (ADED)
Ed.D. in Education (VOED)

Interdisciplinary Degree Programs
M.S. in Cell & Molecular Biology (CEMB)
M.A. in Comparative Literature (CPLT)
M.S. in Microelectronics-Photonics (MEPH)
M.F.A. in Translation (TRAN)
Ph.D. in Comparative Literature (CPLT)
Ph.D. in Environmental Dynamics (ENDY)
Ph.D. in Plant Science (PTSC)
Ph.D. in Public Policy (PUBP)

The Graduate School: Objectives, Regulations, Degrees

OBJECTIVES

In addition to the advancement and dissemination of knowledge, the general objective of the Graduate School is to provide an opportunity for the development of the intellectual potential of individuals in an environment of freedom of expression and inquiry and to enhance the academic integrity of the institution.

ADMISSION

Anyone who wishes to earn graduate-level credit, whether as a degree-seeking student or as a non-degree student, must make formal application to, and be officially admitted by, the Graduate School.

The Graduate School offers two classifications of admission:

1. GRADUATE STANDING
   The Graduate School shall admit only those applicants to full GRADUATE standing whose enrollment the Graduate School considers will contribute positively to the quality of life and educational programs of the Graduate School. This enrollment will allow degree credit to be earned if the degree program also accepts the student.

2. NON-DEGREE STANDING
   The Graduate School shall admit those applicants to single semester NON-DEGREE standing whose enrollment will not lead to a degree.

Application. Applications for admission to the Graduate School must be accompanied by a $40.00 application fee ($50.00 for international applicants) which is not refundable and will not apply against the general registration fee if the applicant enrolls. The application form may be obtained from our web page at: http://www.uark.edu/depts/gradinfo or the application form may be obtained from and should be submitted directly to:

GRADUATE SCHOOL ADMISSIONS OFFICE
119 Ozark Hall
University of Arkansas
Fayetteville, AR 72701

Telephone: 501-575-4401

Transcripts. For applicants who desire full graduate standing: it is the responsibility of each applicant who desires full graduate standing to request EACH college or university which the student has previously attended to send directly to the Graduate School Office two official copies of the student's academic record including all courses, grades, and credits attempted and indication of degree(s) earned. *(Note: The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended.)* All transcripts become the property of the University of Arkansas Graduate School and will not be released to the applicant or to any other person, institution or agency. The University should receive all application materials, including all official transcripts, at least one month prior to the date of registration.

Previously Enrolled or Currently Enrolled at Fayetteville. For those previously enrolled or currently enrolled at the University of Arkansas, Fayetteville, the Graduate School obtains transcripts from the Registrar's Office. For a graduate of the University of Arkansas, Fayetteville (baccalaureate degree), the only transcripts required are those from the University of Arkansas, Fayetteville, and those from each institution attended *after* completing the University of Arkansas, Fayetteville, degree. Anyone who was previously enrolled, but who is not currently enrolled in the University of Arkansas Graduate School, is considered a "readmission" and is required only to submit an Application for Admission (no fee) and official transcripts from institutions attended after the University of Arkansas Graduate School enrollment. (See Admission Classification: Readmission.)

Admission is for a Specific Semester Only. Applicants who wish to change their date of entry after submitting an application must notify the Graduate School Admissions Office; applicants who have already been admitted should also notify the department in which they plan to major. Application materials for applicants who apply for admission, but who do not subsequently enroll, will be retained by the Graduate School Admissions Office for two calendar years from the date of the applicant's original proposed semester of entry. However, applicants must file a new Application for Admission (no fee) to notify the Graduate School of their request for reconsideration. Applicants who are admitted but do not enroll for two years or more after admission must submit an application for admission, application fee, and have two official copies of the student's academic record sent from each college or university attended and follow procedures for initial admission.

Admission to Graduate Standing. Official notice of the decision concerning admission will be sent from the Graduate School. *Admission will not be granted until all requirements are met, and graduate credit will not be granted retroactively except in unusual circumstances as approved by the Graduate Dean.* Further, admission to graduate standing does not automatically constitute admission to a specific program of study leading to a graduate degree. Therefore, in addition to satisfying the general requirements of the Graduate School, applicants must comply with the specific requirements and have the approval of the department in which they desire to pursue graduate study.

Adviser. At the time of admission to a degree program of the Graduate School, the student is assigned to a major adviser who acts as the adviser throughout the student's program of study. The appointment of the adviser is made in the student's major department and is determined primarily by the student's particular areas of interest in the field. More detailed information regarding the student's program of study can be secured from the appropriate department chairperson.

International and Resident Alien Applicants. International applicants and resident aliens must submit a minimum score of 550 on the paper-based or 213 on the computer-based Test of English as a Foreign Language (TOEFL) taken within the preceding two years, unless their native language is English, they have received a graduate degree from an accredited U.S. graduate school, or they have demonstrated an acceptable level of language proficiency as defined in the *Graduate School Handbook* located on the Graduate School website. Individual departments may have higher requirements and reference should be made to program descriptions. Resident aliens must submit a copy of their Resident Alien card with their application. International applicants must have all material submitted by May 1 for fall semester admission, by October 1 for the spring semester, and by March 1 for the summer session. International applicants must be acceptable to a program of study as a condition to being granted admission to the Graduate School and must meet the requirements for regular admission status unless holding a degree from the University of Arkansas.

International students and resident aliens whose native language is not English must demonstrate competency in spoken English by submitting a test score of at least 50 on the Test of Spoken English (TSE) in order to be eligible for a graduate assistantship, which requires direct contact with students in a teaching or tutorial role. This test cannot be waived.

The publication *International Student Information* is available from the International Admissions Office, 215 Silas H. Hunt Hall.

Classifications of Admission to Graduate Standing

Full Graduate Standing, Regular Admission. To be considered for full graduate standing, regular status, applicants must have earned a baccalaureate or a master's degree from the University of Arkansas, Fayetteville, or from a regionally accredited institution in the United States with requirements for the degrees substantially equivalent to those of this University, or from a foreign institution with similar requirements for the degrees. Admission to graduate standing *does not automatically* constitute acceptance to a program of study leading to a graduate degree. To pursue a graduate degree a person must also be accepted in a program of study by a department after gaining regular admission to graduate standing. *International applicants cannot be admitted to graduate standing unless they are also accepted by a department in a degree program AT THE SAME TIME.*

Persons who achieve regular admission but are not initially seeking a graduate degree (non-degree) and who *subsequently* decide to pursue a degree must *apply for and be accepted* in a degree program by the appropriate department and by the Graduate School. A student with regular graduate standing who has not been accepted in a program of study leading to a specific graduate degree may take no more than 12 semester hours of graduate-level courses that can be counted toward the requirements for a graduate degree. At the time of acceptance in a degree program, the chair of the appropriate department will recommend to the Graduate School which courses previously taken, if any, are to be accepted in the degree program.

Requirements for regular admission to graduate standing and acceptance in a program of study leading to a graduate degree are:

1. For regular admission to graduate standing:
   a. a grade-point average of 2.70 or better (A=4.00) on all course work taken prior to receipt of a baccalaureate degree from a regionally accredited institution of higher education or
   b. a grade-point average of 3.20 or better on the last 60 hours of course work taken prior to receipt of baccalaureate degree from a regionally accredited institution of higher education or
   c. a grade-point average between 2.50 and 2.69 on all course work taken prior to receipt of a baccalaureate degree from a regionally accredited institution of higher education and a satisfactory score on the Graduate Record Examinations general test, the Miller Analogies Test, or a similar test acceptable to the Graduate Dean, or
   d. conferral of a post-baccalaureate graduate degree (excluding professional degrees) from a regionally accredited institution.
2. For acceptance to a graduate degree program the requirements are:
   a. fulfillment of either 1.a or 1.b, and recommendation of the chair of the department offering instruction for the degree program; or
   b. fulfillment of 1.c, recommendation of the chair of the department offering instruction for the degree program and approval of the Graduate Dean, on the condition that the student makes a cumulative grade-point average of 2.85 or better on the first 12 hours of graduate-level course work in that degree program and meets any other conditions that may be specified by the faculty of the department.

Any other consideration for regular admission must be by individual petition to the Graduate Dean and, where pertinent, a recommendation from the appropriate departmental chair and will be considered on its own merits, case by case.

Single Semester, NON-DEGREE Standing. Applicants who desire NON-DEGREE standing must obtain from the Graduate School Admissions Office and sign a STATEMENT OF UNDERSTANDING. Students admitted to single semester NON-DEGREE standing must understand that any enrollment taken in this classification will not normally carry degree credit. Transcripts are not required for applicants seeking this single semester NON-DEGREE standing. For all other types of admission, please see the *Graduate School Handbook* located on the Graduate School web site.

Letter of Good Standing. A graduate student who is in good standing at another regionally accredited institution in the United States may be given admission (non-degree status) to the Graduate School for one semester upon submission of an Application for Admission and a letter of good standing from the Dean of the Graduate School at that institution. If at sometime in the future the student should wish to pursue a degree in the University of Arkansas Graduate School, it will be necessary to follow the normal procedures for admission and to have official transcripts sent from each institution previously attended. Graduate courses transferred and used for requirements for a degree at another university cannot be used for a graduate degree at this institution.

Readmission. *Readmission to the Graduate School is not automatic.* Students who have been enrolled in the Graduate School within the two preceding academic years but have not enrolled in the immediately preceding semester will be readmitted if:

1. The student has earned at least a 2.70 cumulative grade-point average on all (12 hours or more) graduate credits attempted during all previous enrollments;
2. A new Application for Admission form (no fee) is filed prior to the desired registration date (preferably, at least one month prior to that date);
3. The Graduate School has received two official transcripts of all course work attempted at other institutions subsequent to the previous enrollment in the University of Arkansas Graduate School;
4. The student's graduate status at the end of the previous enrollment was "regular."

Students who have been previously enrolled in Graduate School but who have not been enrolled within the preceding two years and who meet the above conditions may be granted further registration after completion of a readmission process. Students seeking readmission for the purpose of entering or resuming a graduate degree program must be accepted by the faculty of that program of

study. Such acceptance must state specifically what credit will be granted for the earlier work, any conditions which must be fulfilled to qualify this earlier work in the degree program, and an exact timetable for the completion of all degree requirements. When such recommendations exceed the normal time limits or other conditions established by the Graduate School, the approval of the Dean of the Graduate School will be required. Such recommendations must be submitted and approved prior to the granting of readmission.

Readmission to the Graduate School (including that of students who were conditionally admitted) under any other circumstances will be considered and decided on an individual basis. Students interested in obtaining such readmission should contact the Graduate School.

Students who were not enrolled in the Spring Semester, but who were enrolled for the Summer Session will have registration materials available for the Fall Semester should they wish to continue their registration.

Admission to Graduate Centers

In an attempt to fulfill the recognized need for graduate education for Arkansas residents who find it impossible or inconvenient to attend classes at Fayetteville, the University of Arkansas Graduate School offers selected graduate-level courses at graduate centers throughout the state.

All courses and instructors at these centers have been individually evaluated by the University of Arkansas Graduate Council and are subject to the same standards of quality that apply to graduate faculty and graduate programs at Fayetteville.

Similarly, those desiring to enroll in these courses must follow the same admission procedures and are subject to the same admission criteria as persons admitted at Fayetteville. There are no exceptions or deviations from these policies and procedures. Admission materials, including all official transcripts, should be received in the Graduate School at least one month prior to the requested semester of entry. (See Section on "Admission.")

For more comprehensive information regarding format of instruction, schedule of classes, enrollment and registration, fees, etc., contact: Director of Continuing Education, Number 2, University Center, Fayetteville, Arkansas 72701.

Those intending to enroll for classes at the Graduate Resident Center for Engineering (University of Arkansas at Little Rock, host campus) must submit application for admission to the Graduate School at least one month prior to initial registration through:

Graduate Resident Center for Engineering
3189 Bell Engineering Center
University of Arkansas
Fayetteville, AR 72701

Telephone: 1-800-423-1176 or
(501) 575-6015

To assure timely processing of the Application for Admission, a check or money order made to the University of Arkansas for the $40 application fee must accompany the application when submitted to the Graduate School.

Contact the above address for information pertaining to classes, enrollment, fees, etc.

GRADUATE CENTERS

The University of Arkansas offers graduate-level courses for residence credit at Graduate Centers located off the Fayetteville campus. There are two types of graduate centers currently in existence: Twelve-Hour Graduate Centers and Graduate Resident Centers. Graduate courses completed at Graduate Resident Centers may be used to satisfy course work requirements for any graduate degree but may not be used to satisfy residence requirements for doctoral degrees.

Any graduate credit couse offered by the University of Arkansas, Fayetteville, via distance education (regardless of class sites) will be counted as residence credit.

Twelve-Hour Graduate Centers. The University of Arkansas, Fayetteville, offers graduate courses at off-campus locations. At those locations, not defined as Graduate Resident Centers for specified degrees, a student may complete a maximum of twelve semester hours of courses for residence credit applicable to the master's degree requirements at the University of Arkansas.

To obtain graduate credit for courses offered at off-campus locations, the student must gain admission to the University of Arkansas, Fayetteville, Graduate School. If graduate credit so received is to be applied to a specific master's degree, the student must be accepted in a program of study leading to that degree. Graduate courses completed, but not applicable to the requirements for the master's degree the student is pursuing, will not be accepted as part of the 30-week residence required for that degree.

Graduate Resident Centers. The University of Arkansas offers graduate level courses for residence credit off the Fayetteville campus. All of the residence requirements for some graduate degrees may be completed off campus at Graduate Resident Centers. These centers are located at Camden, Fort Smith, Little Rock, Monticello, Pine Bluff, Russellville, and at military bases in Little Rock; Hurlburt, Florida; and Millington, Tennessee.

FORT SMITH GRADUATE RESIDENT CENTER

All course requirements for the Master of Business Administration degree and the Master of Education degrees in elementary education, secondary education, special education, and vocational education may be completed at the Graduate Resident Center in Fort Smith.

GRADUATE RESIDENT CENTER FOR ENGINEERING IN CENTRAL ARKANSAS

(University of Arkansas at Little Rock as host campus).

All requirements for the Master of Science in Engineering (M.S.E.) degree may be completed at the Graduate Resident Center for Engineering, University of Arkansas at Little Rock as host campus.

GRADUATE RESIDENT CENTERS AT MILITARY BASES AND THE CAMDEN AND RUSSELLVILLE GRADUATE RESIDENT CENTERS

The Master of Science degree (M.S.), with a major in operations management, is offered at Graduate Resident Centers established at the Naval Air Station in Millington, Tennessee; the Little Rock Air Force Base in Jacksonville; the Hurlburt Field Air Force Base in Florida; and in Camden and Russellville. For further information on this degree program and a description of courses offered, see page 108.

LITTLE ROCK GRADUATE RESIDENT CENTER

All of the course requirements for the Master of Science (M.S.) degree in rehabilitation may be completed at the Graduate Resident Center in Little Rock.

MID-SOUTH CENTER OF LEADERSHIP TRAINING

All course requirements for the Master of Science in human environmental sciences may be completed at the Mid-South Center of Leadership Training in Little Rock.

MISSISSIPPI COUNTY COMMUNITY COLLEGE

All course requirements for the Master of Education in adult education and the Master of Education in vocational education may be completed at the Graduate Resident Center at Mississippi County Community College.

NORTH ARKANSAS COLLEGE

All course requirements for the Master of Education in adult education and the Master of Education in vocational education may be completed at the North Arkansas College.

PHILLIPS COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS

All course requirements for the Master of Science in human environmental sciences, the Master of Arts in Teaching in childhood education, the Master of Education in adult education, and the Master of Education in vocational education may be completed at the Graduate Resident Center at the Phillips Community College of the University of Arkansas, Helena.

PINE BLUFF GRADUATE RESIDENT CENTER

All course requirements for the Master of Education degree may be completed at the Graduate Resident Center in Pine Bluff. In addition, all requirements for Educational Specialist degree with a specialization in adult education, educational administration, or vocational education may be completed at the Graduate Resident Center in Pine Bluff.

SOUTH ARKANSAS COMMUNITY COLLEGE

All course requirements for the Master of Education in adult education and the Master of Education in vocational education may be completed at the South Arkansas Community College.

UNIVERSITY OF ARKANSAS AT LITTLE ROCK

All course requirements for the Master of Science in human environmental sciences may be completed at the University of Arkansas at Little Rock.

UNIVERSITY OF ARKANSAS COMMUNITY COLLEGE AT BATESVILLE

All course requirements for the Master of Science in human environmental sciences may be completed at the Graduate Resident Center at the Phillips Community Center of the University of Arkansas.

UNIVERSITY OF ARKANSAS COMMUNITY COLLEGE AT HOPE

All course requirements for the Master of Science in human environmental sciences, the Master of Education in adult education, and the Master of Education in vocational education may be completed at the Graduate Resident Center at the University of Arkansas Community College at Hope.

UNIVERSITY OF ARKANSAS EXTENSION BUILDING

All course requirements for the Master of Science in human environmental sciences may be completed at the Graduate Resident Center at the University of Arkansas Extension Building in Little Rock.

REGISTRATION AND RELATED TOPICS

Students must register during one of the formal registration periods. Graduate students, new, returning, or currently enrolled, may register during the priority registration held each semester for the following semester. Students who have not already registered should register during the one-day registration session, which immediately precedes the beginning of classes each semester. There is a late registration period of five days at the beginning of fall and spring semesters and a one- or two-day late registration period at the beginning of summer sessions

Registration for Audit

When a student audits a course, that student must register for audit, pay the appropriate fees, and be admitted to class on a space-available basis. The instructor shall notify the student of the requirements for receiving the mark of "AU" for the course being audited. The instructor and the student's dean may drop a student from a course being audited if the student is not satisfying the requirements specified by the instructor. The student is to be notified if this action is taken. The only grade or mark that can be given is "AU." The Graduate School does not normally pay tuition for audited classes for students on assistantship.

Proper Address of Students

It is the responsibility of all students to maintain and correct their addresses with the University and to report any change of address promptly to the Office of the Registrar or to the Graduate School. Failure to do so may result in undelivered grades, registration notices, invoices, invitations, or other official correspondence and announcements.

Identification Cards

Identification cards are made by the Division of Student Services during each registration period and at scheduled times and places during the year. Consult the schedule of classes for the times and locations. The I.D. card can be used as a debit card for purchases at the Bookstore or the Servery.

Adding and Dropping Courses

A currently enrolled student who has registered during the advance registration period should make any necessary or desired schedule adjustments such as adding or dropping courses or changing course sections during the schedule-adjustment period scheduled for the same semester. Students may also add or drop courses during the first five class days of a semester, but a fee will be charged for changes of registration at this time.

A student may drop a course during the first 10 class days of the semester without having the withdrawal shown on the official academic record. After the first 10 class days, and before the drop deadline of the semester, a student may drop a course, but a mark of "W," indicating withdrawal, will be recorded. A student may not drop a course after the Friday of the eighth week of classes in a semester.

Drop-add deadlines for partial semester courses are published in the schedule of classes. Drop-add deadlines for summer sessions are published in the summer sessions' schedule of classes.

Withdrawal from Registration

Withdrawing from the University means withdrawing from all classes that have not been completed up to that time. A student who leaves the University voluntarily before the end of the semester or summer term must file and have accepted by his or her academic dean and the Registrar a Petition for Withdrawal from Registration. Withdrawal must occur prior to the last class day of a semester. Students who do not withdraw officially from a class that they fail to complete will receive an "F" in that class.

Attendance

Students are expected to be diligent in the pursuit of their studies and in their class attendance. Students have the responsibility of making arrangements satisfactory to the instructor regarding all absences. Such arrangements should be made prior to the absence if possible. Policies of making up work missed as a result of absence are at the discretion of the instructor, and students should inform themselves at the beginning of each semester concerning the policies of their instructors.

Full-Time Status

Enrollment in 9 semester hours (not including audited courses) is considered full-time for graduate students not on assistantship. For graduate assistants or students with Research Fellowships on 50% appointment or more, 6 semester hours (not including audited courses) of enrollment is considered full-time in the fall and spring semesters. For full-time enrollment in the summer, consult the Graduate School Handbook, available on the Graduate School website, http://www.uark.edu/depts/gradinfo.

GRADES AND MARKS

Final grades for courses are "A," "B," "C," "D," and "F." (No credit is earned for courses in which a grade of "F" is recorded.)

A final grade of "F" shall be assigned to a student who is failing on the basis of work completed but who has not completed all requirements. The instructor may change an

"F" so assigned to a passing grade if warranted by satisfactory completion of all requirements.

A mark of "I" may be assigned to a student who has not completed all course requirements, if the work completed is of passing quality. An "I" so assigned may be changed to a grade provided all course requirements have been completed within 12 weeks from the beginning of the next semester of the student's enrollment after receiving the "I." If the instructor does not report a grade within the 12-week period, the "I" shall be changed to an "F." When the mark of "I" is changed to a final grade, this shall become the grade for the semester in which the course was originally taken.

A mark of "AU" (Audit) is given to a student who officially registers in a course for audit purposes (see Registration for Audit).

A mark of "CR" (credit) is given for a course in which the University allows credit toward a degree, but for which no grade points are earned. The mark "CR" is not normally awarded for graduate-level courses but may be granted for independent academic activities. With departmental (or program area) approval and in special circumstances, up to a maximum of six semester hours of "CR" may be accepted toward the requirements for a graduate degree.

A mixing of course letter grades and the mark "CR" is permitted only in graduate-level courses in which instruction is of an independent nature.

A mark of "R" (Registered) indicates that the student registered for master's thesis or doctoral dissertation. The mark "R" gives neither credit nor grade points toward a graduate degree.

A mark of "S" (Satisfactory) is assigned in courses such as special problems and research when a final grade is inappropriate. The mark "S" is not assigned to courses or work for which credit is given (and thus no grade points are earned for such work). If credit is awarded upon the completion of such work, a grade or mark may be assigned at that time and, if a grade is assigned, grade points will be earned.

A mark of "W" (Withdrawal) will be given for courses from which students withdraw after the first 10 class days of the semester and before the drop deadline of the semester.

For numerical evaluation of grades, "A" is assigned 4 points for each semester hour of that grade; "B," 3 points; "C," 2 points; "D," 1 point; and "F," 0 points.

ACADEMIC DISMISSAL

Students may be dropped from further study in the Graduate School if at any time their performance is considered unsatisfactory as determined by either the program faculty or the Dean of the Graduate School. Academic dishonesty and failure to maintain a specified cumulative grade-point average are considered to be unsatisfactory performance.

If a graduate student has less than a 2.85 cumulative grade-point average on 12 or more semester hours of graded course work taken in residence for graduate credit, the student will be placed on academic probation. The student will subsequently be dismissed from the Graduate School if the cumulative GPA is not raised to 2.85 or above on the next nine hours of graded graduate course work. Using its own written procedures, the graduate faculty of an academic degree program may recommend that the student be readmitted to the Graduate School. Dismissed students with non-degree status may petition for readmission to the Graduate School by submitting a written appeal to the Dean of the Graduate School. The graduate faculty of any degree program may establish and state in writing requirements for continuation in that program.

Academic dishonesty involves acts that may subvert or compromise the integrity of the educational process at the University of Arkansas. Included is an act by which a student gains or attempts to gain an academic advantage for himself or herself or another by misrepresenting his or her or another's work or by interfering with the completion, submission, or evaluation of work. These include, but are not limited to, accomplishing or attempting any of the following acts:

1. Altering of grades or official records.
2. Using any materials that are not authorized by the instructor for use during an examination.
3. Copying from another student's paper during an examination.
4. Collaborating during an examination with any other person by giving or receiving information without specific permission of the instructor.
5. Stealing, buying, or otherwise obtaining information about an unadministered examination.
6. Collaborating on laboratory work, take-home examinations, homework, or other assigned work when instructed to work independently.
7. Substituting for another person or permitting any other person to substitute for oneself to take an examination.
8. Submitting as one's own any theme, report, term paper, essay, computer program, other written work, speech, painting, drawing, sculpture, or other art work prepared totally or in part by another.
9. Submitting work without specific permission of the instructor that has been previously offered for credit in another course.
10. Plagiarizing, that is, the offering as one's own work the words, ideas, or arguments of another person without appropriate attribution by quotation, reference, or footnote. Plagiarism occurs both when the words of another are reproduced without acknowledgement or when the ideas or arguments of another are paraphrased in such a way as to lead the reader to believe that they originated with the writer. It is the responsibility of all University students to understand the methods of proper attribution and to apply those principles in all materials submitted.
11. Sabotaging of another student's work.
12. Falsifying or committing forgery on any University form or document.
13. Submitting altered or falsified data as experimental data from laboratory projects, survey research, or other field research.
14. Committing any willful act of dishonesty that interferes with the operation of the academic process.
15. Facilitating or aiding in any act of academic dishonesty.

Term Paper Assistance

The use of the services of term paper assistance companies is a violation of university policies on academic integrity. Student submission of such research or term papers to meet requirements of any class or degree program is expressly prohibited and constitutes academic dishonesty. Any violation of this prohibition will automatically result in both punitive action by the instructor (e.g., the award of a grade of "F" for the course) and a referral of each violation to the All-University Judiciary Committee for its consideration.

ADMINISTRATIVE REQUIREMENT FOR GRADUATION

Application for graduation must be completed in the Graduate Dean's office, filed with the Registrar and fees paid for the semester in which degree requirements will be completed and graduation effected. If a student fails to complete the degree, the student must then renew the application and pay a renewal fee.

DEGREES OFFERED

The faculty of the Graduate School, under the authorization of the Board of Trustees, grants the degrees listed below. The graduate faculty, as represented by the Dean of the Graduate School and through the Graduate Council, has primary responsibility for the development, operating policies, administration, and quality of these programs. Operating through the Graduate Dean, the faculty

appoints committees that directly supervise the student's program of study and committees that monitor research activities and approve theses and dissertations.

Doctor of Philosophy
Doctor of Education
Educational Specialist
Master of Accountancy
Master of Arts
Master of Arts in Teaching
Master of Business Administration
Master of Education
Master of Fine Arts
Master of Information Systems
Master of Music
Master of Public Administration
Master of Science
Master of Science in Biological and Agricultural Engineering
Master of Science in Chemical Engineering
Master of Science in Civil Engineering
Master of Science in Computer Engineering
Master of Science in Electrical Engineering
Master of Science in Engineering
Master of Science in Environmental Engineering
Master of Science in Industrial Engineering
Master of Science in Mechanical Engineering
Master of Science in Operations Research
Master of Science in Transportation Engineering
Master of Transportation and Logistics Management

MASTER'S DEGREES

The degree of Master of Arts (M.A.) is conferred for graduate work of which the major portion has been done in the liberal arts.

The degree of Master of Science (M.S.) is conferred for graduate work of which the major portion has been done in agriculture, engineering, kinesiology, health science, counseling, rehabilitation, human environmental sciences, biological and physical sciences, statistics, and communication disorders.

The degree of Master of Accountancy (M.Acc.) is conferred upon a student who completes an approved program of graduate studies in accounting.

The degree of Master of Arts in Teaching (M.A.T.) is conferred upon a student who majors in agricultural education, childhood education, physical education, secondary education, special education or vocational education.

The degree of Master of Business Administration (M.B.A.) is conferred upon a student whose major work is in the field of business.

The degree of Master of Education (M.Ed.) is conferred upon a student who majors in the field of education.

The degree of Master of Information Systems (M.I.S.) is conferred upon a student who completes an approved program in computer information systems and quantitative analysis.

The degree of Master of Music (M.M.) is conferred upon a student who completes an approved program of graduate studies in music.

The Master of Public Administration (M.P.A.) is conferred upon a student who completes an approved program of graduate studies in the field of public administration.

The degree of Master of Fine Arts (M.F.A.) in art, creative writing, drama, or translation is conferred upon a student who completes an approved two-year program of graduate studies in these areas.

The degree of Master of Transportation and Logistics Management (M.T.L.M.) is conferred upon a student who completes an approved program of graduate studies in this area.

MASTER OF ARTS, MASTER OF SCIENCE

General minimum requirements of the Graduate School for the degrees of Master of Arts, Master of Science, including the several engineering degrees, follow. (Note: For degree requirements in the Master of Arts in Economics, see the Graduate School of Business.)

1) 24 semester hours and a thesis, or 30 semester hours without a thesis. (The thesis may be a departmental requirement or may be required by the major adviser.)
2) A comprehensive examination.
3) A cumulative grade average of 2.85. (Individual departments may have higher grade standards.)
4) A minimum residence of 24 weeks. (See Residence Requirements.)

Departments may require higher grade standards and other requirements.

Program of Study

At the time of admission to the Graduate School and acceptance in a program of study leading to a graduate degree, the student is assigned to a major adviser who becomes the adviser throughout the program of study and chair of the student's graduate advisory committee. The choice of a major adviser is largely determined by the student's choice of a major subject.

The program of study may consist of courses chosen from one department or it may include such cognate courses from other departments as may in individual instances seem to offer greatest immediate and permanent values. As a general principle, two-thirds of the courses come from the degree program in which the student is seeking a graduate degree.

A student who writes a master's thesis must register for a minimum of six semester hours of master's thesis. No more than six semester hours of master's thesis enrollment may be given credit in the degree program.

Students wishing to take 3000-level undergraduate courses for graduate credit should consult the Graduate School Handbook available on the Graduate School web site at http://www.uark.edu/depts/gradinfo. Undergraduate courses numbered below 3000 will not be allowed to carry graduate credit.

Under ordinary circumstances graduate registration is limited to 18 hours for any one semester including undergraduate courses and courses audited.

All requirements for a master's degree must be satisfied within six consecutive calendar years.

Admission to Candidacy

To be admitted to candidacy for a degree, students must have been unconditionally admitted to graduate standing, and must have been approved by the major adviser and the Dean of the Graduate School for their particular degree program. The minimum prerequisite is 12 semester hours of graduate credit over and above any entrance deficiencies or conditions.

Transfer of Credit

The University of Arkansas will permit a student to transfer six hours of graduate credit from an accredited graduate school in the United States, provided that the grades are "B" or better and the subjects are acceptable to the department concerned, as a part of the master's program. (The transfer of graduate credit from institutions outside the United States is not permitted.) This does not, however, reduce the minimum requirement of 24 weeks of residence for the master's degree as set by state law. Students contemplating transfer of credit should consult with the Graduate School Office in advance.

Residence Requirements

The candidate must be in residence a minimum of 24 weeks. A total of 12 weeks of residence may be accredited from University of Arkansas off-campus graduate courses (restriction does not apply to graduate degree programs offered through the Graduate Residence Centers, see page 19) or for work done in off-campus classes held in Fayetteville. Acceptance of transferred credit does not reduce the minimum residence requirement of 24 weeks.

Thesis

The title of the thesis must be recommended by the thesis director and the thesis committee and be approved by the Dean of the Graduate School at least three months before the date of the comprehensive examination. The thesis must be submitted for approval to the thesis committee consisting of a minimum of three faculty members who have been approved by the Dean of the Graduate School. This committee must receive the thesis at least three weeks prior to the comprehensive examination which is to be completed at least one week before the degree is to be conferred.

Upon acceptance of the thesis by the thesis committee and at least one week before graduation, two typewritten copies of the unbound thesis in prescribed form must be delivered to the Graduate Dean for approval before it is deposited in the Mullins Library. All copies of the thesis must include original signatures of the student's thesis committee of record as approved and filed in the Graduate Dean's Office. Signatures of persons other than those of the official thesis director and members of the thesis committee are unacceptable.

Comprehensive Examination

In addition to completing other requirements, the candidate for a master's degree must take a comprehensive examination, which may be oral and/or written as recommended by the major department.

Grade-Point Average

In order to receive a master's degree, a candidate must present a minimum cumulative grade-point average of 2.85 on all graduate courses required for the degree. Failing to earn such an average on the minimum number of hours, the student is permitted to present up to six additional hours of graduate credit in order to accumulate a grade-point average of 2.85. In the computation of grade point, all courses pursued at this institution for graduate credit that are part of the degree program (including any repeated courses) and the thesis (if offered) shall be considered. Students who repeat a course in an endeavor to raise their grade must count the repetition toward the maximum of six additional hours. Individual departments may have higher grade standards.

MASTER OF ACCOUNTANCY

See the Graduate School of Business, page 32

MASTER OF ARTS IN TEACHING

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree offered in consecutive summer, fall and spring semesters with initial enrollment in the summer semester. The M.A.T. degree is the initial certification program for students at the University of Arkansas and has seven areas of emphasis: agricultural education, childhood education, middle level education, physical education, secondary education, special education, and vocational education. Students are selected up to the maximum number designated for each cohort area of emphasis. Admission requirements for the M.A.T. degree for initial certification are: completion of an appropriate undergraduate degree program; a cumulative grade point average of 2.7 in all previous courses; admission to the Graduate School; admission to Teacher Education program; completion of the pre-education core with a minimum of a "C" grade in all courses; completion of all prerequisite courses in the teaching field; and payment of an internship fee.

The M.A.T. degree requires the completion of 10 to 12 hours of core courses to be selected from the following: CIED 5012, Measurement/Research/Statistical Concepts for Teachers; CIED 5022, Classroom Management Concepts for Teachers; CIED 5032, Curriculum Design Concepts for Teachers; CIED 5042, Reading and Writing Across the Curriculum; CIED 5052, Seminar: Multicultural Issues; and ETEC 5062, Teaching and Learning with Computer-Based Technologies. In addition, students must complete coursework in their areas of emphasis, and a six hour internship is required. All M.A.T. students must participate in a comprehensive examination and one of the following: project, internship, directed research, and/or student portfolio. In order to receive the degree, a candidate must present minimum cumulative grade-point average of 3.0 on all graduate courses required for the degree.

For information on the areas of specialization, refer to the sections of this catalog on agricultural education, childhood education, middle level education, physical education, secondary education, special education, and vocational education.

Admission to candidacy, residence requirements, and other requirements are the same as for the Master of Education degree. All requirements for the M.A.T. must be completed within six consecutive calendar years.

MASTER OF BUSINESS ADMINISTRATION

See the Graduate School of Business, page 33

MASTER OF EDUCATION

The degree of Master of Education (M.Ed.) is offered with areas of concentration in adult education, education, educational administration, educational technology, elementary education, higher education, physical education, recreation, secondary education, special education, and vocational education. The degree of Master of Science (M.S.) is offered in communication disorders, counseling, health science, kinesiology, and rehabilitation.

General minimum requirements for the degree of Master of Education (M.Ed.) follow:

1) 27 semester hours and a thesis or 33 semester hours without a thesis.
2) A written comprehensive examination.
3) A cumulative grade-point average of 3.00.
4) A minimum residence of 24 weeks.

After a student has been admitted to the Graduate School, the student may seek acceptance into one of the several program areas of concentration offered in the Master of Education program. Procedures and forms facilitating this process may be obtained from the Office for Research, Graduate Studies and Faculty Development, (GE 306), College of Education and Health Professions. Upon acceptance to a program area, the student is assigned an adviser. Acceptance in a program area should be accomplished before the completion of the first graduate course. Some programs require students admitted to the master's degree program to take the Graduate Record Examinations, the Miller Analogies Test, or the National Teachers Examination. This should be accomplished prior to completion of 15 hours of graduate credit.

All Master of Education degree programs include a minimum of 33 semester hours. Nine semester hours of basic core courses are required for all M.Ed. students in three areas: Research Tools, Learning/Development Domain, and History/Philosophy Domain as follows:

1) Research Tools (students must select one course from this category), EDFD 5013 Research Methods in Education, HKRD 5353 Research in HKRD, and EDFD 5393 Applied Educational Statistics;
2) Learning/Development Domain (students must select one course from this category)[3], EDFD 5373 Psychological Foundations of Teaching and Learning, EDFD 5473 Adolescent Psychology in

[3] M.Ed. students in higher education may substitute HIED 5043, The Student in Higher Education.

Education, and EDFD 5573 Life-Span Human Development;

3) History/Philosophy Domain (students must select one course from this category)[4], EDFD 5303 Historical Foundations of Modern Education, EDFD 5353 Philosophy of Education, and EDFD 5323 Global Education. Students who are not eligible for a standard teaching certificate will be expected to complete additional work to fulfill this requirement in addition to the 33-hour graduate program. An exception to this policy is made for students who declare they are not preparing for a school position and will not seek a certificate required of professional employees in public schools.

Admission to Candidacy

Admission to candidacy will be met when the following have been completed:

1) unconditionally admitted to graduate standing.
2) accepted to a program area and assigned an adviser.
3) completion of 12 semester hours of graduate credit over and above any entrance deficiencies or conditions.

Transfer of Credit

Transfer of credit regulations established by the Graduate School for the Master of Arts and Master of Science degree apply to the Master of Education degree. (See page 22.)

The University of Arkansas also offers graduate-level courses for residence credit off the Fayetteville campus. See Graduate Resident Centers on page 19

Residence Requirements

The candidate must be in residence a minimum of 24 weeks. A total of 12 weeks of residence or 12 semester hours of approved study may be accepted for residence credit from the University of Arkansas off-campus graduate courses. Acceptance of transferred credit does not reduce the minimum residence requirement of 24 weeks.

Graduate courses completed, but not applicable to the requirements for the master's degree the student is pursuing, will not be accepted as part of the 24-week residence required for that degree.

All requirements for a master's degree must be satisfied within six consecutive calendar years.

Other Requirements

Students who do not have a grade-point average of 3.00 upon completion of Master of Education program requirements may be allowed to submit up to six additional hours of graduate credit in residence on the Fayetteville campus or at approved Graduate Resident Centers in order to accumulate a 3.00 average.

The policies and procedures approved for the Master of Arts and Master of Science degrees also apply to the Master of Education degree. In addition to completing other requirements, the candidate must pass a comprehensive examination administered by the respective program area.

MASTER OF FINE ARTS DEGREE (IN ART)

The objective of the program of study leading to the degree of Master of Fine Arts in art shall be professional achievement of high order, a knowledge of art history and criticism, the development of a fundamental grasp and understanding of the professional field of art and its relationship to supporting fields of knowledge, as well as the satisfactory completion of course work and other degree requirements. The program of study will vary depending upon the art medium areas selected for the creative work and the goals of the individual graduate student. The Master of Fine Arts degree in art is considered to be the terminal degree in studio art and is awarded in recognition of professional development in the visual arts as evidenced by a period of successful post-bachelor's degree study. The M.F.A. degree is recognized as preparatory to studio art teaching positions at institutions of higher education.

Application for Admission

In addition to the application for admission to Graduate School, the applicant must also submit to the Department of Art all transcripts of college work, letters of reference, a portfolio of creative works, and an application form obtained from the department.

The applicant for the Master of Fine Arts degree in art is expected to have earned the Bachelor of Arts or Bachelor of Fine Arts degree or its equivalent, with a major concentration in visual art. Applicants who do not have an art major may present evidence of proficiency in creative work in the visual arts.

After admission to the Graduate School and acceptance by the Department of Art, the graduate student will be appointed an adviser by the department chairperson to work with the student in planning a suitable program of advanced study. The art faculty will review the student's work and progress in the program at least twice each year.

Residence Requirements

To meet the residency requirements the student is required to complete a minimum of 60 semester hours of graduate credit and study in residence for a minimum of four regular semesters (not to include summer terms) on the Fayetteville campus. All degree requirements must be completed within six consecutive calendar years from the date of first enrollment. With approval of the department chairperson and the Graduate School, up to six credit hours of graduate level work in studio art or art history may be transferred from another recognized graduate school and applied to degree requirements.

Candidacy Application and Review

After completion of at least two semesters in the M.F.A. degree program, the student may make application to be a candidate for completion of the M.F.A. degree. The art faculty will conduct a formal review of the applicant's work and progress in the program. At least two regular semesters of residence must be completed after acceptance as a degree candidate.

Graduate Committee and Major Adviser

When the student has been accepted as a degree candidate, the student will select a major adviser from the graduate art faculty. The major adviser will serve as adviser to the student in planning the completion of the program of study. At least one semester before graduation, a four- or five-member committee of graduate art faculty will be selected. The student's major adviser will be chairperson of this committee and one member of the graduate committee will represent the art history or criticism area. The degree candidate may select one additional committee member from a discipline outside the Department of Art.

Final Examination

Final approval for the completion of the M.F.A. degree will be the responsibility of the candidate's graduate committee, and will require an oral examination over the candidate's exhibition of creative works and related aspects of the student's program of study.

MASTER OF FINE ARTS (IN CREATIVE WRITING)

See Creative Writing, page 65.

MASTER OF FINE ARTS (IN DRAMA)

See Drama, page 70.

MASTER OF FINE ARTS (IN TRANSLATION)

See Translation, page 127.

[4] M.Ed. students in higher education and adult education may substitute HIED 5083, History and Philosophy of

Other Requirements for MFA Degrees

The policies and procedures approved for the Master of Arts and the Master of Science degrees also apply to the Master of Fine Arts degrees. In addition to completing other requirements, the candidate must pass a comprehensive examination administered by the respective program area.

MASTER OF INFORMATION SYSTEMS

See the Graduate School of Business, page 37.

MASTER OF TRANSPORTATION AND LOGISTICS MANAGEMENT

See the Graduate School of Business, page 40.

EDUCATIONAL SPECIALIST DEGREE

The Educational Specialist degree (Ed.S.) is undifferentiated but with seven areas of specialization - adult education, counselor education, educational administration, elementary education, higher education, secondary education, and vocational education - and may be issued by the Graduate School to those students whose major objective is to develop educational competency in one of these specialized areas. All graduate courses applicable to this degree must be taken on the Fayetteville campus unless otherwise specified.

All requirements for the Educational Specialist degree with specialization in adult education, educational administration, or vocational education may also be completed at Graduate Resident Center in Pine Bluff.

Admission to the Program

Admission to the Educational Specialist degree program is based on the total profile of applicants' educational background and their career objectives. After students have been admitted to the Graduate School, they may seek acceptance in one of the program areas of specialization. All students seeking admission must meet the following admission criteria:

1) Completed a master's degree or its equivalent in a related field.
2) Presented a Graduate Record Examinations general score on three parts (verbal, quantitative, and analytical) or a Miller Analogies Test score. These scores are considered as part of the applicant's profile. Required scores may vary within given programs.
3) Attained a cumulative grade-point average of at least 3.25 on all graduate course work before being admitted into the Specialist program.
4) Students with a 3.00 to 3.25 cumulative grade-point average in all graduate courses must present a combined minimum Graduate Record Examinations general score of 1300 on three parts (verbal, quantitative, and analytical) or 55 on the Miller Analogies Test.
5) Two years of successful professional experience, or equivalent, in an area related to the student's academic goals prior to the completion of the degree.
6) A minimum of three letters of recommendation (form ORGS-33) from individuals capable of commenting on qualification for graduate study.
7) A personal interview with the program area graduate faculty. This evaluative process will subjectively measure such factors as poise, professional objectives, professional commitment, and ability to discuss professional problems.

General Requirements

All Ed.S. programs contain a minimum of 30 semester hours of graduate work beyond the master's degree in a planned program. The program for each student must include the requirements specified in the particular program to which the student has been accepted; assessed deficiencies in the area of specialization; assessed courses to meet current professional requirements of the Master of Education degree; a minimum of nine semester hours of graduate work in a related field(s) other than the area of specialization; a graduate course in research, statistics, or data processing applicable for educational specialists; and an original project, research paper, or report for which variable credit up to six semester hours is required. A grade-point average of 3.25 is required for the Ed.S. degree program on all work presented as part of the Ed.S. degree program.

After a student is accepted into an Ed.S. program, a committee with a minimum of three members will be appointed and a program of study will be established outlining the minimum requirements. Only the adviser and one other member of the student's committee may be from the program area sponsoring the program. The committee's responsibilities include the determination of deficiencies, the acceptability of previous graduate work, the approval of the candidate's program of study, the approval of the original project or research paper, and the conduct of a final examination. This examination will be a comprehensive oral evaluation scheduled near the end of the candidate's program and will include one or both of the following: (1) evaluation of the original project, research paper, or report, and (2) evaluation covering material related to the background and professional preparation of the candidate. A written examination may not be taken to substitute for the oral examination. A written account of the original project, research paper, or report will be filed with the program area sponsoring the candidate's program of study.

A declaration of intent to pursue the Ed.S. program must be filed with the Dean of the Graduate School by the student immediately following the approval of the program of study. The last 30 hours of the program must be completed within a period of six years from the date of declaration. A minimum of 30 weeks of resident study at the University of Arkansas, Fayetteville, in an approved program is required. Credit earned in any University of Arkansas center, off-campus workshop or special course will not count as residence study in the Ed.S. program. The only exception is course work completed at the Pine Bluff Graduate Resident Center by students pursuing the Ed.S. degree in education with a specialization in adult education, educational administration, or vocational education.

Upon completion of all requirements, candidates are issued an Educational Specialist degree. Their names appear on the commencement program, but there is no distinctive academic regalia in connection with the Educational Specialist degree.

DOCTOR OF EDUCATION

The Doctor of Education (Ed.D.) degree is designed to prepare the interested student for advanced professional proficiency in a selected field of education and, in addition, to develop the ability for scholarly study of professional problems. The degree is awarded to those persons who, through their planned program, show professional growth and competence.

The Doctor of Education degree (Ed.D.) is undifferentiated but has five areas of specialization-adult education, educational administration, higher education, recreation, and vocational education.

Admission to the Program

Admission to the Doctor of Education program is based on the total profile of the applicants' educational attributes. In evaluating an application for doctoral study leading to the Ed.D. degree, particular attention is given (1) to the apparent congruence between the stated career objective and the proposed field of specialized study, and (2) to the estimated prospects of the success of the applicant both in completing the degree requirements and in fulfilling the professional expectations of the education position to which the applicant aspires if a doctoral degree is earned. Applicants must meet the following admission profile requirements for the Ed.D.:

1) All students seeking admission must have completed a master's degree or its equivalent in a related field.
2) All students must present a Graduate

Record Examinations general score on three parts (verbal, quantitative and analytical) or a Miller Analogies Test score. These scores are considered part of the applicant's profile. Required scores may vary within given programs.

3) Students must have attained a 3.50 cumulative grade-point average on all graduate courses previous to being admitted into the Ed.D. program.
4) Students with a 3.00 to 3.50 cumulative grade-point average in all graduate courses must present a combined minimum Graduate Record Examinations general score of 1500 on three parts (verbal, quantitative and analytical) or 55 on the Miller Analogies Test.
5) All students must have three years of successful professional experience, or equivalent, in an area related to the degree program prior to the completion of the degree.
6) All students must have a minimum of three letters of recommendation (form ORGS-33) from individuals capable of commenting on qualification for graduate study.

Interested applicants must first gain admission to the Graduate School, then be accepted by a program area in education by gaining approval of a majority of the graduate faculty teaching regularly in that program area. This decision is made after the applicant has been interviewed by the program faculty.

Declaration of Intent

Immediately after formal acceptance into the Ed.D. program, students must file with the Dean of the Graduate School a statement of their intention to become a candidate for the degree of Doctor of Education. Courses taken prior to filing the Declaration of Intent cannot be used to satisfy the residence requirement for the Ed.D. degree.

The appointment and responsibility of the Doctoral Advisory Committee for the Doctor of Education degree is the same as that for the Doctor of Philosophy degree (see below).

The degree must be completed within seven consecutive calendar years from the date of the Declaration of Intent.

Residence Requirement

The residence requirement for the Doctor of Education degree may be fulfilled by selecting any one of four plans. This selection must be made in consultation with the adviser, soon after the Declaration of Intent is filed. The plan will specify a number of hours of enrollment and a number of consecutive semesters or terms in which the enrollment must be completed.

Students who also hold University appointments, other than those of Graduate Assistant, for half time or more, should see the residence requirement under the Doctor of Philosophy.

In meeting the doctoral residence requirement, candidates who hold a master's degree from the University of Arkansas must earn a minimum of 30 semester hours on the Fayetteville campus; candidates who hold a master's degree from another institution must earn a minimum of 36 semester hours on this campus. Three hours of Doctoral Dissertation may be applied toward this requirement. Doctoral students with regular outside employment responsibilities may not enroll for more than nine semester hours in each semester. Graduate work in an off-campus location, beyond that allowed on the master's degree and the Educational Specialist degree, will not count toward the minimum of 96 graduate hours required of all Ed.D. candidates.

Program of Study

A minimum of 96 semester hours of graduate study is required for the Ed.D. degree. The program of study shall consist of the major field in education and one or two additional fields of study. The dissertation and program emphasis may be in one of the following areas: adult education, educational administration, recreation, higher education, or vocational education. The nature of the program of study will vary, depending upon the field selected and the candidate's objective. Candidates for the Ed.D. degree will be required to complete: EDFD 6403, Educational Statistics and Data Processing; EDFD 6623, Techniques of Research in Education, and at least one of the following advanced statistics courses: EDFD 6413, Experimental Design in Education; EDFD 6423, Multiple Regression Techniques for Education; EDFD 6533, Qualitative Research; EDFD 699V(3), Seminar (Survey Research Methods). Each student is required to elect nine hours of work in a field(s) other than the area of specialization. A grade-point average of 3.25 is required on all work presented as part of the Ed.D. degree program and Ph.D. programs in Education fields.

Other Requirements

The examination for candidacy, dissertation, and final examination requirements for the Doctor of Education degree are the same as those for the Doctor of Philosophy degree.

DOCTOR OF PHILOSOPHY

Programs of advanced study leading to the degree of Doctor of Philosophy (Ph.D.) are offered in the following fields: agronomy, animal science, biology, business administration, chemistry, comparative literature, computer science, counselor education, curriculum & instruction, economics, engineering, English, entomology, environmental dynamics, food science, health sciences, history, kinesiology, mathematics, philosophy, physics, plant science, poultry science, psychology, public policy, and rehabilitation. (Note: For the Ph.D. in Business Administration and Economics, see the Graduate School of Business.)

The degree of Doctor of Philosophy is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of certain prescribed examinations, and the development of a dissertation covering some significant aspect of a major field of learning.

Declaration of Intent

Students who wish to become candidates for the degree of Doctor of Philosophy are expected to complete work equivalent to the requirements for the master's degree as determined by program faculty, and must file a statement of their intention to become doctoral candidates with the Dean of the Graduate School upon registration for their first semester of graduate work beyond the master's degree or its equivalent. A student cannot satisfy any part of the residence requirement for the doctoral degree until after a Declaration of Intent has been filed with the Dean of the Graduate School.

Immediately after the student has filed a Declaration of Intent and indicated the major field of study, a Doctoral Program Advisory Committee will be appointed, with the approval of the Dean of the Graduate School, from the graduate faculty to evaluate the student's preparation and fitness for further graduate work. If the student is allowed to continue as a prospective candidate for the doctoral degree, this committee will serve in an advisory capacity in working out and directing a suitable program of advanced study and investigation. The student's major adviser shall serve as chair of the committee. Appointment of this committee does not constitute admission to candidacy for the degree of Doctor of Philosophy, a very important and significant step in the student's graduate career which must be taken after the student has completed approximately two years of graduate work beyond the baccalaureate degree.

The degree must be completed within seven consecutive calendar years from the date of the Declaration of Intent.

Purpose of the Residence Requirement

Residence requirements are intended to insure that every doctoral student has ample opportunity for the major intellectual development, which can result from a sustained period of intensive study and close association with other scholars in the intellectual

environment of the University. The requirement recognizes that growth as an independent scholar is not merely a matter of class attendance, but rather involves a broader development of the intellect which comes about through intensive study, independent research, sustained association with faculty members and other colleagues who share common scholarly and professional interests, attendance at seminars and colloquia, intensive reading and familiarization with library resources, consultation with specialists in other disciplines and resource centers, and the opportunity for broadened exposure to current intellectual issues as they are revealed in various campus offerings.

Residence Requirement

After filing a Declaration of Intent to pursue the doctoral degree, a student must fulfill a residence requirement by completing a minimum of two consecutive semesters of full-time graduate study (nine hours or more per semester), either fall-spring, spring-fall, spring and a complete 12-week summer session, or a complete 12-week summer session and fall. This period of residence is independent of and in addition to that required for any other graduate degree. During this period of residence, the student must be continually involved on a full-time basis with the on-site academic, scholarly, and research activities of the academic department (or corresponding academic unit) in which the degree program is administered.

A student who does not concurrently hold appointment as a Graduate Assistant must satisfactorily complete a minimum of nine semester hours, including dissertation credits but exclusive of courses offered through the Division of Continuing Education, during each semester or summer counted in the residence period. For degree purposes, any graduate credit couse offered by the University of Arkansas, Fayetteville, via distance education (regardless of class sites) will be counted as residence credit. For students who hold appointments as Graduate Assistants this requirement is six semester hours per semester if the appointment is for 50 percent time and nine semester hours per semester if the appointment is for 25 percent time. A student not on an assistantship who intends to satisfy one semester of the residence period during the summer must satisfactorily complete a minimum of nine semester hours of such work during the summer. For a student holding a concurrent assistantship of 25 percent or 50 percent time in the summer, this requirement is three semester hours per any five- or six-week summer session.

Students who also hold University appointments, other than those of Graduate Assistant, for half time or more will be considered to contribute to the residence requirements only for semesters or 12 weeks in the summer during which all of the following criteria are met: (1) the duties of the appointment primarily involve degree-related academic or scholarly activities such as dissertation research; (2) the departmental chairperson (or corresponding administrator) and the student's Doctoral Program Advisory Committee certify that the duties of the appointment do not interfere with the appointee's regular participation as a student, on an essentially full-time daily basis, in the normal on site academic, scholarly, and research activities of the department and degree program and the associated scholarly demands thereof; (3)the student is enrolled, for each semester or summer session counted in the residence period in at least six semester hours in each semester or three hours in each of two consecutive five-or six-week summer sessions or 6 hours in an entire ten- or twelve-week summer session; and (4) file a plan for approval by the Graduate Dean in advance of satisfying residence requirements.

Program of Study

The objectives of the program of study leading to the degree of Doctor of Philosophy shall be scholarly achievement of high order and the development of a fundamental understanding of the major field and its relation to supporting fields of knowledge, rather than the satisfactory completion of a certain number of credit hours. The nature of the program of study will vary somewhat, depending upon the major field of study and the objective of the prospective candidate.

Language Requirement

Foreign language requirements for the Doctor of Philosophy degree vary from department to department. For specific details see departmental statements. These requirements should be completed early in the doctoral program.

Examination for Candidacy

After completing approximately two years of graduate study, and at least one year before completing all other requirements, the prospective candidate must take candidacy examinations in specified fields of study in accordance with the requirements of the department in which the candidate is working. These examinations may be either written or written and oral. Upon satisfactorily completing these examinations the student may be admitted to candidacy and may proceed to work toward completion of the remaining requirements for the degree.

Dissertation

Each candidate must complete a doctoral dissertation on some topic in the major field. The topic assignment shall be made and a title filed with the Dean of the Graduate School at least one year before the final examination, the specific problem and subject of the dissertation to be determined by the major adviser, the candidate, and the advisory committee. The completed dissertation must be a definite, scholarly contribution to the major field. This contribution may be in the form of new knowledge of fundamental importance, or of modification, amplification, and interpretation of existing significant knowledge.

Each doctoral candidate must register for a minimum of 18 hours of doctoral dissertation. After the student has passed the candidacy examinations the student must register for at least one hour of dissertation each semester and one hour during the summer session until the work is completed whether the student is in residence or away from the campus. For each semester in which a student fails to register without prior approval of the Dean of the Graduate School, a registration of three hours will be required before the degree is granted.

Three typewritten copies of the completed dissertation in the prescribed form must be presented to the candidate's advisory committee for approval at least six weeks before the degree is to be conferred. After approval by the committee and the Dean of the Graduate School, two copies must be deposited in the Mullins Library at least two weeks before the degree is to be conferred, together with two copies of an abstract, of not more than 350 words, approved by the major adviser as suitable for publication. The third copy of the dissertation shall be presented to the candidate's major department.

Final Examination

The candidate's final examination for the degree of Doctor of Philosophy will be oral. The major adviser will forward to the Dean of the Graduate School, not less than ten (10) days before the date of the final oral examination, an abstract of the dissertation accompanied by a memorandum announcing the date, time, and place of the oral examination. The examination will be primarily concerned with the field of the dissertation, but may also include other aspects of the candidate's graduate work. This examination is open to the public. The examining committee shall consist of the student's advisory committee and others who may be included at the discretion of the major adviser and the Dean of the Graduate School

The Graduate School of Business

OBJECTIVES

The Graduate School of Business has as its objective the advancement and dissemination of knowledge in the business and organizational disciplines through scholarly research and excellence in its graduate management education programs.

ADMISSION

Anyone who wishes to earn graduate-level credit, whether as a degree-seeking student or as a non-degree seeking student, must make formal application to, and be officially admitted by the Graduate School of Business. The Graduate School of Business offers two classifications of admission: Degree Standing and Non-Degree Standing.

1. DEGREE STANDING
   The Graduate School of Business shall admit only those applicants to DEGREE standing whose enrollment the Graduate School of Business considers will contribute positively to the quality of life and educational programs of the Graduate School of Business. Unlike the Graduate School, students are simultaneously admitted to the Graduate School of Business and a degree program.

2. NON-DEGREE STANDING
   The Graduate School of Business shall admit those applicants to single semester NON-DEGREE standing whose enrollment will not lead to a degree.

Application. Applications for admission to the Graduate School of Business must be accompanied by a $40.00 application fee ($50.00 for international applicants), which is not refundable and will not apply against the general registration fee if the applicant enrolls. Applicants will not be considered for admission until all required application materials have been received by the Graduate School of Business.

Applicants who are seeking a graduate degree must submit the following:

1) Application form
2) Application fee ($40 domestic; $50 international)
3) Current resume
4) Three letters of recommendation
5) Official transcripts from each college or university attended
6) Two one-page essays
7) Official GMAT score (MBA, MAcc, MIS, and MTLM)
8) Official GRE score (MAEcon)
9) Official TOEFL score (International applicants only)
10) Financial and Supplemental Information form (International applicants only)
11) Educational Summary form (International applicants only)

The application form may be obtained on the Web at: http//www.uark.edu/depts./badm/, or the application packet may be obtained from and should be submitted directly to:

GRADUATE SCHOOL OF BUSINESS
475 Business Administration Building
University of Arkansas
Fayetteville, AR 72701

Telephone: 501-575-2851
Fax: 501-575-8721
E-mail: gsb@walton.uark.edu

Transcripts. For applicants who desire DEGREE standing: It is the responsibility of each applicant who desires full graduate standing to request EACH college or university that the student has previously attended to send directly to the Graduate School of Business one official copy of the student's academic record including all courses, grades, and credits attempted and indication of degree(s) earned. (Note: The fact that courses completed at one institution may be included on a transcript from another institution will not suffice; official transcripts must be received from each institution previously attended.) All transcripts become the property of the Graduate School of Business and will not be released to the applicant or to any other person, institution or agency. All application materials, including all official transcripts, should be received by the Graduate School of Business by the published application deadline for the program for which the student is applying.

Previously Enrolled or Currently Enrolled at University of Arkansas, Fayetteville. For those previously enrolled or currently enrolled at the University of Arkansas, Fayetteville, the Graduate School of Business obtains transcripts from the Registrar's Office. For a graduate of the University of Arkansas, Fayetteville (baccalaureate degree), the only transcripts are those from the University of Arkansas, Fayetteville, and those from each institution attended after completing the University of Arkansas, Fayetteville, degree. Anyone who was previously enrolled, but who is not currently enrolled in the University of Arkansas Graduate School of Business, is considered a "readmission" and is required only to submit an Application for Admission (no fee) and official transcripts from institutions attended after the University of Arkansas Graduate School of Business enrollment. (See Admission Classification: Readmission.)

Deferred Admission. Admission to the Graduate School of Business is for a specific semester only. Applicants who wish to change their date of entry after submitting an application must notify the Graduate School of Business Office. Applicants who have already been admitted but who would like to change their date of entry must request to have their admission deferred. Admission may be deferred for up to one academic year at the discretion of the Director of the masters program to which the student has been admitted. Application materials for applicants who apply for admission, but who do not subsequently enroll, will be retained by the Graduate School of Business Office for two calendar years from the date of the applicant's

original proposed semester of entry. However, applicants must file a new Application for Admission (no fee) to notify the Graduate School of Business of their request for reconsideration. Applicants who are admitted, but who do not enroll for two years or more after admission must resubmit the entire application packet and follow procedures for initial admission.

Admission to Degree Standing. Official notice of the decision concerning admission will be sent from the Graduate School of Business for admission to the Master of Business Administration, Master of Accountancy, Master of Arts in Economics, Master of Information Systems, and the Master of Transportation and Logistics Management programs.

Advisor. At the time of admission to a degree program in the Graduate School of Business, the student is assigned to a major advisor who acts as the advisor throughout the student's program of study. The appointment of the advisor is made in the student's major department.

International and Resident Alien Applicants. International applicants and resident aliens must submit a minimum score of 550 on the paper-based Test of English as a Foreign Language (TOEFL) or 213 on the computer-based version of the TOEFL taken within the preceding two years, unless their native language is English, they have received a graduate degree from an accredited U.S. graduate school, or they have demonstrated an acceptable level of language proficiency as defined in the Graduate School Handbook located on the Graduate School website. Applicants to the Master of Information Systems degree who are also applying for a graduate assistantship must submit official scores for the Test of Spoken English (TSE). International applicants and resident alien applicants should refer to page 18 of the *Graduate School Catalog* for additional information related to their application.

Classifications of Admission

The Graduate School of Business admits students as either degree-seeking or as non-degree-seeking for a single semester. Degree-seeking students are simultaneously admitted to the Graduate School of Business and to the degree program in which they are seeking a degree. Each master's degree program in the Walton College has its own minimum admissions criteria. Meeting the minimum criteria listed below does not imply that admission will be granted. The minimum requirements for admission to the Graduate School of Business and master's degree programs leading to a graduate degree are:

Degree-Seeking/Regular Standing

a. a grade-point average of 2.70 or better (A=4.00) on all course work taken prior to receipt of a baccalaureate degree from a regionally accredited institution of higher education and an acceptable GMAT or GRE score.

b. a grade-point average of 3.20 or better on the last 60 hours of course work taken prior to the receipt of a baccalaureate degree from a regionally accredited institution of higher education and an acceptable GMAT or GRE score.

Degree-Seeking/Conditional Standing

c. a grade-point average between 2.50 and 2.69 on all course work taken prior to receipt of a baccalaureate degree from a regionally accredited institution of higher education, acceptable GMAT or GRE score, and approval of the Associate Dean for Academic Affairs, on condition that the student makes a cumulative grade-point average of 3.00 or better on the first 12 hours of graduate-level course work in the degree program and meets any other conditions that may be specified by the faculty of the department or program.

Any other consideration for regular admission must be by individual petition to the Associate Dean for Academic Affairs and, where pertinent, a recommendation from the appropriate departmental chair will be considered on its own merits, case by case.

Non-Degree Seeking, Single Semester

Applicants who desire non-degree standing must complete the Non-Degree Seeking Application and must sign the STATEMENT OF UNDERSTANDING portion of the form. Students admitted to a single semester NON-DEGREE standing must understand that any enrollment taken in this classification will not normally carry degree credit. Transcripts are not required for applicants seeking this single semester NON-DEGREE standing.

Persons who are admitted as non-degree seeking and who subsequently decide to pursue a degree must apply for and be admitted into a master's degree program by the appropriate admissions committee of the Graduate School of Business.

A non-degree seeking student may take no more than six semester hours of graduate-level courses that can be counted toward the requirements for a graduate degree. At the time of acceptance into a degree program, the director of the appropriate master's degree program will recommend to the Graduate School of Business which courses previously taken, if any, are to be accepted in the degree program.

Letter of Good Standing. A graduate student who is in good standing at another regionally accredited institution in the United States may be given admission (non-degree status) to the Graduate School of Business for one semester upon submission of an Application for Admission and a letter of good standing from the dean of the Graduate School at that institution. If at some time in the future the student should wish to pursue a degree in the Graduate School of Business or in the University of Arkansas Graduate School, it will be necessary to follow the normal procedures for admission and to have official transcripts sent from each institution previously attended. Graduate courses transferred and used for requirements for a degree at another university cannot be used for a graduate degree at this institution.

Readmission. Readmission to the Graduate School of Business is not automatic.

a) A student who has not been enrolled during the preceding semester (fall or spring), and who has not attended any other institution of higher education during his or her absence must submit to the Graduate School of Business a Readmission Form.

b) A student who has not been enrolled during the previous semester (fall or spring) and who has attended any other institution of higher education during that semester must submit a new application form (no fee) to the Graduate School of Business along with an official transcript from the institution attended.

c) A student who has not been enrolled for more than one semester, whether or not he or she has attended another institution of higher education, must submit a new application for admission (no fee). At the time of readmission, the appropriate admissions committee will determine whether to readmit the student and which classes taken during previous enrollments at the Graduate School of Business will be counted toward graduation.

Transfer of Credit. The Graduate School of Business will allow transfer of credit of a maximum of six credit hours under the following circumstances:

1) The hours were earned at an AACSB accredited school, and
2) The student earned an "A" or "B" in the courses requested for transfer credit, and
3) The master's program coordinator approves the courses for credit toward a master's degree.

REGISTRATION AND RELATED TOPICS

Important information regarding registration for classes, withdrawal, attendance and related issues can be found on page 20. The Graduate School of Business adheres to the guidelines as set forth in the Graduate Catalog with the exception of full-time status noted below.

Full-Time Status. Enrollment in 9 semester hours (not including audited courses) is

considered full-time for graduate students unless otherwise specified by individual degree programs. For full-time enrollment in the summer, consult the Graduate School Handbook, available on the Graduate School website, http://www.uark.edu/depts/gradinfo.

GRADES AND MARKS

The Graduate School of Business uses the same grading and marking system as the Graduate School. For additional information regarding grades and marks, please see page 20.

ACADEMIC DISMISSAL

Students may be dropped from further study in the Graduate School of Business if at any time their performance is considered unsatisfactory as determined by either the program faculty or the Associate Dean for Academic Affairs of the Walton College of Business Administration. Academic dishonesty and failure to maintain a specified cumulative grade point average are considered to be unsatisfactory performance. The Graduate School of Business subscribes to and enforces the academic honesty policy of the University of Arkansas (see page 17 of the *Graduate School Catalog*).

For students enrolled in the Master of Accountancy, Master of Arts in Economics, Master of Information Systems, or the Master of Transportation and Logistics Management degree programs, the following academic standards apply: If a student has less than a 2.85 cumulative grade point average on 12 or more semester hours of graded course work taken in residence for graduate credit, the student will be placed on academic probation. The student will subsequently be dismissed from the Graduate School of Business if the cumulative GPA is not raised to 2.85 or above on the next nine hours of graded graduate course work. Using its own written procedures, the graduate faculty of each master's degree program may recommend that the student be readmitted to the Graduate School of Business. The graduate faculty of the master's degree programs may establish and state in writing the requirements for continuation in that program. Non-degree seeking students who are dismissed may petition for readmission to the Graduate School of Business by submitting a written appeal to the Associate Dean for Academic Affairs.

A cumulative grade point average of 3.00 is required to be eligible for graduation. In addition, at least 75 percent of the graduate credit hours submitted for a degree must be "A" or "B" grades. Students may take up to an additional six credit-hours of graduate coursework in an effort to raise the cumulative grade-point average to 3.00. Students who repeat a course in order to raise their grade must count the repetition toward the maximum of six additional hours. All requirements for a master's degree must be completed within six calendar years.

MBA Program Academic Dismissal

For students enrolled in the Master of Business Administration program, the following academic standards apply.

Grade Policies

1. An MBA student must have a 3.00 grade point average on all courses taken in the thirty-eight hour program to be eligible for graduation. Classes taken either in residence or administered from the Fayetteville campus will be used to calculate a student's grade point average.
2. At least 75 percent of the credit hours from all courses taken in the MBA program, either in residence or administered from the Fayetteville campus, must be an "A" or a "B" prior to graduation. A student may take up to six additional credit hours (up to forty-four hours total) to meet the 75 percent rule.
3. "D" and "F" grades will not apply toward satisfying course requirements for graduation, but will be included in grade point calculations.

Probation and Dismissal Policies

1. Any MBA student who does not make a "C" or better in each area (financial and economic analysis, information systems, management, marketing, and quantitative analysis) of the Foundations module will be dismissed from the program. There is no probationary period after the Foundations module.
2. A student with the following grade point averages will be placed on probation:
   a. Lower than or equal to 2.5 after six hours (Foundations module).
   b. Lower than or equal to 2.8 after twelve hours (Module 1)
   c. Lower than or equal to 2.88 after eighteen hours (Module 2)
   d. Lower than or equal to 3.0 after twenty-one hours (Strategic Management)
   e. Lower than or equal to 3.0 after thirty-two hours
3. To be removed from probationary status, a student must have earned a 3.0 grade point average on all coursework taken in the MBA program.
4. Students on probation who do not raise their grade point averages to the following levels will be dismissed from the program:
   a. 2.75 after twelve hours (Module 1)
   b. 2.94 after eighteen hours (Module 2)
   c. 3.0 after twenty-one hours (Strategic Management)
   d. 3.0 after thirty-two hours
5. Students whose grade point average falls below 2.85 are not eligible to remain on an assistantship.

ADMINISTRATIVE REQUIREMENT FOR GRADUATION

Application for graduation must be completed in the Graduate Dean's office, filed with the Registrar and fees paid for the semester in which degree requirements will be completed and graduation effected. If a student fails to complete the degree, the student must then renew the application and pay a renewal fee.

RESIDENCY REQUIREMENTS

The Graduate School of Business adheres to the residency requirements established by the Graduate School as described on page 22.

DEGREES OFFERED

The faculty of the Graduate School, under the authorization of the Board of Trustees, grants the following degrees offered by the Graduate School of Business. The graduate faculty, as represented by the Dean of the Graduate School and through the Graduate Council, has primary responsibility for the development, operating policies, administration and quality of these programs. Operating through the Graduate Dean, the faculty appoints committees which directly supervise the student's program of study and committees which monitor research activities and approve theses and dissertations.

Doctor of Philosophy
- Economics
- Business Administration Concentration Areas:
  - Accounting
  - CISQA
  - Finance
  - Management
  - Marketing

Master of Accountancy
Master of Arts in Economics
Master of Business Administration
Master of Information Systems
Master of Transportation and Logistics Management

MASTER'S DEGREES

Master of Accountancy

Master of Accountancy Program Coordinator
Deborah Thomas
575-6132

The Master of Accountancy program (MAcc) is accredited by the AACSB – International Association for Management Education. AACSB accreditation assures quality and promotes excellence and continuous improvement in undergraduate and graduate education for business administration and accounting.

The MAcc program is designed to provide professional preparation at the graduate level for students wishing to pursue accounting-oriented careers in industry, government, and public practice. The program provides advanced work in the various areas of accounting. The educational objective of the MAcc program is to prepare students to become professional accountants. In addition to building upon specific undergraduate objectives, the master's program develops skills to 1) identify alternative solutions to accounting, auditing, and tax problems, 2) solve practice-related problems through archival and empirical research, and 3) critically analyze emerging practice-related problems. The MAcc program is a full-time program designed to be completed in one year.

Admission to Degree Program: The MAcc program is open to students who have an acceptable undergraduate grade point average, an acceptable Graduate Management Admission Test (GMAT) score, and (international students only) an acceptable TOEFL score. Students entering the program are expected to possess a basic understanding of statistics, mathematics, information systems, accounting, and business. Course work deficiencies must be resolved at the beginning of the program.

Requirements for the Master of Accountancy Degree: Students with appropriate backgrounds in business administration and economics and with an undergraduate concentration in accounting will be required to complete 30 semester hours of course work beyond the baccalaureate degree, at least 21 semester hours of which must be in courses reserved exclusively for graduate students. Prior accounting and computer courses must either have been successfully completed within the five years prior to entry to the MAcc program, or the student must provide other evidence of current knowledge in these areas. Otherwise, applicants may be required to repeat selected courses.

All students must be enrolled for a minimum of 12 hours during consecutive Fall/Spring semesters. The student must be in residence a minimum of 24 weeks (see residency requirements of the Master of Arts/Master of Science).

Course work in the accounting discipline beyond introductory accounting must include coverage of each of the following areas:

a) financial accounting and accounting theory
b) management accounting and cost accounting
c) accounting information systems
d) financial and operational auditing
e) taxation

Eighteen semester hours of accounting are required, 12 hours of which are specified:

ACCT 5413, Accounting Issues for Restructurings
ACCT 5433 Fraud Prevention and Detection
ACCT 5443 Asset Management
ACCT 5463 Contemporary Accounting Issues

Nine semester hours of the student's program must be non-accounting electives. Three semester hours may be either accounting or non-accounting electives.

A student may transfer to the MAcc program not more than six hours of graduate level credit from an AACSB-accredited graduate program, provided that each course has a grade of "B" or better and the courses are acceptable to the departmental MAcc committee. Students contemplating transfer of credit should consult in advance with both the MAcc Advisor and the Graduate School of Business.

In addition to the degree requirements noted above, students with no undergraduate work in business administration and economics will be required to complete the courses or their equivalents listed below. Students with some background in business administration and economics, but with deficiencies in the following areas, will be required to remove these deficiencies as soon as possible.

- Financial management
- Legal environment
- Management concepts/organization behavior
- Management information systems
- Marketing principles
- Microeconomics and macroeconomics
- Production/operations management
- Statistics

A cumulative grade-point average of 3.00 is required on (1) graduate work taken for the degree and (2) all accounting courses (both undergraduate and graduate) taken for the degree. At least 75 percent of the graduate credit hours submitted for the degree must be "A" or "B" grades. The MAcc degree program does not require a thesis. Successful completion of a Master of Accountancy Degree from the University of Arkansas will qualify a student to take relevant professional examinations.

For further information, write to the MAcc Advisor, Department of Accounting, Walton College of Business Administration, University of Arkansas, Fayetteville, AR 72701.

Master of Arts in Economics

Master of Arts in Economics Program Coordinator
Andrew Horowitz
575-6228

Prerequisites to Degree Program: Applicants for graduate studies in economics must meet the requirements of the Graduate School of Business and be accepted by the Department of Economics. Generally, the requirements are (1) a bachelor's degree from an accredited institution with a satisfactory grade-point average, and (2) a satisfactory score on the Graduate Record Examinations (GRE).

Students from all academic backgrounds are encouraged to apply. Students who have had few economic courses at the undergraduate level may be required to enroll in several undergraduate courses at the beginning of their course of study at the University of Arkansas. In order to take graduate courses in economics, students, as a general rule, must have had courses in intermediate microeconomics and macroeconomics, basic statistics, calculus, and linear algebra. Students who have not had these courses will be asked to take them at the beginning of their program of study.

Areas of Concentration: Within the Master of Arts program in Economics, two options are available. The pre-Ph.D. option is a traditional program designed for students who may wish eventually to pursue the Doctor of Philosophy degree. The business economics option is designed for students who seek advanced training in applied economics and business preparatory to entering industry or government employment.

Master of Arts, Pre Ph.D. Option

Prerequisites to Degree Program, Pre-Ph.D. Option: The requirements for this option are (1) intermediate economic theory, (2) 2 semesters of calculus, (3) basic statistics, and (4) linear algebra.

Requirements for the Master of Arts Degree, Pre-Ph.D. Option: This program is designed primarily for students who plan eventually to pursue the Doctor of Philosophy at the University of Arkansas or elsewhere. Therefore, the program stresses the acquisition of knowledge of economic theory and the development of research skills. Candidates for this degree must complete a minimum of 30 semester hours of course work, including the thesis requirement, and register for the graduate seminar each semester they are on campus.

Core Requirements: 21 hours

ECON 5563 History of Economic Thought
ECON 5613 Econometrics I
ECON 5623 Econometrics II

ECON 6233 Microeconomic Theory II
ECON 6243 Macroeconomic Theory II
STAT 3013 Introduction to Probability and Statistics

Seminars:
Students are required to register for ECON 643V or 644V for one-hour credit each semester they are on campus.

Electives:
6 hours (Must be approved by the Economics Department Head.)

Thesis: 6 hours
The thesis requirement may be waived and substituted with 6 additional hours of course work; however, 3 of these hours must be an independent study project (ECON 636V) that involves the writing of a research paper.

Comprehensive Exam:
A comprehensive exam is required.

Master of Arts, Business Economics Option

Prerequisites to Degree Program, Business Economics Option: The requirements fort his option are (1) intermediate theory, (2) 1 semester of calculus, (3) basic statistics, and (4) linear algebra.

Requirements for the Master of Arts Degree, Business Economics: This program is designed for students seeking advanced training as preparation for entering into public or private employment. Therefore, the program stresses the development of skills in areas of applied economics and business administration in addition to economic theory. Candidates for this degree must complete a minimum of 39 semester hours of course work with a cumulative grade-point average of at least a 3.00 and register for the graduate seminar each semester they are on campus.

Economics Core Requirements: 18 hours
ECON 5333 Managerial Economics
ECON 5613 Econometrics I
ECON 5623 Econometrics II
ECON 6233 Microeconomic Theory II
ECON 6243 Macroeconomic Theory II
ECON 636V Special Problems in Economics

Business Administration Core Requirements: 12 hours
1. 9 hours in finance, accounting, or marketing (Note: Students who do not have the necessary background in these areas to take graduate-level courses will be required to take additional course work to make up deficiencies.)
2. 3 hours in a complementary field:

Finance concentration - 3 hours in accounting
Accounting concentration - 3 hours in finance
Marketing concentration - 3 hours in accounting or finance

Seminars:
Students are required to register for ECON 643V or 644V for one-hour credit each semester they are on campus.

Electives:
9 hours (Must be approved by the Economics Department Head).

Comprehensive Exam:
A comprehensive exam is required.

Master of Business Administration (see Business Administration Department for course listings)

MBA Program Director
Julie Gentry
575-6137

The Master of Business Administration program is accredited by the American Assembly of Collegiate Schools of Business (AACSB). The MBA degree is directed at students preparing for a professional career. It requires a minimum of 38 graduate credit hours of study for students with an adequate undergraduate background. Students without the necessary academic background may be required to take additional hours prior to enrollment in the MBA program. Two plans of study are offered: the full-time program and the managerial (part-time) program. The full-time program can be finished in one calendar year; the managerial program requires a minimum of twenty-eight months of study.

The lock-step program comprises prematriculation preparatory work, a foundations module, two core modules, strategic management, a partnering project (capstone project for managerial program students), and nine hours of approved electives (twelve hours for students in the managerial program) which constitute the concentration area.

Areas of Concentration. The MBA program has four defined areas of concentration in Entrepreneurship and Strategic Innovation, Finance, Global Business, and Strategic Retail Alliances. The student may also create his or her own customized concentration with the approval of the Director of the MBA program.

Prerequisites to Degree Program. Students entering the MBA program are expected to have already mastered basic business concepts in the areas of information technology, quantitative analysis, accounting, finance, economics, marketing, management, business law, and production/operations management. Mastery of the aforementioned topics must be demonstrated before entering the core modules. Students entering the managerial (part-time) program must have two years of work experience prior to graduation.

Admission to Degree Program. Students must be admitted to the Graduate School of Business and to the MBA program by the MBA Admissions Committee. Admission to the MBA program is based upon an acceptable Graduate Management Admission Test (GMAT) score, an acceptable grade-point average, recommendations, essays, and related work experience. For specific admission requirements in addition to general admission requirements for the MBA program, write to the MBA Program Director, Walton College of Business Administration, University of Arkansas, Fayetteville, AR 72701.

Requirements for the Master of Business Administration Degree.

Full time Program

Summer I
MBAD 5013 Foundations I
MBAD 5023 Foundations II

Fall
MBAD 5112 Corporate Financial Management
MBAD 5122 Accounting Decisions and Control
MBAD 5132 Information, Technology, and Decision Making
MBAD 5212 Leading High Performance Organizations
MBAD 5222 Managing Ideas, Products, and Services
MBAD 5232 Economics of Management and Strategy
MBAD 5511 Focus Topic 1
MBAD 5521 Focus Topic 2

Spring
MBAD 5313 Strategic Management
MBAD 5413 Partnering Project I
MBAD 5423 Partnering Project II
+ 1 concentration course

Summer II
2 concentration courses

Managerial (part-time) Program
Fall
MBAD 5013 Foundations I
MBAD 5023 Foundations II

Spring
MBAD 5122 Accounting Decisions and Control
MBAD 5212 Leading High Performance Organizations
MBAD 5232 Economics of Management and Strategy
MBAD 5511 Focus Topic 1

Fall
MBAD 5112 Corporate Financial Management
MBAD 5132 Information, Technology, and Decision Making
MBAD 5222 Managing Ideas, Products, and Services

MBAD 5521 Focus Topic 2

Spring
MBAD 5313 Strategic Management
MBAD 5433 Capstone Project

Summers and/or Fall 3
12 hours from concentration areas

Defined Concentrations

Entrepreneurship and Strategic Innovation Required:
MGMT 5363 Strategic Innovation
Choose 6-9 hours from the following:
MGMT 5323 New Venture Development and Small Business Management
MGMT 5993 Entrepreneurship Practicum
TLOG 5633 Business Logistics Systems
MKTT 5433 Consumer and Market Research
FINN 5633 Financial Institutions

Strategic Retail Alliances
Required:
MKTT 5333 Retailing Strategy and Processes
Choose 6-9 hours from the following:
MKTT 5433 Consumer and Market Research
MKTT 5533 Strategic Category Management
TLOG 5633 Business Logistics Systems
FINN 5703 Multinational Business Finance

Global Business
Required:
ECON 5853 International Economics Policy
Choose 6 hours from the following:
• Study abroad (6 hours + 6 hours for language proficiency, if needed)
• International internship

Finance
Required:
FINN 5333 Investment Theory and Management
Choose 6-9 hours from the following:
FINN 5633 Financial Institutions
FINN 5703 Multinational Business Finance
ECON 5853 International Economics Policy

Customized Concentration
Choose 9 hours (12 hours for managerial program) from the following:
• Any 5000 level or above WCBA course
• Any 5000 level or above approved course outside WCBA

A GPA of 3.00 on all graduate work taken for credit on the MBA (at least 75 percent of the credit hours must be completed with a "B" grade or better) is required for continuation in the program and for graduation. Courses in which a student receives a grade below "C" do not count toward the required 38 hours. The degree is a non-thesis program. See Page 31 – for MBA probation policy.

MBA/JD Program

For students interested in obtaining both the MBA and JD (law) degrees, the MBA/JD dual degree program is available. This program allows the student to receive both the MBA degree and the JD degree. The program requires separate application and admission to both the School of Law and the Graduate School of Business and the MBA degree program. Students participating in the MBA/JD program must file a degree plan for both degrees and obtain approval prior to taking elective courses to be used for reciprocal credit. Interested students should obtain bulletins and applications from both the School of Law and the Graduate School of Business.

Master of Information Systems

Master of Information Systems Program Coordinator
Paul Cronan
575-6130

The Master of Information Systems is designed to provide professional preparation for positions in business and government. It is designed with sufficient flexibility to meet the needs of students with various backgrounds and foster lifelong learning and innovation. Students may concentrate in one of four areas - Information Technology Management, Telecommunications Management, Software Engineering Management, or Transportation/Logistics Technology Management.

Admission Requirements: The Master of Information Systems program is open to students who have earned a bachelor's degree from an accredited institution and who can present evidence of their ability to do graduate work. "Evidence of ability" means superior grade-point average, an acceptable test score on the Graduate Management Admission Test (GMAT), and recommendations with respect to ability for successful pursuit of graduate level work.

Requirements for the Master of Information Systems Degree: The Master of Information Systems is a thirty (30) credit-hour program designed to provide professional information systems preparation for positions in business and government. Students whose previous studies in business administration and economics have fulfilled requirements as to the common body of knowledge in business administration and who have complete appropriate coursework in the areas of computer information systems (programming language /COBOL, management information systems, systems analysis, database) will be required to complete a minimum of thirty (30) hours of graduate work.

Core Courses (9 hours - required for all Areas of Concentration):
CISQ 5423 Seminar in Systems Development
CISQ 5833 Data Management Systems
CISQ 5943 Management of Information Technology Seminar

Areas of Concentration (12 hours):

Information Technology Management
CISQ 5503 Decision Support Systems
CISQ 5713 Seminar in Telecomm
Computing Electives (6 hours) (Selected from CISQ, CSEG, and CSCI)

Telecommunications Management
CISQ 5713 Seminar in Telecomm
Select 9 hours from:
CSEG 5083 Computer Comm Networks
CSEG 4953 Minicomputer Applications
CSEG 4213 Windows/GUI
CSEG 4743 Graphics and Animation

Software Engineering Management
CISQ 5503 Decision Support Systesm
Select 9 hours from:
CISQ 4333 O-O Technologies Seminar
CSEG 4323 O-O Programming and Design
CSEG 4513 Operating Systems
CSEG 5023 Software Engineering I
CSEG 5033 Software Engineering II
CSEG 4743 Graphics and Animation

Transportation/Logistics Technology Management
CISQ 5503 Decision Support Systems or
CISQ 5713 Seminar in Telecomm
TLOG 5633 Business Logistics Systems
TLOG 5673 Transportation and Logistics Modeling
Select 3 Hours from:
TLOG 5643 Strategic Issues in Trans Mgmt
TLOG 5653 Global Logistics Strategy
TLOG 5663 Supply Chain Management
TLOG 560V Special Topics

Electives (9 hours)

Total Hours 30 hours

Electives are chosen by the student in consultation with the Masters Program Director in the Department of Computer Information Systems and Quantitative Analysis (CISQA). Approved electives (9 hours) may be any graduate course approved by the Masters

Program Director, but only three hours of CISQ courses are permitted. Note: With the approval of the Masters Program Director, any senior level CISQ course (CISQ 4—-) may be taken for graduate credit. CSEG is Computer Systems Engineering. CSCI is Computer Science Arts and Sciences.

After admission, the student must maintain a 3.00 average on all graduate coursework and all information systems coursework. Additionally, the student must receive a letter grade of at least a "B" in 75 percent of the courses attempted.

Master of Transportation and Logistics Management
(see Marketing Department for course listings)

Master of Transportation and Logistics Management Program Coordinator
Julie Gentry
575-6137

The Master of Transportation and Logistics Management program is designed to produce outstanding professionals in the fields of transportation and logistics. Graduates of the program will be able to take positions within business firms or governments agencies. The program is designed with sufficient flexibility to meet the needs of students with various backgrounds and work experience. Students can pursue the Master of Transportation and Logistics Management degree on either a conventional full-time or a convenient part-time basis through evening classes.

Admission Requirements: The Master of Transportation and Logistics Management program is open to students who have earned a bachelor's degree from an accredited institution and who can present evidence of their ability to do graduate work. "Evidence of ability" means an excellent grade-point average, an acceptable test score on the Graduate Management Admissions Test (GMAT), recommendations for graduate study, and an acceptable score on the TOEFL (unless the native language is English).

Requirements for the Master of Transportation and Logistics Management Degree: The Master of Transportation and Logistics Management program is a thirty (30) credit-hour program designed to provide students with transportation and logistics expertise, general business principles, and quantitative skills in preparation for positions in business firms and government. Students with a bachelor's degree in business administration from an accredited institution will be required to complete thirty hours of graduate work:

TLOG 5633 Business Logistics Systems (3 hours)
TLOG 5643 Strategic Issues in Transportation Management (3 hours)
TLOG 5653 Global Logistics Strategy (3 hours)
TLOG 5663 Supply Chain Management (3 hours)
TLOG 5673 Transportation and Logistics Modeling (3 hours)
Approved business electives (9 hours)
Approved engineering electives (6 hours)
TOTAL: 30 hours

Electives are chosen by the student in consultation with the M.T.L.M. Coordinator in the Department of Marketing and Transportation (MKTT). For students with an undergraduate degree in business, approved business electives must be 5000 or 6000-level courses. Business electives may be taken in accounting, economics, finance, computer information systems and quantitative analysis, management or marketing. A limited number of 4000-level courses within the College of Engineering may be take for graduate credit as approved engineering electives. Students without prior business and/or engineering degrees may have to take additional courses in order to meet prerequisite requirements.

After admission, the student must maintain a 3.00 grade-point average on all graduate coursework and all transportation and logistics courses. Additionally, the student must receive a letter grade of at least a "B" in 75 percent of the courses attempted.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this degree program as in-state students for fee purposes. See page 163 for details.

DOCTOR OF PHILOSOPHY

See pages 26-27 for general information regarding the declaration of intent, residence requirements, candidacy examinations, dissertation requirements, and final examinations.

Application

Applicants for the Ph.D. program in Business Administration or the Ph.D. program in Economics must submit an application for admission, official transcripts from each college or university attended, a statement of purpose, three letters of recommendation, the assistantship application and a current resume. All documents must be submitted by March 1 for consideration for fall. Applicants for the Ph.D. program in Business Administration must submit a satisfactory GMAT score. Applicants to the Ph.D. program in Economics must submit a satisfactory GRE score.

International applicants must also submit the summary of educational experience form, and a supplemental and financial information form (required for the I-20 visa). The TOEFL is required of all international applicants (minimum 550 paper-based test or 213 computer-based test). Doctoral applicants must also present a minimum score of 50 on the Test of Spoken English (TSE).

The application packet should be submitted to

Graduate School of Business
BADM 475
University of Arkansas
Fayetteville, AR 72701

Ph.D. Business Administration

The Ph.D. in Business Administration is designed primarily to prepare individuals for teaching, research, service, and collegial roles in academic and research institutions. The degree program provides (a) an exposure to the functional areas of business, (b) intensive study of the relevant body of knowledge in a concentration, and (c) skills and tools to conduct research in that area.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this Ph.D. degree program (with emphasis in accounting) as in-state students for fee purposes. See page 163 for details.

Prerequisites to Degree Program

1. Admission to the Graduate School
2. Satisfactory GMAT scores.
3. Satisfactory previous academic record.
4. Admission to a concentration
5. An M.B.A. or other appropriate master's degree is generally required for admission. Individuals admitted to the program may be required to take additional courses in accounting, business law, computer information systems, statistics, finance, economics, management, or marketing. The additional courses will be determined by the advisor in the student's concentration with the approval of the Walton College of Business Administration's Associate Dean for Academic Affairs.

Requirements for the Doctor of Philosophy Degree

The program consists of the following:

1. Concentration. Emphasis areas may be taken in the following fields:
   - Accounting
   - Computer Information Systems and Quantitative Analysis
   - Finance
   - Management
   - Marketing and Transportation
2. Course work and seminars: the requirements for the Ph.D. in business administration will consist of a program of research, appropriate course work, seminars, and independent study as specified by the student's Concentration.
3. Comprehensive Examination. Satisfactory completion of a comprehen-

sive examination in the concentration is required.
4. Dissertation. A dissertation will be written and successfully defended in the concentration.

Ph. D. Economics

Prerequisites to Degree Program:

Students may first earn a master's degree and then enter the doctoral program, or students may enter the doctoral program immediately upon completion of the bachelor's degree. The requirements for this program include (1) intermediate theory, (2) 2 semesters of calculus, (3) basic statistics, and (4) linear algebra.

Requirements for the Doctor of Philosophy Degree:

The doctoral program consists of
1. Core requirements
2. Fields of specialized study
3. Electives
4. Comprehensive Examination
5. Dissertation.

Core Requirements:

All doctoral candidates must satisfactorily complete the following 27 semester hours of core requirements, which include courses in economic theory, history of economic thought, mathematical economics, econometrics, and statistics. In addition, they must register for the graduate seminar each semester they are in residence.

1. Economics (12 hours)
   - ECON 5563 History of Economic Thought
   - ECON 6243 Macroeconomic Theory II
   - ECON 6233 Microeconomic Theory II
   - ECON 643V Seminar in Economic Theory and Research I
2. Quantitative Methods (15 hours)
   - STAT 3013 Introduction to Probability and Statistics
   - ECON 5613 Econometrics I
   - ECON 5623 Econometrics II
   - ECON 644V Seminar in Economic Theory and Research II

Seminars:

Doctoral students are required to register for ECON 643V or 644V each semester they are in residence. Normally they will register for one hour of credit. However, at one point in their program, usually the last year of course work, they must register for three hours of credit.

Fields of Specialized Study:

The student must select two fields of specialization, one of which may be complementary to economics (e.g., finance or statistics). Complementary fields must be approved by the Economics Department Head. Field requirements are satisfied by successfully completing course work (usually 6 to 9 hours) and passing the comprehensive examination. In some cases course work may be satisfied by independent study under supervision of a member of the faculty.

Special Comment on Course Requirements

The foregoing requirements are for students who enter the doctoral program directly from undergraduate school. Students whose qualifications exceed the baccalaureate will be evaluated individually in accordance with standards established by the Graduate School and the Walton College of Business Administration. Students who have earned a master's degree in economics at the University of Arkansas or elsewhere will probably have substantially shorter programs. However, there is a minimum requirement of 24 hours of course work (5000-level and above) beyond that required for a master's degree. Doctoral candidates must have a cumulative grade-point average of 3.25 on all graduate course work.

Dissertation

The dissertation represents a demonstration of a candidate's ability to select, define, organize, and complete a major research project. It should demonstrate that the student has technical mastery of the field, is capable of doing independent scholarly research, and is able to formulate conclusions which enlarge the body of economic knowledge. Dissertation requirements include (1) a defense of proposal, and (2) presentation of an acceptable doctoral dissertation.

Examinations for the Doctor of Philosophy

Qualifying Examination

A student must pass a written qualifying examination on material included in the core area (excluding ECON 643V and ECON 644V). This will be done as early in a student's program as possible.

Comprehensive Examination

A student becomes eligible to take comprehensive examinations after completing all required course work. He or she must pass written examinations in economic theory, quantitative methods, and in the two areas of specialization. An oral examination will be administered after the written examinations have been successfully completed. The oral examination may be waived upon recommendation of the faculty who grades the written examinations.

Candidates who fail any or all parts of the comprehensive on the first attempt will normally be allowed a second attempt. A failure on the second attempt may result in the student being required to engage in additional course work before being allowed a third attempt, or in the student being terminated from the program.

Final Examination

The final examination is normally an oral defense of the student's dissertation.

Graduate School of Business Departments and Courses of Instruction

DEPARTMENT OF ACCOUNTING (ACCT)

Karen V. Pincus
Department Head
204 Business Administration Building
575-4051

Walter B. Cole Chair of Accounting Professor Wright • S. Robson Walton Chair in Accounting Professor Pincus • Professor Millar • Ralph McQueen Chair of Accounting Associate Professor Bouwman • Associate Professors Gist, Norwood, Thomas • Assistant Professors Austen, Carnes, Lee, Leflar (C.), Mosebach, Smith • Instructors Caldwell, Leflar (M.), Little, Scott, Shook

Degrees Conferred:
M.Acc. (ACCT)
Ph.D. in Business Administration

COURSES ACCOUNTING (ACCT)

ACCT410V Special Topics in Accounting (1-3) (IR) Explore current events, concepts and new developments relevant to Accounting not available in other courses. May be repeated. Prerequisite: ACCT 2013 and ACCT 2023, each with a grade of "C" or better.

ACCT4673 Product, Project and Service Costing (FA, SP) Cost systems with emphasis on information generation for cost management of products, projects and services. Prerequisite: ACCT 3533 and ACCT 3613 each with a grade of "C" or better.

ACCT4753 Generally Accepted Accounting Principles (FA, SP) The origins, uses, and application of generally accepted accounting principles. Emphasizes researching technical accounting pronouncements for application to external financial reporting issues. Prerequisite: graduate standing or (ACCT 3721L and ACCT 3723) each with a grade of "C" or better.

ACCT4963 Operational Auditing (FA, SP) The audit of efficiency, effectiveness, and performance of business and nonbusiness entities. Includes coverage of performance auditing techniques and application of these techniques to financial and nonfinancial functions. Prerequisite: senior standing and completion of all junior-level BA core and completion of junior-level accounting courses with a grade of "C" or better or graduate standing.

ACCT5112 Introduction to Financial Accounting (FA) Fundamentals of financial accounting, accumulation and reporting of data which show the results of operations and financial positions for use by creditors, investors, regulators, managers, and others in their evaluation of the organization. Prerequisite: graduate standing.

ACCT5122 Introduction to Management Accounting (FA) Introduction to cost terminology, concepts, and measurements leading to product costs, cost control, and budgeting. Prerequisite: ACCT 5112 with a grade of "C" or better.

ACCT5303 Accounting Decisions and Control (FA, SU) Preparation and utilization of financial information for internal management purposes: planning and special decisions, cost determination, performance evaluation and control. Prerequisite: ACCT 5112 and ACCT 5122.

ACCT5413 Accounting Issues for Restructurings (FA) Integrated course which examines the financial reporting, tax, managerial, systems and auditing aspects of major corporate restructurings arising from events such as mergers, acquisitions, spinoffs, reorganizations and downsizing. Prerequisite: ACCT 4753 with a grade of "C" or better.

ACCT5433 Fraud Prevention and Detection (FA) An examination of various aspects of fraud prevention and detection, including the sociology of fraud, elements of fraud, types of fraud involving accounting information, costs of fraud, use of controls to prevent fraud, and methods of fraud detection. Prerequisite: ACCT 5112 and ACCT 5122 and CISQ 3333 with a grade of "C" or better.

ACCT5443 Asset Management (SP) Acquisition and management of inventories, tangible capital assets, and intangible assets. Included are issues such as acquisition processes, internal controls, system requirements, accounting measurements, inventory models, re-engineering, capital budgeting, and tax implications. Prerequisite: ACCT 5112 and ACCT 5122 and CISQ 3333 each with a grade of "C" or better.

ACCT5463 Contemporary Accounting Issues (SP) Cross-functional seminar on emerging issues in accounting. Prerequisite: ACCT 5413 and ACCT 5433.

ACCT549V Special Topics in Accounting (1-3) (FA, SP, SU) Seminar in current topics not covered in other courses. Course is taught in separate 1-hour units, each with a different topic and instructor. Students may enroll in one or more units.

ACCT5523 Advanced Accounting Information Systems (SP) This course describes accounting systems in technologically advanced environments. Controls and other technical design considerations are described for the input, processing, storage, and reporting of accounting information. Special topics, such as expert systems and artificial intelligence applications in financial accounting, auditing, and tax also receive considerable attention. Prerequisite: ACCT 5112 and ACCT 5122 and CISQ 3333 with a grade of "C" or better.

ACCT5873 Advanced Taxation (FA) A review of the more complex tax issues, focusing on the tax problems encountered by various forms of business entities. Prerequisite: ACCT 3843 or equivalent with a grade of "C" or better.

ACCT5883 Individual Tax Planning (SP) A review of the financial planning opportunities available to individuals, focusing on tax implications of personal business decisions. Prerequisite: ACCT 5112 and ACCT 5122 and CISQ 3333 with a grade of "C" or better.

ACCT5953 Assurance Services (FA) The expression of assurance on financial statements and other forms of information for decision makers. Includes risk assessment, evidence gathering, and reporting. Prerequisite: ACCT 4753 and ACCT 4963 each with a grade of "C" or better.

ACCT6011 Graduate Colloquium (FA, SP) Presentation and critique of research papers and proposals.

ACCT6033 Accounting Research Seminar I (FA) First course in the accounting research seminar sequence which explores and evaluates current accounting literature. Course content reflects recent developments in the literature and specific interests of participants. examples of potential topics include research methods in accounting, managerial accounting, behavioral accounting,

ACCT6133 Accounting Research Seminar II (SP) Second course in the accounting research seminar sequence which explores and evaluates current accounting literature. Course content reflects recent developments in the literature and specific interests of participants. Examples of potential topics include research methods in accounting, financial accounting, managerial accounting, behavioral accounting, tax, audit, international accounting, and education. Prerequisite: ACCT 6033.

ACCT6233 Accounting Research Seminar III (FA) Third course in the accounting research seminar sequence which explores and evaluates current accounting literature. Course content reflects recent developments in the literature and specific interests of participants. Examples of potential topics include research methods in accounting, financial accounting, managerial accounting, behavioral accounting, tax, audit, international accounting, and education. Prerequisite: ACCT 6033.

ACCT6333 Empirical Research in Finance and Accounting (1-6) (FA) A study of recent empirically based research in finance and accounting literature with emphasis on the application of various research methods to finance and accounting data. (Same as FINN 6333)

ACCT636V Special Problems in Accounting (1-6) (FA, SP, SU) Special research project under supervision of a graduate faculty member.

ACCT6433 Accounting Research Seminar IV (SP) Fourth course in the accounting research seminar sequence which explores and evaluates current accounting literature. Course content reflects recent developments in the literature and specific interests of participants. Examples of potential topics include research methods in accounting, financial accounting, managerial accounting, behavioral accounting, tax, audit, international accounting, and education. Prerequisite: ACCT 6033.

ACCT6633 Accounting Research Seminar V (FA, SP, SU) Fifth course in the accounting research seminar sequence which explores and evaluates current accounting literature. Course content reflects recent developments in the literature and specific interests of participants. Examples of potential topics include research methods in accounting, financial accounting, managerial accounting, behavioral accounting, tax, audit, international accounting, and education. Prerequisite: ACCT 6033.

ACCT700V Doctoral Dissertation (1-6) (FA, SP, SU) Prerequisite: candidacy.

SAM M. WALTON COLLEGE OF BUSINESS ADMINISTRATION (BADM)

William P. Curington
Associate Dean for Academic Affairs
Business Administration Building
575-2851

Faculty are listed by department.

Degrees Confered:
M.B.A.
Ph.D. in Business Administration

COURSES: BUSINESS ADMIN (BADM)

BADM500V Study Abroad (1-12) (FA, SP, SU) Open to graduate students studying abroad in officially sanctioned programs. May be repeated for 12 hours.

BADM6111 Seminar in Business Administration Teaching I (FA) This course in college level teaching is designed for graduate students and new college teachers with specific emphasis on the Business Administration learning and classroom management. The purpose of this course is to introduce graduate students to principles of teaching and learning and to prepare these future teachers to lifelong learners in the classroom as teachers. Prerequisite: graduate standing.

BADM6121 Seminar in Business Administration Teaching II (FA, SP) Given that the student has successfully completed Seminar in Business Administration Teaching I, this course is suggested as the second course in the sequence. It is designated a 'hands on' teaching course. Students will be assigned a class to teach by their respective department and will be supervised. In addition, all students in the class will come together for seminar discussion twice per month. Prerequisite: BADM 6111 or equivalent.

BADM6131 Seminar in Business Administration Teaching III (FA, SP) This is an advanced course in college level teaching designed for graduate students and new college teachers with specific emphasis on the Business Administration learning and classroom management. The purpose of this course is to enhance graduate students' knowledge of teaching pedagogy given a base knowledge and classroom experience. This course will focus on current and advanced topics of teaching and learning, as well as research in teaching. Prerequisite: BADM 6111 or equivalent, BADM 6121 suggested.

COURSES: MBA (MBAD)

MBAD5013 MBA Foundations I (SU) (First Offered Summer II 1999.) A focus on leader ship, teamwork, process improvement, and communication, in association with business content, in the area of, information technology, quantitative analysis, marketing management, and managing people and the organization. Corequisite: MBAD 5023. Prerequisite: admission to the M.B.A. program and satisfactory completion of the M.B.A. preparation work.

MBAD5023 MBA Foundations II (SU) A focus on leadership, teamwork, process improvement and communication, in association with business content in the areas of financial and economic analysis and production and operations management. Corequisite: MBAD 5013.

MBAD5112 Corporate Financial Management (FA) Financial analysis, planning and control; decision making and modeling for financial managers; and financial policies for management. Corequisite: MBAD 5122 and MBAD 5132. Prerequisite: MBAD 5023.

MBAD5122 Accounting Decisions and Control (FA) Preparation and utilization of financial information for internal management purpose: planning and special decisions, cost determination, performance evaluation, and controls. Corequisite: MBAD 5112 and MBAD 5132. Prerequisite: MBAD 5023.

MBAD5132 Information Technology and Decision Making (FA) Utilization of information, quantitative techniques, and computer application in decision making and problem solving for managers. Corequisite: MBAD 5112 and MBAD 5122. Prerequisite: MBAD 5023.

MBAD5212 Leading High Performance Organizations (FA, SP) Managing in a global workforce, including human resource issues, motivation, performance evaluation, quality concepts, transformational leadership, and selection/ recruitment/ development of employees. Corequisite: MBAD 5222 and MBAD 5232. Prerequisite: MBAD 5112 and MBAD 5122 and MBAD 5132.

MBAD5222 Managing Ideas, Products, and Services (FA, SP) Product management, market research, marketing communications, retailing and distribution, consumer behavior, and social and ethical implications of marketing. Corequisite: MBAD 5212 and MBAD 5232. Prerequisite: MBAD 5112 and MBAD 5122 and MBAD 5132.

MBAD5232 Economics of Management and Strategy (FA, SP) Information economics and applied game theory. Corequisite: MBAD 5212 and MBAD 5222. Prerequisite: MBAD 5112 and MBAD 5122 and MBAD 5132.

MBAD5313 Strategic Management (FA) Strategy formulation, strategy implementation, and other topics related to the long-term success of the firm. Includes role of the general manager, international issues, and the impact of management fads on decision making. Prerequisite: MBAD 5212 and MBAD 5222 and MBAD 5232.

MBAD5413 Partnering Project I (SP) A large-scale, real world, 10 week project involving hands-on work addressing issues faced by managers in partnering firms. Corequisite: MBAD 5313 and MBAD 5423.

MBAD5423 Partnering Project II (SP) Continuation of MBAD 5413. Corequisite: MBAD 5313 and MBAD 5413.

MBAD5433 Capstone Project (FA, Odd years) A large-scale project integrating various business topics. Corequisite: MBAD 5313.

MBAD5511 Focus Topic I (FA) A concentrated emphasis on one business topic. Corequisite: MBAD 5112, MBAD 5122 and MBAD 5132. Prerequisite: MBAD 5023.

MBAD5521 Focus Topic II (FA) A concentrated emphasis on business topic. Pre- or Corequisite: MBAD 5212, MBAD 5222, and MBAD 5232. Prerequisite: MBAD 5112, MBAD 5122, and MBAD 5132.

DEPARTMENT OF COMPUTER INFORMATION SYSTEMS AND QUANTITATIVE ANALYSIS (CISQA)

Fred Davis, Department Chair
204 Business Administration Building
575-4500

• University Professor Taylor (P.H.) Professors Cronan, Davis, Douglas, Glorfeld, Jones (T.W.) • Associate Professor Hardgrave • Assistant Professors Aloysius, Chaney, McKinney, O'Leary-Kelly (S), Riemenschneider, Wilson • Clinical Assistant Professor Renwick • Assistant Professor Executive in Residence Schmidt

Degrees Conferred:
M.I.S. In Information Systems (INSY)
Ph.D. in Business Administration (BADM)

COURSES: CMP INF/QUAN (CISQ)

CISQ4243 Current Topics in Computer Information (FA, SP, SU) Intensive investigation of selected developments in computer information systems hardware, software, and organization having current impact on computer information systems design and application. Offering an extension of lower-level CIS courses through individual student research and faculty team-teaching of advanced topics. Topical selection made with each course offering. Prerequisite: CISQ 3283 and CISQ 3393.

CISQ4253 Business Systems Simulation (SP) System simulation techniques; their applications to business systems using an appropriate simulation language; extensive use of computer. Prerequisite: CISQ 3333.

CISQ4283 Centralized Data Systems (FA, SP) Introduces student to centralized information system design and implementation for business applications. Indepth study of logical systems modeling; physical file management; and software requirements. Prerequisite: CISQ 2263 and CISQ 3293.

CISQ4333 Object-Oriented Technologies Seminar (SP) Provides the student with theory and application of information systems development utilizing object-oriented (OO) technology. Topics include: object-oriented—analysis, design, data modeling, database management systems, and programming. Prerequisite: CISQ 3293.

CISQ4363 Business Application System Development (FA, SP) Review of fundamentals of application processing systems design and development, implementation of such a system by class. Prerequisite: CISQ 3393 and CISQ 4283.

CISQ4373 Object-Oriented Programming for Business Applications (FA) This course covers object-oriented programming concepts and illustrates them via and appropriate object-oriented programming language. Students will be exposed to the design of software objects, creation of software objects, and the use of objects in constructing an information system. Prerequisite: CISQ 2263 or (CSCI 1023 and CSCI 1021L).

CISQ4423 Quantitative Managerial Methods II (IR) Further topics in linear and integer programming; introduction to nonlinear and dynamic programming; problems in queuing techniques. Prerequisite: CISQ 2013.

CISQ450V Independent Study (1-3) (FA, SP) Permits students on individual basis to explore selected topics in data processing and/or Quantitative Analysis.

CISQ5103 Business Statistics (FA, SP) Analysis, summarization, and interpretation of data for use in managerial decision making. Includes descriptive statistics, probability and probability distributions, sampling, test of hypotheses, analysis of variance, and regression. Prerequisite: MATH 2043 and MATH 2053.

CISQ5203 Statistics and Quantitative Analysis (FA) Statistical analysis at intermediate level; lectures and problems develop understanding of statistical methods and provide illustrative situations for applying those methods. Includes analysis of variance and multiple regression. Prerequisite: CISQ 3033.

CISQ5303 Applications of Decision Theory (FA, SP, SU) Develops appreciation of role of general decision theory and qualitative methods in facilitating managerial decisions. Prerequisite: CISQ 5103.

CISQ5333 Operations Management (IR) Functions and quantitative techniques involved in the operating areas of a business. An enterprise is viewed as integrated system to demonstrate interrelation of functions and use of feedback, control; current research and special problems supplement text. (Same as MGMT 5333) Prerequisite: CISQ 5103.

CISQ5413 Decision Analytics (IR) Development and application of quantitative methods to the managerial and business decision processes. Topics include linear, integer, and goal programming and sensitivity analysis; nonlinear optimizations, network models, inventory models, queuing models, simulation, heuristics, and decision theory; computer solutions; related literature. Prerequisite: CISQ 5303 and MATH 2043.

CISQ5423 Seminar in Systems Development (IR) Advanced study of structured systems development. Emphasis on strategies and techniques of structured analysis and structured design for producing logical systems specifications and for deriving physical systems designs. Coverage of methodologies for dealing with complexity in the development of information systems. Prerequisite: CISQ 3293.

CISQ5443 Marketing Methods (IR)

CISQ5503 Decision Support Systems (FA) An analysis of the highest level of information support which serves the manager-user. A study of systems providing quantitative-based information derived from one or more databases within and/or external to the organization and used to aid upper-level management in the decision making process. The evaluation and application of tools in problem solving and decision making. Prerequisite: CISQ 2263 and CISQ 3333.

CISQ5613 Business Applications of Nonparametric Techniques (SP) Consideration of business and economic research related to sampling and experimental design, testing of hypothesis, and using nonparametric tests. Prerequisite: CISQ 5203 or equivalent.

CISQ5623 Statistical Analysis (SP) Applications of statistical techniques and analysis of business and economic research. For students in business and economics without regard to fields of specialization. Prerequisite: CISQ 5203.

CISQ5713 Seminar in Telecommunications (FA) General telecommunications characteristics and capabilities relative to business applications, networking, electronic commerce, consideration of IT management, security, and ethics. Prerequisite: CISQ 3333.

CISQ5723 Computer Methods in Research (SU) Applications of computers to business and industrial research. Numerical problem-solving techniques, statistical computational techniques and packages, accessing of government and private standard data bases. Prerequisite: CISQ 5623.

CISQ5733 Advanced Business System Modeling (IR) Analysis and modeling of business systems using simulation techniques. Modeling of business systems using an appropriate simulation language; extensive use of computer. Prerequisite: CISQ 2263 and CISQ 3333.

CISQ5833 Data Management Systems (IR) Investigation and application of advanced database concepts include database administration, database technology, selection and acquisition of database management systems. Data modeling and system development in a database environment. Prerequisite: CISQ 5423 and CISQ 2263.

CISQ5933 Global Information Systems Seminar (IR) (First Offered Spring 2000.) This course is designed to provide an updated, comprehensive and rigorous treatment of the emerging global IT fields. It summarizes current experiences, offers managerial insights, and incorporates foundational perspectives and examines significant issues from global perspectives. Prerequisite: graduate standing.

CISQ5943 Management of Information Technology Seminar (SP) Presented in a way that allows you to play an active role in the design, use, and management of information technology. Using IT to transform the organization, as competitive strategy, and creating new relationship with other firms is included. Pre- or Corequisite: CISQ 5833. Prerequisite: CISQ 5423.

CISQ6001 Research Seminar in DSS (IR) An examination of research topics in decision support systems (DSS). Emphasis on understanding and conducting DSS research. Pre- or Corequisite: CISQ 5503.

CISQ6011 Graduate Colloquium (FA, SP) Presentation and critique of research papers and proposals.

CISQ6021 Research Seminar in Systems Development (IR) An examination of research topics in system development. Emphasis on understanding and conducting systems development research. Pre- or Corequisite: CISQ 5423.

CISQ6031 Research Seminar in Data Management (IR) An examination of research topics in data management. Emphasis on understanding and conducting data management research. Pre- or Corequisite: CISQ 5833.

CISQ6103 Seminar in Management Information Systems (IR) Focuses on the relationship between an information system and the organization it supports. Topics include system theory, information system resources, types of information systems, and characteristics of the managerial activities that involve information systems. Prerequisite: CISQ 5723.

CISQ6113 Seminar in Computer Information Systems (IR) Provides the student with information in current CIS technological topics. Topics include end-user computing and development, advanced generation languages, artificial intelligence, human factors, small business computing, data center management, distributed data processing and communications, and technology. Prerequisite: CISQ 6103.

CISQ6123 Seminar in Computer Information Systems Research (IR) This directed special problems seminar provides a forum to study research in CIS. In addition, students design and develop plans of research in light of current topics and methodology. Research topics in CIS. Prerequisite: CISQ 5423 and CISQ 5503 and CISQ 5833 and CISQ 6113.

CISQ636V Special Problems (1-6) (IR) Independent reading and research under supervision of senior staff member.

CISQ6423 Seminar in Causal Marketing (FA, SP, SU) Exposure to use of casual modeling in current marketing research; particular emphasis given to confirmatory factors analysis and covariance structure modeling and their applications in construct measurement and hypothesis testing. (Same as MKTT 6423)

CISQ700V Doctoral Dissertations (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF ECONOMICS (ECON)

Joseph A. Ziegler
Department Head
Business Administration Building
575-ECON (3266)

Distinguished Professor and Phillips Petroleum Chair Murray • Professors Britton, Curington, Dixon, Gay, McKinnon, Ziegler • Adjunct Professor Millar • Associate Professors Farmer, Horowitz, Schulman, Sonstegaard • Associate Professor and Lewis E. Epley Jr. Professorship in Economics Ferrier • Assistant Professors Barnett, Kali • Visiting Assistant Professor Collins • Visiting Clinical Assistant Professor Stapp

Degrees Conferred: M.A., Ph.D. (ECON)

COURSES: ECONOMICS (ECON)

ECON4733 Quantitative Economic Analysis (FA) The use of mathematics to formulate and derive economic relationships. Prerequisite: (ECON 2013 and ECON 2023) or ECON 2143.

ECON512V Workshop in Economic Education (1-3) (IR) Overview of basic economic facts and principles with emphasis on means of employing them in the curriculum of elementary and secondary schools. Not open to majors in business and economics. Offered for degree credit in Education only. (Same as EDFD 512) May be repeated for 3 hours.

ECON5143 Applied Principles of Economic Development (IR) Theories of economic development; factors affecting economic development, including directed efforts by public, private groups. Degree credit in Education only. Not open to students with degree programs in Economics, Agricultural Economics or Business Administration. Prerequisite: six hours of economics or economic education.

ECON5163 Introduction to Economic Theory and Analysis (FA, SP, SU) Introduction to economic theory primarily for first year M.B.A. students. Surveys the analytic tools of both micro- and macroeconomics that are necessary for business decision making and study of contemporary economic and social problems such as inflation, unemployment, poverty, and international trade deficits. Prerequisite: graduate standing.

ECON5333 Managerial Economics (FA, SP, SU) Application of economic theory to business decisions. Prerequisite: ECON 5163 and CISQ 5103 and FINN 5203 and MATH 2043 and MATH 2053.

ECON5433 Macroeconomic Theory I (FA, SU) Theoretical development of macroeconomic models that include and explain the natural rate of unemployment hypothesis and rational expectations, consumer behavior, demand for money, market clearing models, investment, and fiscal policy.

ECON5533 Microeconomic Theory I (FA, SU) Introductory microeconomic theory at the graduate level. Mathematical formulation of the consumer choice, producer behavior, and market equilibrium problems at the level of introductory calculus. Discussion of monopoly, oligopoly, public goods, and externalities.

ECON5563 History of Economic Thought (FA) Seminar in development of economic ideas, theories; causes and development of schools of thought emphasized.

ECON5613 Econometrics (FA) Use of economic theory and statistical methods to estimate economic models. The single equation model are examined emphasizing multicollinearity, autocorrelation, heteroskedasticity, binary variables and distributed lags. An introduction to the simultaneous systems model is presented. Two 80 min. lecture peri-

ods weekly. (Same as AGEC 5613) Prerequisite: MATH 2043 and knowledge of matrix methods, which may be acquired as a corequisite and (AGEC 1103 or ECON 2023) and an introductory statistics course.

ECON5623 Econometrics II (SP) Use of economic theory and statistical methods to develop and estimate simultaneous equation models of an economy. Emphasis given to the problem of identification and the methods of estimating systems models. Frontier topics are introduced. (Same as AGEC 5623) Prerequisite: ECON 5433 and ECON 5533 and (ECON 5613 or AGEC 5613).

ECON5853 International Economics Policy (SP) An intensive analysis of the operation of the international economy with emphasis on issues of current policy interest. Prerequisite: ECON 5163.

ECON600V Master's Thesis (1-6) (FA, SP, SU)

ECON6233 Microeconomic Theory II (SP) Advanced treatment of the central microeconomic issues using basic real analysis. Formal discussion of duality, general equilibrium, welfare economics, choice under uncertainty, and game theory.

ECON6243 Macroeconomic Theory II (FA) Further development of macroeconomic models to include uncertainty and asset pricing theory. Application of macroeconomic models to explain real world situations.

ECON636V Special Problems in Economics (1-6) (FA, SP, SU) Independent reading and investigation in economics.

ECON643V Seminar in Economic Theory and Research I (1-3) (FA)

ECON644V Seminar in Economic Theory and Research II (1-3) (SP) Independent research and group discussion.

ECON6833 Seminar in International Economics (FA) A rigorous survey of theories and empirical evidence in international economics covering the determinants of trade and investment, commercial policy, balance of payments adjustments, and the workings of the international monetary system. Prerequisite: ECON 5433 and ECON 5533.

ECON700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF FINANCE (FINN)

Wayne Y. Lee
Department Chair and
Alice L. Walton Chair in Finance
302 B.A. Building
575-4505

• Arkansas Bankers Association and Bellamy Chair of Banking Professor Dominick • Alice L. Walton Chair In Finance Professor Lee • Dillard Chair Of Corporate Finance Professor Millar • Harold A. Dulan Finance Chair In Capital Formation • Professor Liu • Associate Professors Hearth, Perry, Rimbey • Clinical Assistant Professor Carter

Degree Conferred: Ph.D. in Business Administration (BADM)

(See College of Business Administration)

COURSES: FINANCE (FINN)

FINN4133 Advanced Investments (FA, SP) Sound training in the principles of security analysis and portfolio management and certain advanced techniques of financial management. Modern portfolio theory and its application to portfolio management practices will be emphasized. Prerequisite: ECON 2023 and ACCT 2023 and CISQ 2013 and FINN 3063 and FINN 3043.

FINN4143 Portfolio Management I (FA) Theories of portfolio construction, rules, fundamental analysis, and random walk as applied to portfolio management; investment goals and strategies; decision making on portfolio of Rebsamen Investment Trust. Prerequisite: FINN 3043 and FINN 3063.

FINN4153 Portfolio Management II (SP) Theories of portfolio construction, rules, fundamental analysis, and random walk as applied to portfolio management; investment goals and strategies; decision making on portfolio of Rebsamen Investment Trust. Prerequisite: FINN 4143.

FINN4233 Financial Policy and Planning (FA, SP, SU) Policy and problems in financial planning for working capital, capital budgets, and capital structure. Prerequisite: FINN 3043.

FINN5203 Money and Capital Management (SP, SU) Role of finance in U.S. economy; the institutions, monetary theory, policies which comprise environment in which financial decisions are made. Finance function within firm; financial analysis, planning and control, financial decision making models, financial policies for management. Prerequisite: ACCT 5103 and ECON 5103 and CISQ 5203.

FINN5303 Advanced Financial Management (FA, SP, SU) Financial management of firm, with special emphasis on financial planning, capital budgeting, cost-of-capital concepts. Prerequisite: FINN 5203.

FINN5333 Investment Theory and Management (FA) Integration of theory, practice of investments with solution of individual and institutional portfolio management problems; Institute of Chartered Financial Analysts' Problems; variable annuity in estate planning. Prerequisite: FINN 5203.

FINN5623 Investment Banking and Securities Markets (FA) Topics include investment banking, securities markets, traditional and new financial products, money management, and financial innovation. Prerequisite: FINN 5203.

FINN5633 Financial Institutions (SP) Savings intermediation and its effects on allocating investments funds; characteristics of financial institutions including services, assets management, growth; relations between growth of institutions and interest rates, consumer behavior, investment demand, government policies, critical evaluation of performance by financial intermediaries. Prerequisite: FINN 5203.

FINN5703 Multinational Business Finance (FA) Problems pertinent to manager of firm in multinational business environment, including international institutions, risks, investments, capital budgeting. Prerequisite: FINN 5203.

FINN6043 Finance Theory (FA, SP, SU) Provides a conceptual understanding of key theoretical developments in the field of financial economics, including firm decisions under risk within a world of uncertainty.

FINN6133 Seminar in Investment Theory (SP) Study advanced literature in field investments, with special reference to theory of random walks, stock valuation models, portfolio management.

FINN6233 Seminar in Financial Management (FA) Financial management of firm with emphasis on financial theory or firm, quantitative methods used in financial analysis, planning.

FINN6333 Empirical Research in Finance and Accounting (FA, SP, SU) A study of recent empirically based research in finance and accounting literature with emphasis on the application of various research methods to finance and accounting data. (Same as ACCT 6333)

FINN636V Special Problems in Finance (1-6) (IR) Case studies in investments, corporation finance, money and banking, monetary theory, international finance, public finance. By arrangement.

FINN6733 Seminar in Financial Markets and Institutions (FA, SP, SU) Recent developments in the literature of financial markets and institutions. Participants will be involved in the extensive study of existing theories and empirical tests of the theories.

FINN700V Doctoral Dissertation (1-18) (FA, SP) Prerequisite: candidacy.

DEPARTMENT OF MANAGEMENT

Daniel C. Ganster
Department Chair
402 Business Administration Building
575-6216

• Professors Gupta, Todd, White (D.D.) • Raymond F. Orr Chair In Management And Professor Of Management Ganster • Associate Professors Delery, O'Leary-Kelly (A.), Reeves • Assistant Professors Anand, Johnson, Ellstrand • Visiting Assistant Professor Rohrer-Murphy

Degree Conferred: Ph.D. in Business Administration (BADM)

(See College of Business Administration)

COURSES: MANAGEMENT (MGMT)

MGMT5203 Managerial Process and Organizational Behavior (FA, SP) Acquaints students with administrative and management functions of planning, organizing, directing, and controlling. Special attention given to the impact of human subsystems in organization, organizational designs and structures, and organizational environments.

MGMT5323 New Venture Development and Small Business Management (SU) Identification and analysis of new venture opportunities, including the acquisition of resources. The role of the entrepreneur in developing and managing small business, including the development of entrepreneurial strategies and the analysis of growth opportunities.

MGMT5333 Operations Management (FA) Functions and quantitative techniques involved in the operating areas of a business. An enterprise is viewed as integrated system to demonstrate interrelation of functions and use of feedback, control; current research and special problems supplement text. (Same as CISQ 5333) Prerequisite: CISQ 5103.

MGMT5343 Managerial Communication (FA, SP, SU) Communication concepts and theories with emphasis on written and oral skill building. Students apply concepts and skills in a variety of communication contexts.

MGMT5353 Multinational Management (FA) Problems involved in multinational management of business firms; emphasis placed on environmental and organizational variables and the application of management concepts as they apply to international situations.

MGMT5363 Strategic Innovation (SU) Management of innovation and growth in organizations. Organization development processes, and the application of organizational change models such as intrapreneurship, innovation management, and total quality management.

MGMT5373 Management of Human Resources (SP, SU) Familiarizes students with impact of routine managerial decisions on human resources and impact of human resource management on organizational functioning. Develops human resource management skills and highlights the place of human resource management in the performance of managers' functional roles. Prerequisite: MGMT 5203.

MGMT5383 Intra/Entrepreneurship of Technology (SP) (First Offered Spring 2000) A multidisciplinary review of managing the development of new technical products and services in startups and in existing companies. The course includes examination of the search and evaluation for new technical products; development of business plans, resources, and prototypes: and managing the launch and business development of new products.

MGMT5403 Business Policy and Decision Making (FA, SP, SU) Policy problems of business organization; develops logical thinking, gives training in writing and presenting oral solutions to problems requiring business decision making. Integrates fields of marketing, finance, accounting, economics, law, personnel, insurance, transportation into managerial concept of business decision making.

MGMT5943 Labor Legislation (IR) Principal statues, administrative board decisions, common law applications relevant to problems of labor-management relations; impact of collective bargaining and labor contract on managerial decision making and prerogatives; labor's rights and duties and management's rights and duties under current labor legislation.

MGMT5993 Entrepreneurship Practicum (FA, SP, SU) Hands-on management of an actual on-going business. Students will gain experience working in, making decisions about, and managing a competitive business. Students will be required to analyze the business in a term paper or other integrative assignment.

MGMT6011 Graduate Colloquium (FA, SP) Presentation and critique of research papers and proposals. May be repeated.

MGMT6113 Seminar in Organizational Behavior (IR) Survey of theoretical and empirical literature in organizational behavior. Stresses critical evaluation of current writing in the field and its integration with prior research. Covers topics relating to motivation, individual differences, job attitudes, social influence processes, and group dynamics. Prerequisite: admission to a Ph.D. program.

MGMT6123 Seminar in Organization Theory (IR) This Ph.D.-level seminar presents an overview and introduction into organization theory literature. Emphasis on the development of relevant schools of thought, changes in the content of the traditional or 'mainstream' themes, current topics, schools of thought, and future directions are examined. Prerequisite: admission to a Ph.D. program.

MGMT6133 Seminar in Strategy Research (IR) This Ph.D.-level seminar presents an overview and introduction into the strategic management literature. Emphasis on both the content and process of the extant research. Relevant theory, methods, 'mainstream' themes, current topics, schools of thought, and future directions are examined. Prerequisite: admission to a Ph.D. program.

MGMT6213 Seminar in Research Methods (IR) Familiarizes students with the principles and techniques underlying research in management and organizations. Issues of basic philosophy of science and research methods are covered. Special attention given to the practical problems of research design, measurement, data collection, sampling, and interpretation in conducting research in management and in organizations. Prerequisite: admission to a Ph.D. program.

MGMT6223 Seminar in Management Topics (IR) Seminar in special research topics in management. Topics vary depending upon instructor. Prerequisite: admission to a Ph.D. program.

MGMT6233 Seminar in Human Resource Management (IR) Provides an overview of major issues in human resource management. Designed to familiarize students with the seminal research in human resource management, and to provide them with the conceptual and methodological tools necessary to do research in the area. Prerequisite: admission to a Ph.D. program.

MGMT636V Special Problems in Management (1-6) (FA, SP) Individual reading and research.

MGMT700V Doctoral Dissertation (1-18) (FA, SP) Prerequisite: candidacy.

DEPARTMENT OF MARKETING AND TRANSPORTATION (MKTT)

Thomas D. Jensen
Department Chair
302 Business Administration Building
575-4055

Wal-Mart Chair of Marketing Professor Burton • Wal-Mart Lecturer in Retailing Professor Jensen • R.A. and Vivian Young Chair of Business Administration Professor Kurtz • Oren Harris Chair of Transportation Professor Ozment • Oren Harris Chair of Logistics Professor Williams • Associate Professors Ashton, Creyer, Gentry, Kopp, Murray, Rapert, Stassen • Assistant Professor Mendoza • Visiting Assistant Professor Yarbrough • Research Associate Professor Walker

Degrees Conferred:
M.T.L.M. in Transportation and Logistics Management (TLOG)
Ph.D. in Business Administration (BADM)

COURSES: MARKT/TRANSP (MKTT)

MKTT5103 Marketing Concepts (FA, SP) Marketing organization and methods; emphasizes social, emphasizes social, economic aspects of distribution. Consumer problems, marketing functions, institutions, distribution methods. Prerequisite: ECON 5163.

MKTT5303 Marketing Problems (FA, SP, SU) Case approach to marketing problems of wholesale and retail establishments, manufacturers; problems related to consumer, products, channels of distribution, promotion, pricing, operating diagnosis, control. Prerequisite: MKTT 5103.

MKTT5313 International Marketing (IR) Studies overseas environmental forces; their impact on international marketing decision making; stresses marketing problem solving in the international setting.

MKTT5333 Retailing Strategy and Processes (SU) Strategic planning and operation of retailing organizations. Investigation of the various types of retailing with emphasis on both the strategic and functional aspects in retail processes.

MKTT5433 Consumer and Market Research (SP) Modern marketing research techniques and their applications to problems related to marketing strategy, pricing, forecasting, and policy determination. Special attention is given to consumer research, behavioral concepts, and the measurement for marketing purposes. Prerequisite: CISQ 5203

MKTT5533 Strategic Category Management (SU) Strategic planning and management of brands and product categories from both manufacturing and retailing perspectives. Focus is on the product brand development, pricing, distribution, and promotion of brands and their strategic and functional roles in the product mix.

MKTT5553 Buyer Behavior (FA) Behavioral science concepts, applied research relating to consumer and executive purchasing processes; stresses problems in buyer behavior research , conceptual integration, relevance to marketing management. Prerequisite: MKTT 5103

MKTT636V Special Problems in Marketing (1-6) (IR) Individual research problems.

MKTT6413 Special Topics in Marketing (FA, SP, SU) Seminar in special topics in marketing. Topics vary depending upon the instructor.

MKTT6423 Seminar in Causal Marketing (FA, SP, SU) (Same as CISQ 6423)

MKTT6433 Seminar in Research Methods (FA) Extensive review of literature illustrative of marketing research studies. Focuses upon theoretical foundations of research design, methodology, and analysis as well as interpretation of univariate, bivariate, and multivariate data in marketing theory exploration.

MKTT6443 Seminar in Marketing Theory (SP) Comprehensive survey and critical review of the history of marketing thought and contemporary schools of thought in marketing discipline. Indepth research, review, synthesis, and a research proposal will be required in a selected topic from the perspectives of advancing marketing theory. Prerequisite: MKTT 5103 and MKTT 5303.

MKTT6453 Seminar in Transportation and Business Logistics (Odd years) Underlying theories and problems related to the development of logistical systems in the U.S. Attention focused on transport economics, the role of government in providing transportation facilities, and managerial issues related to integrating transportation, inventory control, warehousing, customer service levels, and facility location.

MKTT6463 Seminar in Strategic Marketing Management (FA, SP, SU) Comprehensive survey of literature of strategic marketing management area. Focuses on critical evaluation of conceptual frameworks, research methodologies, and interdisciplinary integrations. Requires indepth research, synthesis, integration, and conceptualization resulting in a research paper aimed at advancing the field of strategic marketing management. Prerequisite: MKTT 5303.

MKTT700V Doctoral Dissertation (1-18) (FA, SP) Prerequisite: candidacy.

COURSES: TRANSP & LOG (TLOG)

TLOG560V Special Topics in Logistics (1-3) (IR) Explores current events, concepts, and new developments in the field of logistics and transportation. Topics are selected by the Marketing and Transportation faculty for each semester the course is offered.

TLOG5633 Business Logistics Systems (FA) Case approach to physical distribution problems of wholesale, retail, manufacturing establishments.

TLOG5643 Strategic Issues in Transportation Management (FA) Focuses on the setting of objectives and the design of optimal transportation strategy and alternative means of implementing transportation strategies within different types of organizations.

TLOG5653 Global Logistics Strategy (SP) Transportation and logistics activities of multinational firms with emphasis on transportation, customer service, inventory control, facility location global sourcing, customs documentation, and the role of government in importing and exporting. Attention given to current events and their effect on the marketing and logistics activities of U.S.-based organizations. Prerequisite: TLOG 5633.

TLOG5663 Supply Chain Management (FA) This course examines the planning and management of supply chain activities including supplier selection and development, demand management, quick response, vendor managed inventory, logistics options, strategic alliances, and performance measurement. Emphasis is placed on the integration of purchasing, materials management, and multi-firm logistics planning.

TLOG5673 Transportation & Logistics Modeling (SP) This course examines technology and computer applications in transportation and logistics, using an integrated supply chain management technique. Topics covered include computer information systems, decision support systems, optimization models, simulation, advanced statistics, and commercial logistics software systems. Prerequisite: TLOG 5633 and TLOG 5643.

Departments, Degree Programs, and Courses

COURSE NUMBERS AND DESCRIPTIONS

The following courses of instruction are offered by the Graduate School of the University of Arkansas. Each course is identified by a four-digit number, which carries the following information:

The first three digits identify the course, the first digit denoting course level. The fourth digit indicates semester credit hours.

The letter "V" is used in place of the last digit for those courses in which credit is variable, the minimum and maximum credit being given in parenthesis after the course title.

A suffix to the course number will provide further identification. An "L" denotes a laboratory. Other suffixes may be found in the class schedule.

As nearly as can be determined in advance, the semester in which each course will be offered is designated by a symbol in parentheses placed immediately after the course title.

• Courses marked (FA) will be offered in the fall semester.

• Courses marked (SP) will be offered in the spring semester.

• Courses marked (SU) will be offered one or both terms of the summer session.

Where there are prerequisites to a course, these are noted following the description. Students are urged to check prerequisites before enrolling in any course, and to consult their advisers whenever there is any question of prerequisites having been satisfactorily completed.

Course Prefixes (Alpha Codes)

AAST	African American Studies
ACCT	Accounting
ADED	Adult Education
AERO	Aerospace Studies
AGAD	Agricultural Administration
AGEC	Agricultural Economics
AGED	Agricultural Education
AGME	Agricultural Mechanization
AGRN	Agronomy
AGST	Agricultural Statistics
AIST	Asian Studies
ANSC	Animal Sciences
ANTH	Anthropology
APHY	Applied Physics
ARAB	Arabic
ARCH	Architecture
ARED	Art Education
ARHS	Art History
ARSC	Arts & Sciences
ARTS	Art
ASTR	Astronomy
BADM	Business Administration
BAEG	Biological and Agricultural Engineering
BAST	Biological and Agricultural Systems Technology
BIOL	Biology
BLAW	Business Law
BOTY	Botany
CDIS	Communication Disorders
CEMB	Cell and Molecular Biology
CHEG	Chemical Engineering
CHEM	Chemistry
CHIN	Chinese
CIED	Curriculum and Instruction
CISQ	Computer Information Systems and Quantitative Analysis
CLST	Classical Studies
CMJS	Criminal Justice
CNED	Counselor Education
COMM	Communication
CSCE	Computer Science
CENG	Computer Engineering
CVEG	Civil Engineering
DANC	Dance
DRAM	Drama
EASL	English As A Second Language
ECON	Economics
EDAD	Educational Administration
EDFD	Educational Foundations
ELED	Elementary Education
ELEG	Electrical Engineering
ENDY	Environmental Dynamics
ENGL	English
ENSC	Environmental Science
ENTO	Entomology
ENVD	Environmental Design
ETEC	Educational Technology
EUST	European Studies
EXED	Extension Education
FDSC	Food Science
FIIR	Fulbright Institute of International Relations
FINN	Finance
FLAN	Foreign Languages
FREN	French
GEOG	Geography
GEOL	Geology
GERM	German
GNEG	General Engineering
GREK	Greek
HESC	Human Environmental Sciences
HIED	Higher Education
HIST	History
HKRD	Health Science, Kinesiology, Recreation and Dance
HLSC	Health Science
HNED	Education Honors
HNRS	Honors Studies
HORT	Horticulture
HUMN	Humanities
INEG	Industrial Engineering
ITAL	Italian
ITED	Industrial and Technical Education
JAPN	Japanese
JOUR	Journalism
KINS	Kinesiology
LARC	Landscape Architecture
LAST	Latin American Studies
LATN	Latin
LAWW	Law
MATH	Mathematics
MBAD	Masters of Business Administration
MBIO	Microbiology
MEEG	Mechanical Engineering
MEPH	Microelectronics-Photonics
MEST	Middle East Studies
MGMT	Management
MILS	Military Science
MKTT	Marketing/Transportation
MLIT	Music Literature
MUAC	Applied Music (Class)
MUAP	Applied Music (Private)
MUED	Music Education
MUEN	Music Ensemble
MUHS	Music History

MUPD	Music Pedagogy
MUSC	Music
MUTH	Music Theory
NURS	Nursing
OFSM	Office Systems Management
OMGT	Operations Management
PADM	Public Administration
PEAC	Physical Education (Activity)
PHED	Physical Education
PHIL	Philosophy
PHSC	Physical Science
PHYS	Physics
PLPA	Plant Pathology
PLSC	Political Science
PORT	Portuguese
POSC	Poultry Science
PSYC	Psychology
PTSC	Plant Science
PUBP	Public Policy
RDNG	Reading
RECR	Recreation
RHAB	Rehabilitation Education
RSOC	Rural Sociology
RSST	Russian Studies
RUSS	Russian
SCWK	Social Work
SEED	Secondary Education
SOCI	Sociology
SPAN	Spanish
SPED	Special Education
STAT	Statistics
TLOG	Transportation and Logistics
UNIV	University Level
VAED	Vocational and Adult Education
VOED	Vocational Education
VTSC	Veterinary Science
WCIV	Western Civilization
WLIT	World Literature
ZOOL	Zoology

CHANGES IN CATALOG INFORMATION

This catalog contains information which should be accurate at the time of completion. However, regulations, fees, programs of study, and individual courses are regularly revised, and the catalog information is thus subject to change.

Students are expected to keep themselves informed concerning current regulations, policies, and program requirements in their fields of study and must meet all requirements of the degree programs in which they are enrolled. Courses which are modified or added to a curriculum and which are incorporated into the curriculum at a level beyond that at which a student is enrolled may become graduation requirements for that student. Courses which are incorporated into the curriculum at a level lower than the one at which the student is enrolled are not required for that student.

The most current information may be found at the Graduate School web site (http://www.uark.edu/depts/gradinfo).

A full listing of all Graduate School policies may be found in the Graduate School Handbook, available on the Graduate School web site at http://www.uark.edu/depts/gradinfo.

DEPARTMENT OF ACCOUNTING (ACCT)

(See Graduate School of Business, page 32.)

ADULT EDUCATION (ADED)

Barbara E. Hinton
Head, Department of Vocational and Adult Education
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B.R. Lyle, Graduate Coordinator

• Professors Dutton, Hinton • Associate Professors Harvey, Lyle • Assistant Professor Emeritus Herrington • Visiting Assistant Professor Brooks, Carder, Lofton • Adjunct Instructor Holt • Instructor Wills

Degrees Conferred:

M.Ed. (ADED)
Ed.S., Ed.D. (EDUC)

Requirements for the Master of Education Degree: The basic M.Ed. program is a 33-hour non thesis, non-certification program; however, certification is available for adult educators who meet the requirements. The student's program of study consists of the requirements listed below. All candidates who seek admission to the program must have a cumulative grade-point average of 2.70 or higher; demonstrate professional promise; and have obtained a bachelor's degree from an accredited institution.

Degree Requirements - 33 hours

1. College of Education and Health Professions(COEHP) Core - 9 hours
2. Adult Education Core - 3 hours (ADED 5323)
3. Specialty Studies - 12-15 hours (ADED and VAED)
4. Electives - 6-9 hours

Requirements for the Educational Specialist and Doctor of Education Degrees:

See Vocational and Adult Education (VAED).

Through an agreement with the Academic Common market, residents of certain southern states may qualify for graduate enrollment in the Ed.D. program in adult education. See page 163 for details.

COURSES: ADULT EDUC (ADED)

ADED5103 Learner in Adult Education (FA, SP, SU) The learner in adult education programs is examined from young adulthood to death. Emphasis is given to understanding the effect this knowledge has on the teaching-learning process in adult education and to how adult education programs are designed to serve the uniqueness demanded by adult learning situations.

ADED5113 Adult Learner: The Later Years (FA, SP, SU) Directed toward people who are most likely to interact with older adults in a learner setting. Emphasis is on understanding the educational needs, wants, and characteristics of older learners so that appealing, valuable, and efficient instruction can be developed.

ADED5123 Nontraditional Student (FA, SP, SU) An overview of activities that could ultimately promote greater access and success for adult learners with higher education.

ADED5203 ABE/GED/ESL (FA, SP, SU) An introductory course to teaching adults at the Adult Basic Education (ABE), General Education Development (GED-High School Equivalency), and English as a Second Language (ESL) levels. Will address instructional needs assessment, curriculum development and evaluation, and techniques of teaching basic skills in various settings including public schools, vocational-technical schools, technical institutes, technical colleges, community organizations, and the workplace.

ADED5213 Teaching Reading to Adults (FA, SP, SU) A practically-oriented course enabling the ABE/GED teacher to improve the reading program by developing skill in the identification of the reading difficulties of adult students and in the use of suitable strategies for helping these adults overcome their difficulties. Emphasis on diagnostic-prescriptive reading instruction and will include the following 3 main components: the adult as a learner; assessing reading needs in adult basic education; and developing reading skills for the adult learner.

ADED5223 Teaching Disadvantaged Adults (FA, SP, SU) A survey of the diversity of adult learners comprising that population described as educationally disadvantaged. Consideration given to the various physical, mental, social, and economic factors which contribute to the uniqueness of this body of individual differing abilities.

ADED5303 Contemporary Issues in Adult Education (FA, SP, SU) Examines issues of methodology, theories, materials, and programming currently emerging in the field of adult education. Discussion focus upon timely topics as they appear in the professional publications.

ADED5313 The Change Process in Adult Education (FA) Processes available for changing adult behavior in both formal and informal situations. Emphasis on adult educator's role as a change agent.

ADED5323 Foundations of Adult Education (FA, SP, SU) History of the adult education movement in America, characteristics, interests, abilities, and educational needs of adults; the role of the public school in adult education; methods and techniques of conducting adult classes.

ADED560V Workshop (1-18) (FA, SP, SU)

ADED574V Internship (1-18) (FA, SP, SU)

ADED599V Seminar (1-18) (FA, SP, SU)

ADED700V Doctoral Dissertation (1-18) (FA, SP, SU)

DEPARTMENT OF AGRICULTURAL & EXTENSION EDUCATION (AEED)

Donald R. Herring
Department Head
205 Agriculture Building
575-2035

George W. Wardlow
Graduate Coordinator
205 Agriculture Building
575-2035

• Professors Ferguson, Herring, Johnson, Wardlow • Associate Professors Arthur, Graham, Scott • Assistant Professors Lester, Wyatt

Degrees Conferred: M.A.T. in Agricultural Education (AGED)

(See Agricultural Education)

M.S. (AEED)

Areas of Concentration: Agricultural education or extension education, and a technical area.

Prerequisites to Degree Program: Bachelor's degree in a closely allied field. Some deficiency courses may be assessed depending on the background and educational objectives of the student.

Requirements for the Master of Science Degree: This program requires 33 semester hours, including completion of a thesis (6 hours). Core courses (12 hours) are specified by departmental graduate faculty and include: research methods, statistics, technical writing or AGED 5473 and philosophy of agricultural and extension education. The remaining 15 hours may be taken in a technical area of concentration, or agricultural and extension education, or agricultural mechanization. The thesis will be done on a research problem which bridges agricultural education, or extension education, with the technical area.

COURSES: AGRI EDUC (AGED)

AGED5001 Seminar (SP) Presentations and discussion of graduate student research as well as review of current literature and topics of current interest by students and faculty. All graduate students will make at least one formal presentation.

AGED5013 Advanced Methods in Agricultural Mechanics (IR) Emphasis on shop organization and management, courses of study, unit shop instruction, and development of skills in agricultural mechanics.

AGED5031 Ethics in Agricultural and Extension Education (FA) A study of ethics as applied to problems of professional practice. The focus will be on case studies.

AGED5033 Developing Leadership in Agricultural Organizations (IR) Organizational concepts of leadership; administrative styles and structures; leadership for boards, committees, governmental bodies, and review of societal and political processes. Prerequisite: graduate standing.

AGED5053 Philosophy of Agricultural and Extension Education (IR) An examination and analysis of social and economic events leading to the establishment and maintenance of federal, state, county, and local agricultural education programs. Lecture 3 hours per week. Prerequisite: graduate standing.

AGED5074 Program Management Practicum (SP) A course involving activities emphasizing the practical application of theory and on-the-job experiences in program management. Corequisite: AGED 575. Prerequisite: admission into the MAT program.

AGED510V Special Problems (1-6) (FA, SP, SU) Individual investigation of a special problem in agricultural education which is not available through regular courses. These will be directed by a member of the graduate faculty. Prerequisite: graduate standing.

AGED520V Special Topics in Agricultural and Extension Education (1-4) (IR) Topics not covered in other courses or a more intensive study of specific topics in agriculture education. May be repeated. Prerequisite: graduate standing.

AGED5463 Research Methodology in the Social Sciences (SP, Odd years) Logical structure and the method of science. Basic elements of research design; observation, measurement, analytic method, interpretation, verification, presentation of results. Applications to research in economic or sociological problems of agriculture and human environmental sciences. (Same as HESC 5463, RSOC 5463) Prerequisite: graduate standing.

AGED5473 Interpreting Social Data in Agriculture (FA) The development of competencies in analyzing, interpreting and reporting the results of analyses of social science data in agriculturally related professions. Students will select appropriate analysis techniques and procedures for various problems, analyze data, and interpret and report the results of statistical analyses in narrative and tabular form. Prerequisite: AGST 4023 (or EDFD 5393) and AGED 5463 (or RSOC 5463 or HESC 5463).

AGED550V College Teaching in Agriculture and Related Disciplines (1-3) (IR) For students who are pursuing graduate degrees where emphasis is on preparation for a research career, but who also may desire or expect to teach. Provides theory and practice in planning and executing a college-level course.

AGED575V Internship in Agricultural Education (1-6) (FA, SP) Scheduled practical field experiences under supervision of a professional practitioner in off-campus secondary school systems. Emphasis includes classroom preparation, teaching, and student evaluation.

AGED600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

COURSES: EXTENSION ED (EXED)

EXED4173 Principles of Extension Teaching (FA) An understanding of the principles of teaching and learning, selection, and use of teaching methods and materials with emphasis on the role of extension as a part of the community education system. Prerequisite: EXED 3023 and PSYC 2003.

EXED5113 Program Development and Evaluation (IR) Principles and proceedings of program development process including planning, designing, implementing, and evaluating of extension education programs. An emphasis on the framework for applying adult and nonformal education principles to the change process. Prerequisite: EXED 3023.

EXED5133 Extension Organization and Administration (IR) Program and personnel administration for planning and management of county extension programs. Emphasis will be given to organization, structures, principles, and theories of administration, personnel management, training and evaluation. Prerequisite: graduate standing.

COURSES: AGRI MECH (AGME)

AGME400V Special Problems (1-6) (FA) Individual research or study in electrification, irrigation, farm power, machinery, or buildings. May be repeated. Prerequisite: senior standing.

AGME402V Special Topics in Agricultural Mechanization (1-4) (IR) Topics not covered in other courses or a more intensive study of special topics in agricultural mechanization. May be repeated.

AGME4203 Mechanized Systems Management (FA, SP, SU) Selection, sizing, and operating principles of agricultural machinery systems, including power sources. Cost analysis and computer techniques applied to planning and management of mechanized systems. Corequisite: AGME 4200L. Prerequisite: MATH 1203 and BAST 2903 (or AGME 2903).

AGME4200L Mechanized Systems Management Laboratory (FA, SP, SU) Corequisite: AGME 4203.

AGME4963 Soil and Water Conservation Technology (SP, Even years) Management and conservation of soil and water resources in agriculture. Analysis of the nature of natural resources in agriculture and problems arising form their abuse. Analytical solution of soil and water management problems including estimating runoff and erosion and effective control. Recitation 2 hours per week, laboratory 3 hours per week. Prerequisite: AGME 1613.

AGME4960L Soil and Water Conservation Technology Laboratory (FA, Even years) Corequisite: AGME 4963.

AGME4973 Irrigation (SP, Odd years) Methods of applying supplemental water to soils to supply moisture essential for plant growth, sources of water, measurement of irrigation water, pumps, conveyance structure, economics, and irrigation for special crops. Lecture 2 hours, laboratory 3 hours per week. Corequisite: AGME 4970L. Prerequisite: MATH 1203.

AGME4970L Irrigation Laboratory (SP, Odd years) Corequisite: AGME 4973.

AGME4983 Agricultural Meteorology (FA, Even years) Meteorological phenomena, their observation and measurements and their interaction with agricultural biological systems. Lecture 3 hours per week. Prerequisite: MATH 1203.

AGME5014 Experiment Station Operations I (IR) Planning and design of experiment stations; general, personnel, fiscal, and communications administration on an experiment station. Lecture 3 hours, laboratory 3 hours per week. Corequisite: AGME 5010L.

AGME5010L Experiment Station Operations I Laboratory (IR) Corequisite: AGME 5014.

AGME5024 Experiment Station Operations II (IR) Research support services; natural resource management; experiment station operations; physical plant operations and equipment; and augmentation services. Lecture 3 hours, laboratory 3 hours per week. Corequisite: AGME 5020L.

AGME5020L Experiment Station Operations II Laboratory (IR) Corequisite: AGME 5024.

COURSES: BI/AG SY TEC (BAST)

BAST400V Special Problems (1-6) (FA, SP)

BAST4754 Engineering Principles of Processing of Agricultural Products (SP, Odd years) Basic mechanics of refrigeration, temperature controls, materials handling and mechanical problems as applied to foods and food processing. Lecture 3 hours, laboratory 3 hours per week. Corequisite: BAST 4750L. Prerequisite: MATH 1213 and PHYS 2033 and PHYS 2031L.

BAST4750L Engineering Principles of Processing of Agricultural Products Laboratory (SP, Odd years) Corequisite: BAST 4754.

DEPARTMENT OF AGRICULTURAL ECONOMICS AND AGRIBUSINESS (AEAB)

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575-2256

• University Professor LaFerney • L.C. Carter Chair In Market Policy Professor Cramer • Professors Cochran, Dixon, Redfern, Wailes • Associate Professors Ahrendsen, Goodwin, Parsch • Assistant Professors McKenzie, J. Popp, M. Popp, Thomsen • Adjunct Assistant Professors Bryant, Millager, Miller

Degree Conferred:
M.S. in Agricultural Economics (AGEC)

Areas of Concentration: agricultural economics, agribusiness, international agribusiness.

Requirements for the Master of Science Degree in Agricultural Economics (Thesis)

Prerequisites to the Thesis Concentration: Six semester hours of Mathematics (College Algebra and Survey of Calculus or above); 3 semester hours of Statistics; 6 semester hours of upper level (junior or senior) Micro and Macro Economic Theory; 3 semester hours of Farm Management or junior or senior level equivalent; 3 semester hours of Agricultural Marketing or junior or senior level equivalent; 6 semester hours of Humanities and/or Social Sciences.

Core Requirements (12 hours):
- AGEC 5303, Agricultural Marketing Theory
- AGEC 5403, Economics of Agricultural Production and Resource Use
- AGEC/ECON 5613, Econometrics I
- ECON 5533, Microeconomic Theory I, OR
- ECON 6233, Microeconomic Theory II

Elective Areas:
- Electives (12 hours)*
- AGEC 5011, Seminar (1 hour)**
- AGEC 600V, Master's Thesis (6 hours)

*A minimum of 19 hours of Agricultural Economics is required.

** All Agricultural Economics graduate students are required to attend AGEC 5011, Seminar, for each semester they are in residence. Each student will register for AGEC 5011 the last semester in attendance.

Requirements for the Master of Science Degree in Agricultural Economics (Agribusiness Concentration, Nonthesis)

Prerequisites to the Nonthesis Concentration: Six semester hours of Mathematics (College Algebra and Survey of Calculus or Finite Mathematics or above); 3 semester hours of Statistics; 6 semester hours of lower division Economic Theory; 3 semester hours of Farm Management or junior or senior level equivalent; 3 semester hours of Agricultural Marketing or junior or senior level equivalent; 3 semester hours of Introductory Accounting.

Methods, Management, Finance, Trade, Policy, and Marketing (19 hours):
- AGEC 5403, Economics of Agricultural Production and Resource Use
- AGEC 5413, Agribusiness Strategy
- AGEC 5143, Financial Management in Agriculture, OR
- AGEC 4143, Agricultural Finance
- AGEC 5153, The Economics of Agricultural Policy, OR
- AGEC 4613, Domestic and International Agricultural Policy
- AGEC 5303, Agricultural Marketing Theory, OR
- AGEC 4303, Advanced Agricultural Marketing Management, OR
- AGEC 4313, Agricultural Business Management
- AGEC 5113, Agricultural Marketing Analysis, OR
- AGEC 4113, Agricultural Prices and Forecasting
- AGEC 5011, Seminar

Business Electives (6 hours); Choose two from the following:
- ACCT 5303, Accounting Decisions and Control
- FINN 5703, Multinational Business Finance
- FINN 5303, Advanced Financial Management
- MGMT 5203, Managerial Processes & Organizational Behavior
- MGMT 5343, Managerial Communications
- MKKT 5303, Marketing Problems
- MKTT 5313, International Marketing
- MKTT 5553, Buyer Behavior
- TLOG 5633, Business Logistics Systems
- TLOG 5653, Global Logistics Strategy
- TLOG 5663, Supply Chain Management

Controlled Electives (6 hours):
- AGEC 503V, Internship in Agricultural Economics (1-6 hours)
- Other Agricultural Economics Graduate Courses
- Graduate Courses from the Sam M. Walton College of Business Administration
- Graduate Courses from the Bumpers College of Agricultural, Food, and Life Sciences

Other Requirements:
- Maximum of 9 hours at the 4000 level
- Minimum of 16 hours in Agricultural Economics

Requirements for the Master of Science Degree in Agricultural Economics (International Agribusiness Concentration, Nonthesis)*

Prerequisites to the Nonthesis Concentration: Six semester hours of Mathematics (College Algebra and Survey of Calculus or Finite Mathematics or above); 3 semester hours of Statistics; 6 semester hours of lower division Economic Theory; 3 semester hours of Farm Management or junior or senior level equivalent; 3 semester hours of Agricultural Marketing or junior or senior level equivalent; and 3 semester hours of Introductory Accounting.

Methods, Management, Finance, Trade, Policy, and Marketing (19 hours):
- AGEC 5403, Economics of Agricultural Production and Resource Use
- AGEC 5413 Agribusiness Stratagy
- AGEC 5143, Financial Management in Agriculture, OR
- AGEC 4143, Agricultural Finance
- AGEC 5153, The Economics of Agricultural Policy, OR
- AGEC 4613, Domestic and International Agricultural Policy
- AGEC 5303, Agricultural Marketing Theory, OR
- AGEC 4303, Advanced Agricultural Marketing Management, OR
- AGEC 4313, Agricultural Business Management
- AGEC 502(1), Special Topics: Macroeconomic Effects on Agriculture
- AGEC 503(3), Internship in Agricultural Economics, OR
- AGEC 500V, Special Problems**

Agribusiness Management*** (SAC Option 1) (12 hours):
- AGEC 502(1), Mgmt Theory & Reality
- AGEC 502(1), Computers in Business Management
- AGEC 502(1), Diversification Case Study
- AGEC 502(3), Examined Case
- AGEC 502(2), Agribusiness Case Studies
- AGEC 502(1), Environmental Management
- AGEC 502(2), Food Ind & Ret Mgmt.
- AGEC 502(1), Banking Case Study

Food Processing Management*** (SAC Option 2) (12 hours):
- AGEC 502(1), Human Resource Management
- AGEC 502(2), Food Industry & Retail Mgmt.
- AGEC 502(2), Int'l Consumer Studies
- AGEC 502(1), Quality Assur. in Food Chain
- AGEC 502(2), Food Business Case Study
- AGEC 502(2), International Marketing
- AGEC 502(1), Int'l Food Bus Study Tour
- AGEC 502(1), Operations Management

Other Requirements:
- Maximum of 9 hours at 4000 level
- Minimum of 16 hours of Agricultural Economics

*Participation in this program includes both Scottish Agricultural College (SAC) and the University of Arkansas, Fayetteville (UAF) students. Students study during the fall semester at UAF, the spring semester at SAC-Aberdeen, and the summer is spent completing an agribusiness internship or special problem, but enrollment remains at the host institution. UAF students earn credits in AGEC 502(V), Special Topics, for courses taken at SAC.

**This application requirement is completed during the summer session.

***Select either option 1 or option 2. Courses are taken on the SAC-Aberdeen campus during the spring semester.

COURSES: AGRI ECON (AGEC)

AGEC4113 Agricultural Prices and Forecasting (FA) Price theory and techniques for predicting price behavior of general economy and price behavior of individual agricultural products will be analyzed. Provides practice in the application of economics and statistics to agricultural price analysis. Lecture 2 hours, laboratory 2 hours per week. Prerequisite: AGEC 1103 (or ECON 2023) and CISQ 2013 (or AGST 4023 or STAT 2023) and MATH 2053 (or MATH 2043) and BAST 2903 (or CISQ 1121L).

AGEC4110L Agricultural Prices and Forecasting Laboratory (FA)

AGEC4143 Agricultural Finance (FA) Methods and procedures whereby agricultural firms acquire and utilize funds required for their successful operation. Emphasis is placed upon role of finance and financial planning and consideration is given to an understanding of financial firms serving agriculture. ACCT 2013 and ACCT 2023 are recommended. Prerequisite: AGEC 1103 (or ECON 2023) and AGEC 2103 (or ECON 2013).

AGEC4303 Advanced Agricultural Marketing Management (SP) Marketing concepts will be developed and applied to the global food and fiber system. The course will use both commodity and product marketing principles and economic theory to analyze varied marketing situations. Case studies will be used to demonstrate role that demand analysis and consumer behavior play in market management. Prerequisite: AGEC 2303 and AGEC 3303.

AGEC4313 Agricultural Business Management (FA) The planning, organizing, leading and controlling functions of management as they relate to agricultural business firms. Marketing of value-added products, budgeting, organizational structure, cost control, financial statements, capital budgeting and employee supervision and motivation. Case studies are used to teach communication and decision-making skills. Prerequisite: senior standing.

AGEC4373 Advanced Price Risk Management (SP) Use of futures markets as risk shifting institutions. Students design and implement hedging and cross hedging strategies for grain farmers, country elevators, soybean crushers, poultry firms, etc. Spreadsheets and statistical techniques are used to develop optimal hedging ratios. Prerequisite: AGEC 3373.

AGEC4403 Advanced Farm Business Management (SP) Principles and procedures of decision making as applied to the allocation of resources in the farm business for profit maximization. Emphasis is placed on use of principles of economics and their application to the decision making process. Includes exercises on the application of principles to specific farm management problems. Prerequisite: AGEC 3403 and AGME 2903 (or BAST 2903 or CISQ 1121L).

AGEC4413 Economics of Environmental Management (SP) An economic approach to problems of evaluating private and social benefits and costs of altering the environment. Emphasis given to the interaction of individuals, institutions, and technology in problems of establishing and maintaining an acceptable level of environmental quality. (Same as ENSC 4413) Prerequisite: AGEC 1103 and AGEC 3413.

AGEC4613 Domestic and International Agricultural Policy (FA) Agricultural and food policies studied from domestic and international perspectives. Examines public policy in terms of rationale, content, and consequences. Economic framework used to assess policies to improve competitive structure, operation, and performance of U.S. and international food and agriculture. Farm, international trade, resource, technology, food marketing, and consumer policies analyzed. Prerequisite: (AGEC 1103 or ECON 2023) and (AGEC 2103 or ECON 2013).

AGEC500V Special Problems (1-3) (FA, SP, SU) Individual reading and investigation of a special problem in agricultural economics not available under regular courses, under the supervision of the graduate faculty. Prerequisite: graduate standing.

AGEC5011 Seminar (FA, SP) Presentation and discussion of graduate student research. Formal presentations are made by all graduate students. Consideration given to research design, procedures, and presentation of results. Prerequisite: graduate standing.

AGEC502V Special Topics (1-3) (IR) Advanced studies of selected topics in agricultural economics not available in other courses. May be repeated. Prerequisite: graduate standing.

AGEC503V Internship in Agricultural Economics (1-6) (IR) On-the-job application of skills developed in the M.S. program (credit/non-credit only).

AGEC5113 Agricultural Marketing Analysis (SU) Course prepares students for some of the more common tasks in market analysis as undertaken by professional agricultural economists in industry, government, and academic institutions. Major emphasis is on the analytical procedures and techniques required in short- and long-term outlook work; forecasting and projecting supply, demand and prices; and optimal market organization. Prerequisite: AGEC 5303.

AGEC5143 Financial Management in Agriculture (IR) Covers advanced topics in agricultural finance. The general focus of the course is the financial management of non-corporate firms. Covers the basic tools of financial analysis including financial arithmetic, asset evaluation under risk, and financial analysis and planning using econometric models. Such topics covered include management of current assets, capital budgeting, capital structure, and institutions involved in agricultural finance. Prerequisite: graduate standing.

AGEC5153 The Economics of Agricultural Policy (SP) Application of welfare criteria and economic analyses to the problems and policies affecting resource adjustments in agriculture. Existing programs and alternative proposals are evaluated for both short and long term viewpoints, under the criterion of resource use and income distribution within agriculture or between agriculture and the rest of the economy. Prerequisite: graduate standing.

AGEC5163 Agricultural and Rural Development (SU) Examination of agricultural and rural development issues in less developed countries. Alternative agricultural production systems are compared, development theories examined, and consideration given to the planning and implementation of development programs. Prerequisite: graduate standing and AGEC 1103 (or ECON 2023).

AGEC5303 Agricultural Marketing Theory (SP) Survey of the structure of agricultural product and factor markets including a critique of theoretical analyses of industry structure, conduct and performance; and a review of market structure research in agricultural industries. Prerequisite: graduate standing.

AGEC5403 Economics of Agricultural Production and Resource Use (FA) Theory of production economics and the concepts of optimum resource allocation within and among agricultural firms. Emphasis is placed on development of techniques for testing the principles of production economics as they relate to efficient allocation of resources in agriculture. Prerequisite: graduate standing.

AGEC5413 Agribusiness Strategy (FA) Addresses problems of strategy formulation in agribusiness emphasizing current problems and cases in agriculture. Surveys modern and classic perspectives on strategy with applications to agribusiness. Examines the development of firm level strategies within the structure and competitive environment of agricultural firms and industries. Prerequisite: graduate standing.

AGEC5613 Econometrics I (FA) Use of economic theory and statistical methods to estimate economic models. The single equation model is examined emphasizing multicollinearity, autocorrelation, heteroskedasticity, binary variables and distributed lags. An introduction to the simultaneous systems model is presented. Two 80-minute lecture periods weekly. (Same as ECON 5613) Prerequisite: MATH 2043 and knowledge of matrix methods, which may be acquired as a corequisite and (AGEC 1103 or ECON 2023) and an introductory statistics course.

AGEC5623 Econometrics II (SP) Use of economic theory and statistical methods to estimate simultaneous equation models of an economy. Emphasis given to the problem of identification and the methods of estimating system models. Frontier topics are introduced. (Same as ECON 5623) Prerequisite: ECON 5533 and ECON 5613 (or AGEC 5613).

AGEC600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

AGEC700V Doctoral Dissertation (1-6) (FA, SP, SU) Prerequisite: candidacy.

AGRICULTURAL EDUCATION (AGED)

Annette Digby
M.A.T. Director
8 Peabody Hall
575-6831

Donald R. Herring
Department Head of Agricultural and Extension Education
205 Agriculture Building
575-2035

Nolan Arthur
Departmental Coordinator of M.A.T.
205 Agriculture Building
575-2035

• Professors Ferguson, Herring, Johnson, Wardlow • Associate Professors Arthur, Graham, Scott, Wardlow • Assistant Professors Lester, Wyatt

Degree Conferred: M.A.T. (AGED)

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree program offered in consecutive summer, fall, and spring semesters. Initial enrollment will be only in the summer semester. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Areas of Concentration: The M.A.T. degree program has seven areas of emphasis: agricultural education, childhood education, middle-level education, physical education, secondary education, special education, and vocational education.

Prerequisites to Degree Program: Students will be selected up to the maximum number designated for each cohort Concentration. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all previous courses
3. Admission to the Graduate School
4. Admission to Teacher Education Program
5. Completion of the pre-education core with a minimum of "C" in all courses
6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Requirements for the Master of Arts in Teaching Degree

Required M.A.T. Core: 10 hours
CIED 5012, Measurement/Research/ Statistical Concepts for Teachers

CIED 5022, Classroom Management Concepts for Teachers
CIED 5042, Reading and Writing Across the Curriculum
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Remaining Required for Concentration in Agricultural Education: 23 hours
AGED 5013, Advanced Methods in Agricultural Mechanics
AGED 5031, Ethics in Agricultural and Extension Education
AGED 5053, Philosophy in Agricultural and Extension Education
AGED 5074, Program Management Practicum
AGED 575V, Internship in Agricultural Education (6 hours)
3-hour technical agriculture elective
3-hour elective

Agronomy

(See Department of Crop, Soil, and Environmental Sciences, Page 65)

DEPARTMENT OF ANIMAL SCIENCE (ANSC)

Keith S. Lusby
Department Head
104 Animal Science Building
575-4351

• Professors Brown (A.H.), Daniels, Kellogg, McNew, Piper, Yazwinski • Adjunct Professors, Baird, Brown (M.A.), Davis, Friesen, Chewning, Jennings, McPeake, Nugent, Pennington, Swiderski, Troxel, Winder • Associate Professors Coffey, Kreider, Rorie, Rosenkrans • Assistant Professors Apple, Cassida, Coblentz, Gunter, Hellwig, Kegley, Pohlman • Research Assistant Professor Johnson

Degrees Conferred: M.S., Ph.D. (ANSC)

Areas of Concentration: Graduate studies in subject matter areas of genetics, nutrition, parasitology and physiology may be pursued in animal production or meat science. Beef cattle, dairy cattle, swine, sheep, rabbits and laboratory animals are available for research programs in the Animal Science Department.

Prerequisites to Degree Program: The student pursuing a program for a Master of Science degree must meet all general requirements of the Graduate School. In addition, the student must have completed the B.S. degree in a college or university with a major or equivalent in one of the areas of the Animal Science Department. Applicants must submit three letters of recommendation. International students must submit scores on the Graduate Record Examination.

For acceptance into a course of study leading to the Ph.D. degree, a grade-point average of 3.00 on all previous graduate work and three letters of recommendation are required.

Requirements for the Master of Science Degree: The student and adviser will prepare a program of work that may include additional undergraduate basic courses and at least 24 semester hours of studies plus the completion of a thesis and one research paper. Any deficiencies in undergraduate major requirements or prerequisites for advanced courses may be included in the student's program in addition to the 24 hours.

Requirements for the Doctor of Philosophy Degree: In addition to the general requirements of the Graduate School, the requirements will consist of a program of research, appropriate course work and seminars as specified by the student's graduate committee as well as a dissertation and two research papers acceptable to the committee.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this degree program as in-state students for fee purposes. See page 163 for details.

COURSES: ANIMAL SCI (ANSC)

ANSC4263 Swine Production (FA) Methods in producing purebred and commercial swine with specific emphasis on the management programs needed for profitable pork production in Arkansas. Lecture 2 hours, laboratory 3 hours per week. Corequisite: ANSC 4260L. Prerequisite: ANSC 1003 and ANSC 2143 and ANSC 3123.
ANSC4260L Swine Production Laboratory (FA) Corequisite: ANSC 4263.
ANSC4272 Sheep Production (SP, Odd years) Purebred and commercial sheep management emphasizing the programs of major importance in lamb and wool production in Arkansas. Lecture 1 hour, laboratory 2 hours per week. Corequisite: ANSC 4270L. Prerequisite: ANSC 1003 and ANSC 2143 and ANSC 3123.
ANSC4270L Sheep Production Laboratory (SP, Odd years) Corequisite: ANSC 4272.
ANSC4283 Horse Production (SP) Production, use and care of horses and ponies including breeding, feeding, handling, and management. Lecture 2 hours, laboratory 3 hours per week. Corequisite: ANSC 4280L. Prerequisite: ANSC 1003 and ANSC 2143 and ANSC 3123.
ANSC4280L Horse Production Laboratory (SP) Corequisite: ANSC 4283.
ANSC4452 Milk Production (SP) Principles of breeding, feeding, and management of dairy cattle will be reviewed, and course will include field trip touring dairy industry. Lecture one hour per week and laboratory two hours per week. Prerequisite: ANSC 1003 and ANSC 2143.
ANSC4652 Stocker-Feedlot Cattle Management (FA) Production and management systems for stocker and feed-lot cattle including practical applications of forage systems, feeding, health management and economics of production of these livestock. Lecture one hour per week and laboratory two hours per week. Prerequisite: ANSC 1003 and ANSC 2143 and senior standing.
ANSC500V Special Problems (1-6) (FA, SP, SU) Work in special problems of animal industry.
ANSC5013 Domestic Animal Energetics (SP, Odd years) Physical, physiological and biochemical aspects of energy metabolism of domestic animals and their applications to livestock production. Lecture 3 hours per week. Prerequisite: CHEM 3813.
ANSC510V Special Topics in Animal Sciences (1-4) (IR) Topics not covered in other courses or a more intensive study of specific topics in animal sciences. May be repeated. Prerequisite: graduate standing.
ANSC5123 Advanced Animal Genetics (FA, Even years) Specialized study of animal genetics. Lecture 3 hours per week. (Same as POSC 5123) Prerequisite: ANSC 3123.
ANSC5133 Quantitative Inheritance (SP, Odd years) Advanced study of the genetic basis of variation and the genetic control of quantitative traits in populations. Lecture 3 hours per week. Prerequisite: ANSC 3133.
ANSC5143 Advanced Livestock Production (FA, Even years) Nutritional basis of livestock and poultry feeding; nutritional requirements of animals; recent developments in animal nutrition and application to feeding under Arkansas conditions. Lecture 3 hours per week. (Same as POSC 5143) Prerequisite: CHEM 3813 and ANSC 3143 (or POSC 4343).
ANSC5253 Advanced Livestock Production (FA, Even years) Comprehensive review of recent advances in research relative to the various phases of livestock production. Prerequisite: ANSC 4252 (or ANSC 4263) and ANSC 3133 (or ANSC 3143).
ANSC5743L Advanced Analytical Methods in Animal Sciences Laboratory (FA) Introduction into theory and application of current advanced analytical techniques used in animal research. Two 3-hour laboratory periods per week. Prerequisite: CHEM 3813 (or equivalent) and PHYS 2013 and PHYS 2011L and ANSC 4743 (or POSC 4743 or equivalent).
ANSC5853 Advanced Meats Technology (SU, Odd years) An intensive study of processed meats, relating the science, technology, and quality of further processed meat and poultry products. Product development, sensory and chemical analysis, microbiology, nutritional aspects, and (Same as POSC 5853) Prerequisite: POSC 4314 or ANSC 3614.
ANSC5850L Advanced Meats Technology Laboratory (SU, Odd years)
ANSC5901 Seminar (FA, SP, SU) Critical review of the current scientific literature pertaining to the field of animal science. Oral reports. Lecture 1 hour per week. Prerequisite: senior standing.
ANSC5922 Neurophysiology (FA) Neurophysiology, including mechanisms of nerve conduction, understanding of central integration and processing of signals with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (or first 8 weeks of semester). (Same as POSC 5922) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5920D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.
ANSC5920D Neurophysiology Drill (FA) Corequisite: ANSC 5922.
ANSC5932 Cardiovascular Physiology of Domestic Animals (FA) Cardiovascular physiology, including mechanisms of heart function and excitation, and blood vessel mechanisms associated with the circulatory system in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as POSC 5932) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5930D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.
ANSC5933 Environmental Physiology of Domestic Animals (FA, Odd years) Study of the environment of domestic animals and its effect on physiological systems that affect maintenance, growth, production, and reproduction. Lecture 3 hours per week. (Same as POSC 5933) Prerequisite: ANSC 3032 (or POSC 3032) and CHEM 3813 (or equivalent).
ANSC5942 Endocrine Physiology of Domestic Animals (FA) Endocrine physiology, including mechanisms of hormone secretion, function, and regulation. Mechanisms associated with the endocrine system will be discussed for domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (or first 8 weeks of semester). (Same as POSC 5942) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5940D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.
ANSC5940D Endocrine Physiology of Domestic Animals Drill (FA) Corequisite: ANSC 5942.
ANSC5952 Respiratory Physiology of Domestic Animals (SP) Respiratory physiology, including mechanisms of lung function and gas exchange. Mechanisms associated with the interaction of the respiratory system with other bodily systems in domestic animals and poultry will be discussed. Lecture 3 hours; drill 1 hour per week for first 8 weeks of semester. (Same as POSC 5952) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5950D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.
ANSC5950D Respiratory Physiology of Domestic Animals Drill (SP) Corequisite: ANSC 5952.

ANSC5962 Gastrointestinal/Digestive Physiology of Domestic Animals (SP) Gastrointestinal and hepatic physiology, including mechanisms of digestion, absorption of nutrients with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as POSC 5962) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5960D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.

ANSC5960D Gastrointestinal/Digestive Physiology of Domestic Animals Drill (SP) Corequisite: ANSC 5962.

ANSC5972 Renal Physiology (SP) Renal physiology, including mechanisms of renal clearance with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as POSC 5972) Pre- or Corequisite: CHEM 3813. Corequisite: ANSC 5970D. Prerequisite: POSC/ANSC 3032 and POSC/ANSC 3042.

ANSC5970D Renal Physiology Drill (SP) Corequisite: ANSC 5972.

ANSC600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

ANSC6143 Minerals in Animal Nutrition (SP, Odd years) Mineral nutrients, their sources and functions, as related to nutrition of domestic animals. Lecture 3 hours per week. Prerequisite: ANSC 3143 or POSC 4343.

ANSC6243 Ruminant Nutrition (FA, Odd years) Anatomy and physiology of the rumen. The nutrient requirements of microbial organisms and the relation of microbial digestion in the rumen to the nutrition of cattle, sheep and other ruminants. Lecture 3 hours per week. Prerequisite: ANSC 3143.

ANSC6253 Forage-Ruminant Relations (SP, Odd years) Advanced chemical, physical, and botanical characteristics of forage plants, the dynamics of grazing, intake and digestion, and techniques of measuring forage utilization and systems analysis at the plant-animal interface. Lecture 3 hours per week. (Same as AGRN 6253) Prerequisite: ANSC 3143 and AGRN 3113.

ANSC6343 Vitamin Nutrition in Domestic Animals (SP, Even years) The vitamins required by domestic animals with emphasis upon their role in animal nutrition, physiological functions, and consequences of failure to meet the requirement of the animal. Lecture 3 hours per week. (Same as POSC 6343) Prerequisite: ANSC 4143 (or POSC 4343) and CHEM 3813.

ANSC6833 Reproduction in Domestic Animals (SP, Even years) Comprehensive review of current theory of reproductive function in domestic animals. Lecture 3 hours per week. (Same as POSC 6833) Prerequisite: ANSC 3433.

ANSC700V Doctoral Dissertation (1-6) (FA, SP, SU) Prerequisite: graduate standing.

DEPARTMENT OF ANTHROPOLOGY (ANTH)

Mary Jo Schneider
Department Chair
330 Old Main
575-2508

• Professors Limp, McCartney, Rolingson (Toltec Res. Station), Rose, Sabo, Schambach (Sau), Schneider (M.J.) • Associate Professors Early, House (Uapb), Jeter (Uam), Kay, Kvamme, Mainfort, Mitchem (Parkin Res. Station), Stewart-Abernathy (Atu), Swedenburg, Ungar • Assistant Professors D'Alisera, Morrow (Asu), Payne (Blytheville Res. Station), Striffler, Trubitt (Hsu)

Degree Conferred: M.A. (ANTH)

Areas of Concentration: archeology; biological/physical anthropology, cultural anthropology, general anthropology, and anthropological museology.

Prerequisites to Degree Program: Applicants must be admitted to the Graduate School and meet the following requirements: (1) satisfactory undergraduate preparation in anthropology, (2) three letters from persons competent to judge applicant's potential for graduate studies, (3) satisfactory GRE scores, and (4) a completed departmental application. Students who do not meet these requirements may be admitted conditionally. Students with course deficiencies may enroll concurrently in graduate courses.

Requirements for the Master of Arts Degree: A student may choose one of three options to satisfy the requirements for a Master of Arts degree in anthropology:

Anthropology M.A. with thesis. A minimum of 24 semester hours of course work including distribution requirements specified by the department, six semester hours of thesis, and an oral examination conducted by the candidate's faculty committee.

Anthropology M.A. with internship. A minimum of 30 semester hours of course work including distribution requirements specified by the department, six hours of internship, evidence of research ability, and an oral examination conducted by the candidate's faculty committee.

Anthropology M.A. without thesis. Thirty-six semester hours including distribution requirements specified by the department and an oral examination conducted by the candidate's faculty committee.

A list of courses which meet the general distribution requirement is available from the departmental chair. A minimum of 21 graduate hours in anthropology is required in all three options.

Faculty members located off-campus are available for research and individual guidance in any of these options.

Anthropology participates in the interdisciplinary Ph.D. program in Environmental Dynamics. See page 81.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this degree program as in-state students for fee purposes. See page 163 for details.

COURSES: ANTHROPOLOGY (ANTH)

ANTH4013 History of Anthropological Thought (FA) Detailed consideration of anthropological theory through study of its historical development. The research paper in this course fulfills the Fulbright College research paper requirement for anthropology majors.

ANTH4023 Egyptology (IR) Explores multiple aspects of Ancient Egyptian civilization including chronology, art, religion, literature and daily life. Prerequisite: junior standing.

ANTH4033 Popular Culture (SP) Study of national and international varieties of popular culture, including music, dance, fashion, and the media. Emphasis will be given to both ethnographic approaches, which focus on the investigation of production and consumption of cultural forms and to cultural studies approaches, which see culture as a terrain of struggle.

ANTH4093 The Archeology of Death (IR) Study of the analysis and interpretation of archeological mortuary remains and sites. Key archeological and anthropological sources that have influenced major theoretical developments are reviewed.

ANTH4123 Ancient Middle East (SP) The archeology of the ancient Middle East with emphasis upon the interaction of ecology, technology and social structure as it pertains to domestication and urbanization.

ANTH4143 Ecological Anthropology (FA, SP, SU) Anthropological perspectives on the study of relationships among human populations and their ecosystems.

ANTH4153 Culture, History, and Political Economy (FA) This course examines various aspects of the relationship between power and meaning, including concepts such as hegemony, resistance, and political consciousness. How do people produce and manipulate culture and history within the context of inequality and social change?

ANTH4163 Globalization: Crisis, Conflict and Capitalist Development (SP) This course examines the relationship between capitalist development and forms of political and cultural struggle. We explore theories of capitalist development and scholarly attempts to understand local experiences within the context of broader processes of capitalist change.

ANTH4233 Arctic Prehistory (SP) Survey of prehistoric peoples and cultures of the North American Arctic and adjacent regions.

ANTH4243 Archeology of the Midsouth (IR) Survey of prehistoric and protohistoric cultures of the lower Mississippi Valley and adjacent regions. Prerequisite: junior standing or previous coursework in archeology.

ANTH4253 Peoples and Cultures of World Regions (IR) The anthropology (prehistory, peoples, and cultures) of a selected world region. Regional emphasis will vary but may include China, Europe, Northeast Asia, India or the Arctic. May be repeated for 12 hours. May be repeated for 12 hours.

ANTH4256 Archeological Field Session (SU) Practical field and laboratory experiences in archeological research. May be repeated for 12 hours. May be repeated for 12 hours.

ANTH4353 Laboratory Methods in Archeology (IR) Theory and practice of describing, analyzing, and reporting upon archeological materials.

ANTH4453 Introduction to Museum Studies (SP) Introduction to museums and museum work, the place and functions of the modern museum; museum administration, financial development, collections and collections management, conservation, exhibits, museum education and public programs, legal practices, and contemporary issues which effect the museum profession. Corequisite: ANTH 4451L.

ANTH4451L Museum Studies Laboratory (SP) Laboratory exercises illustrating professional practices and procedures in contemporary museum work. Corequisite: ANTH 4453.

ANTH4463L Museum Techniques Laboratory (SP) Practical experience in museum laboratory techniques, and in design and execution of museum exhibits. Pre- or Corequisite: ANTH 4453 and ANTH 4451L.

ANTH4473 North American Prehistory (IR) Survey of the aboriginal prehistory of the North American Continent north of Mexico.

ANTH448V Individual Study of Anthropology (1-6) (FA, SP, SU) Reading course for advanced students with special interests in anthropology.

ANTH449V Special Problems in Museum Work (1-6) (IR) individual research, exhibit design and execution, or other problems of museum work.

ANTH4503 Peoples of the Pacific (IR) Survey of the native societies and cultures of the Pacific; their role in the world today.

ANTH4513 African Religions: Gods, Witches, Ancestors (SP) An exploration of Africa religions from a variety of anthropological perspectives, exploring how religious experience is perceived and interpreted by adherents, highlighting the way in which individual and group identities are constructed, maintained and contested within religious contexts. Readings reflect the vast diversity of religious life in Africa.

ANTH4523 Dental Science (FA) Introduction to the study of the human dentition including its anatomy, morphology, growth and development, and histology.

ANTH4533 Middle East Cultures (SP) Study of the peoples and cultures of the Middle East; ecology, ethnicity, economics, social organizations, gender, politics, religion, and patterns of social change. May be repeated for 9 hours.

ANTH4543 Geographic Information Systems (SP) Computer assisted analysis and display of geographic resource data. Course develops the theory behind spatial data analysis techniques, and reinforces the theory with exercises that demonstrate its practical applications. Prior

experience with computers and/or completion of GEOG 4523 (Computer Mapping) is useful but not a prerequisite. (Same as GEOG 4543)

ANTH4553 Raster GIS (SP) Introduction to spatial analyses in the natural sciences and resource management fields using geographic information systems (GIS). Lectures focus on development of principles, paralleled by workstation-based laboratory exercises using raster-based software, relational data bases, and exploratory data analysis. (Same as GEOG 4553) Prerequisite: GEOG 3023 or ANTH 4543.

ANTH4563 Vector GIS (FA) Introduction to geographic information systems (GIS) applications in marketing, transportation, real estate, demographics, urban and regional planning, and related areas. Lectures focus on development of principles, paralleled by workstation-based laboratory exercises using Arc-node based software and relational data bases. (Same as GEOG 4563) Prerequisite: GEOG 3023 or ANTH 4543.

ANTH4573 Introduction to GRASS Applications in GIS (FA) An introduction to geographic information systems (GIS) problem solving using the Geographic Resource Analysis Support System (GRASS) software. (Same as GEOG 4573)

ANTH4583 Peoples and Cultures of Sub-Saharan Africa (FA) An exploration of the people and places of Africa from a variety of anthropological perspectives. Classic and contemporary works will be studied in order to underscore the unity and diversity of African cultures, as well as the importance African societies have played in helping us understand culture/society throughout the world.

ANTH4593 Introduction to Global Positioning Systems (SP) Introduction to navigation, georeferencing, and digital data collection using GPS receivers, data loggers, and laser technology for natural science and resource management. Components of NavStar Global Positioning system are used in integration of digital information into various GIS platforms with emphasis on practical applications. (Same as GEOG 4593)

ANTH4613 Primate Adaptation and Evolution (FA) Introduction to the biology of the order of Primates. This course considers the comparative anatomy, behavioral ecology and paleontology of our nearest living relatives. (Same as BIOL 4613) Prerequisite: ANTH 1013 (or BIOL 1543 and BIOL 1541L).

ANTH4633 Near Surface Prospection (SP) Geophysical remote sensing methods are investigated for detecting and mapping subsurface features up to 5m in depth. Magnetometry, resistivity, conductivity, ground-penetrating radar, and other methods are examined with a particular focus on their use for understanding archeological deposits. Requires use of instruments, computer skills, and field trips. (Same as GEOS 4633) Prerequisite: ANTH 4553 or GEOG 4553 or ANTH 4573 or GEOG 4573 or GEOG 4543 and GEOL 1113 and ANTH 3023.

ANTH4803 Historical Archeology (IR) Review of the development of historical archeology and discussion of contemporary theory, methods, and substantive issues. Lab sessions on historic artifact identification and analysis.

ANTH4813 Ethnographic Approaches to the Past (IR) Review of the uses of ethnographic data in the reconstruction and interpretation of past cultures and cultural processes, with particular emphasis on the relationships between modern theories of culture and archeological interpretation.

ANTH4863 Quantitative Foundations for GIS (FA, Even years) Reviews mathematics necessary for understanding GIS functions like interpolation, map coordinate transformation, and derivation of landform measurements. Using GIS and other data, examines measurement theory, spatial data types, probability theory, graphical displays, descriptive statistics, probability distributions, randomization methods, tests for means, variances, spatial pattern, categorical methods, ANOVA, correlation and regression. (Same as GEOG 4863)

ANTH4903 Seminar in Anthropology (FA, SP, SU) Research, discussion, and projects focusing on a variety of topics. May be repeated for 12 hours. May be repeated for 12 hours.

ANTH4913 Topics of the Middle East (FA, SP, SU) Covers a special topic or issue. May be repeated for 9 hours.

ANTH500V Advanced Problems in Anthropology (1-18) (FA, SP) Individual research at graduate level on clearly defined problems or problem areas.

ANTH5013 Research Methods in Anthropology (FA) Investigation of the nature of inquiry; scientific and other approaches to the perception of anthropological data; the development and use of research models; organization of observations; numerical and other methods of analyzing and interpreting data.

ANTH5023 Public Archeology (SP) Practical problems of archeology in relation to federal and state needs, legislative requirements, contract research, public support and information need, and the job market.

ANTH5053 Quarternary Environments (FA) An interdisciplinary study of the Quarternary Period including dating methods, deposits, soils, climates, tectonics, and human adaptation. Lecture 2 hours, laboratory 2 hours per week. (Same as ENDY 5053, GEOG 5053, GEOL 5053)

ANTH5153 Topics in Anthropology (FA, SP, SU) Graduate level seminar with varied emphasis on topics relating to cultural anthropology. May be repeated.

ANTH5203 Applications of Archeological Method and Theory (FA) Review of the nature and history of archeology; recent theories and practical implications and applications of various methods of acquiring, analyzing, and interpreting archeological data.

ANTH525V Topics in Archeology (1-6) (FA, SP, SU) Graduate level seminar with varied emphasis on topics relation to archeology. May be repeated.

ANTH5263 Indians of Arkansas and the South (FA) Study of the traditional lifeways and prehistoric backgrounds of Indians living in the southern United States, including Arkansas.

ANTH5303 Applications of Method and Theory in Biological Anthropology (IR) Review of the nature and history of biological anthropology; recent theories and the practical implications and applications of various methods of acquiring, analyzing, and interpreting data.

ANTH5333 Social Organization (FA) Comparative study of social organization focusing primarily on pre-industrial and non-western cultures. Primary topics are variation in kinship, kinship groups, kinship terminological analysis, marriage, and current developments in social structure.

ANTH535V Topics in Physical Anthropology (1-6) (FA, SP) Graduate level seminar with varied emphasis on topics relating to physical anthropology. May be repeated.

ANTH5413 Bioarcheology Seminar (SP, Even years) Intensive coverage of bioarcheological method and theory with the context of both academic and cultural resources management research.

ANTH5443 Cultural Resource Management I (IR) Concentrated discussion of management problems relative to cultural resources, including review and interpretation of relevant federal legislation, research vs. planning needs, public involvement and sponsor planning, and assessment of resources relative to scientific needs. No field training involved; discussion will deal only with administrative, legal, and scientific management problems.

ANTH546V Special Problems in Museum Work (1-6) (IR) Individual research, exhibit design and execution, or other problems of museum work.

ANTH5503 Regional Seminar in Archeology (FA) Graduate-level seminar in the archeology of a particular area or region of the world.

ANTH561V Field Research in Archeology (1-6) (IR) Directed graduate level archeological fieldwork.

ANTH562V Field Research in Cultural Anthropology (1-6) (IR) Directed graduate level ethnographic field work.

ANTH600V Master's Thesis (1-6) (FA, SP, SU)

ANTH610V Internship (1-18) (FA, SP, SU)

ANTH681V Seminar: Cultural Anth (3-9) (FA, SP) Variable topics in Cultural Anthropology will be explored in depth.

ANTH682V Seminar: Archeology (3-9) (FA, SP) Variable topics in Archeology will be explored in depth.

ANTH683V Seminar: Biological Anth (3-9) (FA, SP, SU) Variable topics in Biological Anthropology will be explored in depth.

ANTH700V Doctoral Dissertation (3-9) (FA, SP)

DEPARTMENT OF ART (ARTS)

Michael D. Peven
Department Chair
116 Fine Arts Building
575-5202

• Professors Brody, Harington, Peven, Stout • Associate Professors Golden, Jacobs, Musgnug, Newman • Assistant Professor Nelson

Degree Conferred: M.F.A. (ART)

Areas of Concentration: major and/or minor concentrations include drawing, painting, sculpture, design, printmaking, ceramics, and photography.

Prerequisites to Degree Programs: An earned bachelor's degree with an art major concentration or its equivalent. Consideration will be given applicants without an art major concentration who present evidence of proficiency in creative work in the visual arts.

Acceptance to the M.F.A. degree program requires a two-semester art history survey or its equivalent. Failing to meet this requirement, the M.F.A. student is required to complete the appropriate semesters of survey of art history for non-graduate credit.

In addition to the requirements for admission to the Graduate School, the applicant must also submit the following materials to the Department of Art: transcripts of college level work; at least three letters of reference concerning art work, work habits, and potential for graduate study in art; a portfolio of art works; a personal statement concerning background, imaginative and technical development, and goals for graduate study in visual art; and an application form obtained from the Department of Art on request.

Requirements for the Master of Fine Arts Degree: Completion of a minimum of 60 semester credit hours and a minimum of four regular semesters in residence (not to include summer terms).

1. A minimum of 41 credit hours in studio courses including:
   a. ARTS 5013, Graduate Drawing (3 credit hours)
      Required of M.F.A. students
   b. A minimum major concentration area of 4 semesters (12 credit hours).
   c. A minimum minor concentration area of 3 semesters (9 credit hours).
   d. A minimum of 15 additional credit hours. These may include additional credits in the major concentration, minor concentration, and 3 credit hours in excess of the required 9 hours of Art History and/or criticism. Up to 6 credit hours in graduate courses taken outside the Art

Department may be included, with prior approval from the Department.

2. Art History requirement: While in the M.F.A. program, the student is required to complete a minimum of nine hours of art history as follows:
   a. An elected 19th or 20th century art history course. (ARHS 4813, 4883, 4893, 4913, or 4923)
   b. An elected pre-19th century art history course. (ARHS 4833, 4843, 4853, 4863, or 4873)
   c. ARHS 6943, Seminar: Critical Thought in the Arts
3. Graduate Critique (4 semester hours)
   a. M.F.A. students will have regular group critiques with faculty in their major concentration areas of study. The format for these critiques will be flexible, and professional and practical problems in art will be covered.
   b. All M.F.A. students will have regular reviews with the art faculty to critique works in progress. Required participation in these reviews will be by registration in ARTS 5901, Graduate Critique, for four semesters. The first three semesters will require participation with the full groups of M.F.A. students and art faculty. The fourth semester will be the individual graduate student and the graduate committee; or, a group of M.F.A. candidates preparing to complete the degree, thesis or exhibition requirement. Graduate students not working toward the M.F.A. degree are encouraged to participate in critiques, but they are not required to register for credit.
4. The required final semester in the M.F.A. program is to be devoted to work on M.F.A. Exhibition, ARTS 601V (6 credit hours) The production and presentation, under the direction of a graduate committee, of a one-person exhibition of art work. The M.F.A. candidate will be responsible for making three acceptable slide sets of the exhibition and exhibition statements, which will be retained by the Department of Art and the University Library.

The final semester must be completed during a regular school year. During this final semester, the M.F.A. candidate may enroll for three additional credit hours in electives if the candidate does not hold a graduate assistantship. The M.F.A. candidate holding an assistantship may not take additional credits in the final semester.

COURSES: ART HISTORY (ARHS)

ARHS4813 The History of Photography (IR) Survey of photography from 1685 to present.

ARHS4833 Ancient Art (SP, Even years) Study of the visual arts of Mesopotamia, Egypt, Greece, and The Roman Empire. Prerequisite: ARHS 2923.

ARHS4843 Medieval Art (FA, SP, SU) Study of Early Christian, Byzantine, Early Medieval, Romanesque, and Gothic styles. Prerequisite: ARHS 2923.

ARHS4853 Italian Renaissance Art (FA, SP, SU) Study of Proto-Renaissance, Early, High Renaissance, and Mannerist styles in Italy. Prerequisite: ARHS 2923.

ARHS4863 Northern Renaissance Art (FA, SP, SU) Study of Late Gothic and Renaissance styles in the Netherlands, Germany, and France. Prerequisite: ARHS 2923.

ARHS4873 Baroque Art (FA, SP, SU) Study of art styles of the 17th and 18 centuries, primarily in Italy, Spain, France, Flanders, and the Netherlands. Prerequisite: ARHS 2923.

ARHS4883 19th Century European Art (FA, SP, SU) Study of Neo-Classical, Romanticist, Realist, Impressionist, and Post-Impressionist styles. Prerequisite: ARHS 2923.

ARHS4893 20th Century European Art (FA, SP, SU) Study of the major styles and movements of the century, including Cubism, Fauvism, German Expressionism, and Surrealism. Prerequisite: ARHS 2923.

ARHS4913 American Art to 1900 (FA, SP, SU) The visual arts in the United States from their beginning in Colonial times through the nineteenth century. Prerequisite: ARHS 2923.

ARHS4923 American Art Since 1900 (FA, SP, SU) The visual arts in the United States from the turn of the century to the contemporary era. Prerequisite: ARHS 2923.

ARHS4973 Seminar in Art History (FA, SP, SU) Special studies of periods and styles of art. Prerequisite: 12 hours of art history.

ARHS6943 Seminar: Critical Thought in Art (FA) Explore topics of concern to the studio artist involving underlying concepts and purposes of art as well as models and methods for the analysis of art. Course based on discussions of selected readings, prepared papers and seminar reports. Prerequisite: graduate standing.

COURSES: ART (ARTS)

ARTS4023 Figure Drawing II (IR) Advanced study of the figure with emphasis on figure structure and its relationship to pictorial form in drawing. Prerequisite: ARTS 2013.

ARTS4363 Graphic Design Typography (FA, SP) The primary emphasis of this course is on the aesthetics of letter forms and understanding the symbolic communication inherent in different type faces. Typographic relationships will be investigated through experimental problems and projects such as logos, posters, and brochures. Prerequisite: ARTS 3363.

ARTS4373 Graphic Design: Symbols (FA, SP) Projects focus on the development of logos, pictographs, symbols, and conceptual symbolism, with study of the history of symbol generation. Ideas are visualized through through traditional and computer techniques. Presentation of work and development of portfolio pieces are emphasized. Prerequisite: ARTS 3363.

ARTS4383 Graphic Design: Layout (FA, SP) Projects focus on the organizational principles and practices of layout design, with a study of contemporary design and graphic design history. Ideas are visualized through traditional and computer techniques. Presentation of work and development of portfolio pieces are emphasized. Prerequisite: ARTS 3363.

ARTS4833 Photography IV (FA) Individual problems in photography with optional study in areas of color, slide production, and photography application to other art media. Prerequisite: ARTS 3813.

ARTS484V Special Problems in Photography (1-6) (FA, SP) Individual instruction for advanced undergraduates and graduate students. Special projects in photography designated by students in collaboration with faculty. Prerequisite: ARTS 3813.

ARTS4921 Workshop: Professional Practices in Art (FA, SP, SU) A workshop in professional artistic practices including portfolio presentation, matting, framing, writing resumes, making slides of work, health and safety issues, opportunities, etc. Prerequisite: senior standing and art major or acceptance into the M.F.A. program.

ARTS493V Fine Arts Gallery Internship (1-3) (FA, SP, SU) Study all aspects of operating the Fine Arts Gallery. Research and preparation for exhibitions, organize and install exhibits, care of art works, create and distribute publicity, arrange interviews with newspapers, and other media.

ARTS494V Graphic Design Internship (1-6) (FA, SP) Credit for practical experience gained through internship in graphic design. Report required form intern and field supervisor on progress and significant accomplishments. 3 credit hours per semester. May be repeated for 6 hours. Prerequisite: ARTS 3369 and ARTS 4383.

ARTS5013 Graduate Drawing (FA) Graduate level study of drawing materials and techniques. Prerequisite: graduate standing.

ARTS5901 Graduate Critique (FA, SP, SU) Art faculty review and critique of M.F.A. student's art works. Prerequisite: admission into the M.F.A. program.

ARTS595V Special Topics (1-3) (IR) May be offered in a subject not specifically covered by the courses otherwise listed. May be repeated for 6 hours.

ARTS601V Master of Fine Arts Exhibition (1-6) (FA, SP, SU) Production and presentation of a one person exhibition of art work. The M.F.A. candidate will be responsible for making three acceptable slide sets of the exhibition and exhibition statements. Prerequisite: M.F.A. candidacy.

ARTS602V Graduate Drawing (1-6) (FA, SP, SU) Individual problems in drawing techniques. May be repeated. Prerequisite: ARTS 5013.

ARTS612V Graduate Painting (1-6) (FA, SP, SU) Individual problems in painting techniques. May be repeated. Prerequisite: graduate standing.

ARTS622V Graduate Sculpture (1-6) (FA, SP, SU) Individual problems in sculpture techniques. May be repeated. Prerequisite: graduate standing.

ARTS632V Graduate Design (1-6) (FA, SP, SU) Individual problems in two and three dimensional design. May be repeated. Prerequisite: graduate standing.

ARTS642V Graduate Printmaking (1-6) (FA, SP, SU) Individual problems in printmaking techniques. May be repeated. Prerequisite: graduate standing.

ARTS652V Graduate Ceramics (1-6) (FA, SP, SU) Individual problems in ceramic techniques. May be repeated. Prerequisite: graduate standing.

ARTS672V Graduate Jewelry (1-6) (FA, SP, SU) Individual problems in jewelry-making techniques. May be repeated. Prerequisite: graduate standing.

ARTS682V Graduate Photography (1-6) (FA, SP, SU) Individual problems in photography. May be repeated. Prerequisite: graduate standing.

ARTS692V Special Studio Problems (1-6) (FA, SP, SU) Individual problems in studio areas on arranged basis. May be repeated. Prerequisite: graduate standing.

ARTS695V Special Topics (1-6) (IR) Subject matter not covered in other courses. May be repeated for 12 hours. Prerequisite: graduate standing.

ARTS AND SCIENCES (ARSC)

Charles H. Adams
Associate Dean, Fulbright College
525 Old Main
575- 4801

The following course may be enrolled in by students in certain special circumstances when approved for studies in off-campus programs. The consent of the Associate Dean of Fulbright College is required.

COURSE: ARTS & SCI (ARSC)

ARSC500V Study Abroad (3-12) (FA, SP, SU) Open to graduate students studying abroad in officially sanctioned programs. May be repeated for 24 hours.

DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING (BAEG)

Joel T. Walker
Department Head
203 Engineering Hall
575-2351

• Professors Griffis, Walker • Professors Emeriti Bryan, Nelson • Associate Professors Costello, Tao, Vories • Adjunct Professors Gardisser, Langston • Adjunct Associate Professors Huitink, Li, Tacker, Vandevender • Adjunct Assistant Professors Howell, Wimberly, Yang

Degrees Conferred:
M.S.B.A.E. (BAEG)
M.S.E., Ph.D. in Engineering (ENGR)
(See Engineering)

Areas of Concentration: biological and agricultural applications of power and machinery engineering, soil and water resource engineering, structural and environmental engineering, food and process engineering, and biosystems engineering.

Requirements for the Master of Science Degree: In addition to the requirements of the Graduate School and the graduate faculty in Engineering, the following departmental requirements must be satisfied for the M.S.B.A.E. degree:

1. Candidates are required to complete not less than 24 semester hours of course work acceptable to the committee and a minimum of six semester hours of thesis.
2. The minimum acceptable grade on a graduate course is "C."
3. Prior to acceptance into the program a candidate must, in consultation with the department head, identify a professor who is willing to serve as the major professor. During the first semester, the candidate must, in consultation with the major professor and department head, select a graduate committee. The candidate will, in consultation with the committee, prepare a written graduate program which will achieve the candidate's objectives.
4. Candidates must prepare a paper suitable for submission to a refereed journal from the research done for the thesis or BAEG 500V.

The Biological and Agricultural Engineering Department also offers courses intended for advanced degree programs for students majoring in other departments in the College of Agriculture and Home Economics. For such listings see agricultural mechanization courses which follow.

COURSES: BIO& AG ENGR (BAEG)

BAEG4103 Instrumentation in Biological Systems (SP, Odd years) Continuation of BAEG 2103. Theory and advanced applications of analog circuits, digital circuits, and commercial instrument involving biological materials. Lecture 2 hours, laboratory 3 hours per week. Corequisite: BAEG 4100L. Prerequisite: BAEG 2103 (or ELEG 2103 or ELEG 3903).

BAEG4100L Instrumentation in Biological Systems Laboratory (SP, Odd years) Corequisite: BAEG 4103.

BAEG4113 Risk Analysis for Biological Systems (FA, Odd years) Principles of risk assessment including exposure assessment and dose response, and risk management. Methods of risk analysis modeling and simulation with computer software. Applications of risk analysis in animal, food and environmental systems. Prerequisite: MATH 1203 and BAEG 1022 or BAST 2903 or equivalent.

BAEG4403 Controlled-Environment Structures for Biological Systems (FA, Odd years) (Formerly BAEG 4404) Environmental, structural and functional requirements of buildings, with emphasis on confinement systems for commercial animal and plant production. Analysis of heat and mass balances which incorporate physiological input of the organisms. Psychometrics and solar energy principles. Design of ventilation, heating and cooling systems. Simple structural design with wood components. Pre- or Corequisite: MEEG 3013. Corequisite: BAEG 4400L. Prerequisite: MEEG 2403.

BAEG4400L Controlled-Environment Structures for Biological Systems (FA) Corequisite: BAEG 4403.

BAEG4613 Engineering Analysis of Plant and Animal Systems (IR) An engineering quantification of basic physiological processes of plant and animal growth and reproduction. Integration of process models into organism models that respond to environment and management. Applications of models to system design and management through computer-aided tactical and strategic decision support. Lecture 3 hours per week. Pre- or Corequisite: MATH 3404.

BAEG4703 Food Process Engineering (FA, Odd years) Basic engineering principles involved in the design of systems for handling, conditioning, and storage of agricultural materials. Lecture 2 hours, laboratory 3 hours per week. Pre- or Corequisite: MEEG 3503 or CVEG 3213. Corequisite: BAEG 4700L. Prerequisite: MEEG 2403.

BAEG4700L Food Process Engineering Laboratory (FA, Odd years) Corequisite: BAEG 4703.

BAEG4813 Equipment Design for Biological Systems I (FA, Even years) Design concepts for equipment used in biological and agricultural industries. Initiation of comprehensive 2-semester team-design projects; design objectives, development of functional and mechanical criteria, standards, reliability, safety, ethics issues. Design of mechanisms and consideration of vibrations using computer-aided techniques. Lecture 2 hours, laboratory 3 hours per week. Pre- or Corequisite: BAEG 3803. Corequisite: BAEG 4810L.

BAEG4810L Equipment Design for Biological Systems I Laboratory (FA, Even years) Corequisite: BAEG 4813.

BAEG4822 Machine Design for Biological Systems II (SP, Odd years) Design concepts for equipment used in biological and agricultural industries. Completion of 2-semester team design projects. Construction, testing, and evaluation of prototypes. Written and oral design reports. Discussion of manufacturing methods, safety, ergonomics, analysis/ synthesis/design methods as appropriate for particular design projects. Laboratory/design 4 hours per week. hours per week. Prerequisite: BAEG 4813.

BAEG4903 Water Resource Engineering (SP, Even years) Engineering principles for the design of systems for utilization of surface water and ground water. Includes frequency analysis of rainfall, infiltration, runoff, evapotranspiration, hydraulic control structures, ground water pumping, drainage and irrigation. Lecture 2 hours, laboratory 3 hours per week. Corequisite: BAEG 4900L. Prerequisite: CVEG 3213 or MEEG 3503.

BAEG4900L Water Resource Engineering Laboratory (SP, Even years) Corequisite: BAEG 4903.

BAEG4913 Bio-Environmental Engineering (SP, Even years) Engineering principles for the design of systems for the biological treatment and utilization of organic by-products from animal and crop production and food and crop processing. Design of best management practices to protect bio-environmental resources by minimizing non-point pollution (off-site movement of sediment, nutrients and other constituents) and by minimizing nuisance odors associated with land applied organic residues, inorganic fertilizers and pesticides. Emphasis on economic utilization of beneficial components of typical wastes. Lecture 2 hours, laboratory 3 hours per week. Pre- or Corequisite: BAEG 4903 or CVEG 3223. Corequisite: BAEG 4910L.

BAEG4910L Bio-Environmental Engineering Laboratory (SP, Even years) Corequisite: BAEG 4913.

BAEG500V Advanced Topics in Agricultural Engineering (1-6) (FA, SP, SU) Special problems in fundamental and applied research. Prerequisite: graduate standing.

BAEG5103 Advanced Instrumentation (SP, Even years) Familiarizes students in engineering with applications of advanced instrumentation in agriculture. Lecture 2 hours, laboratory 3 hours per week. Corequisite: BAEG 5100L. Prerequisite: BAEG 4103.

BAEG5100L Advanced Instrumentation Laboratory (SP, Even years) Corequisite: BAEG 5103.

BAEG5123 Imaging and Rapid Analysis of Biological and Agricultural Materials (FA, Odd years) Techniques of imaging and non-invasive analyses of biological and agricultural materials. Covering spectral sensing (x-ray, UV, VS, IR), optics, image processing, recognition, on-line monitoring and vision-based controls. Applications to automated food/fruit inspections, defect/contaminant detection, and characterization of food non-food materials in real-time on processing lines. Prerequisite: BAEG 4103.

BAEG5703 Design and Analysis of Experiments for Engineering Research (IR) Principles of planning and design of experiments for engineering research. Propagation of experimental error. Improving precision of experiments. Analysis of experimental data for optimal design and control of engineering systems using computer techniques. Lecture 2 hours, laboratory 3 hours per week. Corequisite: BAEG 5700L. Prerequisite: INEG 4333.

BAEG5700L Design and Analysis of Experiments for Engineering Research Laboratory (IR) Corequisite: BAEG 5703

BAEG5713 Food Product and Process Development (FA, Odd years) Multidisciplinary approaches for developing new food products and processes, in the context of an industry-sponsored project. Group dynamics and interpersonal skills. Factors that influence product and process development. Analysis and modeling applied to food process design. Lecture 1 hour, laboratory 6 hours per week. Corequisite: BAEG 5710L. Prerequisite: BAEG 4703.

BAEG5710L Food Product and Process Development Laboratory (FA, Odd years) Corequisite: BAEG 5713.

BAEG5723 Engineering Methods for Food Safety (FA, Even years) Principles of engineering methods applied to food and safety and sanitation. Discussion of thermal, chemical, electrical pasteurization or sterilization in food processing. Demonstration of monitoring and detecting techniques for food safety, including image analysis, biosensors and modeling. Lecture 3 hours per week. Prerequisite: BAEG 4103 and FDSC 4124 (or equivalent).

BAEG5801 Graduate Seminar (FA) Reports presented by graduate students on topics dealing with current research in agricultural engineering. Prerequisite: graduate standing.

BAEG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

BAEG6713 Advanced Properties of Biological Materials (IR) An advanced treatment of the physical, thermal, and electromagnetic properties of food and other biological materials. Special emphasis on the microscopic bases for physicochemical properties. Modeling of material properties and behavior. Lecture 2 hours, laboratory 3 hours per week. Prerequisite: graduate standing.

BAEG6710L Advanced Properties of Biological Materials Laboratory (IR)

BAEG700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF BIOLOGICAL SCIENCES (BISC)

Donald Roufa
Department Chair
601 Science Engineering Building
575-3251

• Professors James, Kilambi, Roufa, Smith (K.), Talburt, Walker • Associate Professors Bailey, Brown, Durdik, Etges,Evans (R.), Ivey, Kral, Rhoads, Sagers, Spiegel • Associate Research Professors, Krementz, Powell • Assistant Professors Beaupre, Ferrari, Henry, Schnell, Tichenor, Turbeville, Ziegler

Degrees Conferred: M.A., M.S., Ph.D. in Biology (BIOL)

Areas of Concentration: animal behavior, animal physiology, aquatic ecology, biophysics, cellular physiology, cell and molecular biology, conservation biology, community ecology, embryology, evolutionary biology, exobiology, fisheries biology, herpetology, ichthyology, immunology, limnology, microbial ecology, microbial physiology, molecular genetics, molecular systematics, mycology, ornithology, pathogenic microbiology, physiological ecology, plant morphology, plant physiology, population and quantitative genetics, systematics, taxonomy, and wildlife ecology.

The graduate programs in Biological Sciences offer opportunity for advanced study and research to students who desire a comprehensive view of biological sciences. Accomplishment is judged by competence and a developing sense of responsibility for the advancement of knowledge rather than the fulfillment of routine requirements. The faculty requires of all candidates for advanced degrees a period of study in residence, advanced competence in the chosen area of expertise, satisfactory introduction to allied subjects, the ability to communicate at a scholarly level, and a satisfactory performance in examinations.

Admission to Degree Program: Applicants who wish to study for advanced degrees are expected to present a minimum of 18 hours of biological science. These normally will include training in the three areas of the Biology Subject test of the Graduate Record Examination: (a) cellular and molecular biology, (b) organism biology, and (c) ecology, evolution and population biology. Applicants lacking experience in any of the above areas will be expected to broaden their biological training and may be assigned specific course work to fulfill this requirement. Students lacking a total of 18 hours of biological sciences may be admitted on a conditional basis and are not eligible for assistantships. All students applying for admission to the graduate program must provide scores on (a) the Verbal,Quantitative, and Analytical sections and (b) an appropriatesubject test of the Graduate Record Examinations. Those scores, along with transcripts and three letters of recommendation, will be used in evaluating applications of students applying for assistantships.

All students must have a major professor to enter the graduate program in biological sciences. Ultimately each candidate will have a committee composed of members of the graduate faculty and the student's major professor. Students must also fulfill the Graduate School's residency requirements, which are stated elsewhere in this catalog.

All students are required to take Bibliographic Practicum (BIOL 5101) (or present evidence of its equivalent) within the first three academic semesters, and to earn credit in two graduate seminars. Additional seminar requirements may be specified by the major professor in conjunction with the graduate committee. Students are required to present a research seminar prior to the oral thesis or dissertation defense.

Requirements for the Master's Degree: Two degree programs are available, both of which require 30 semester hours of graduate credit specified by the department. The Master of Science includes at least 24 semester hours of course credit and thesis research. Master of Science students are required to enroll in BIOL 600V for 6 hours of credit and to submit a scholarly thesis based on field and/or laboratory research. Master of Arts students must enroll in BIOL 600V for 6 hours of credit and submit a scholarly thesis based on critical evaluation of scientific literature (on a topic agreed upon by their advisory committee), and complete at least 24 hours of graduate courses. is A specific coursework program will be selected under the guidance of the student's major professor and graduate committee. An oral comprehensive examination is required of all candidates, including a defense of the thesis, which in the case of MS students will follow their research seminar.

Specific Requirements for the Doctor of Philosophy Degree: There are no formal coursework requirements for doctoral students, except the required BIOL 5101 and two seminars mentioned previously, and any prescriptive courses as determined from scores on the Subject test of the Graduate Record Examination. A minimum of 18 hours must be taken in dissertation credit. Students wishing to bypass the Master's degree must complete 24 hours of post-baccalaureate graduate coursework before they can be considered for the doctoral program. The Ph.D. is granted not only for fulfillment of technical requirements, but also for development and possession of a critical and creative ability in science and fruitful expression of imagination. Evidence of this is given in the dissertation that the candidate prepares, which constitutes an original research contribution to the fields of the biological sciences.

The Graduate School requires two examinations of all students pursuing the Doctor of Philosophy degree. These examinations are designed to assist students in developing the ability to communicate at a scholarly level and to show they have attained intellectual mastery of knowledge relating to the biological sciences. The Candidacy Examination contains both written and oral portions related to the student's field of interest and is taken after approximately two years of graduate study. Successful completion of that examination means that the student becomes a candidate for the degree of Doctor of Philosophy; failure of that examination means that the student cannot be readmitted to the graduate program in the Department of Biological Sciences. The oral Final Examination, preceded by a research seminar, is primarily concerned with the candidate's dissertation and is taken at the end of the candidate's program.

COURSES: BIOLOGY (BIOL)

BIOL4234 Comparative Physiology (FA) Comparison of fundamental physiological mechanisms in various animal groups. Adaptations to environmental factors at both the organismal and cellular levels are emphasized. Lecture 3 hours, laboratory 3 hours per week. Corequisite: BIOL 4230L. Prerequisite: (8 hours in biology or zoology) and CHEM 3613 and CHEM 3611L

BIOL4230L Comparative Physiology Laboratory (FA) Corequisite: BIOL 4234.

BIOL4353 Ecological Genetics (FA, Odd years) Analysis of the genetics of natural and laboratory populations with emphasis on the ecological bases of evolutionary change. Prerequisite: BIOL 3323 and BIOL 3321L and MATH 2554 and STAT 2023 or equivalent.

BIOL4613 Primate Adaptation and Evolution (FA, SP, SU) Introduction to the biology of the order Primates. This course considers the comparative anatomy, behavioral ecology and paleontology of our nearest living relatives. (Same as ANTH 4613) Prerequisite: (BIOL 1543 and BIOL 1541L) or ANTH 1013.

BIOL4724 Protistology (FA, Odd years) The biology of eukaryotes other than Animals, Land Plants, and Fungi with emphasis on morphology and modern approaches to phylogenetic systematics. Three hours lecture, four hours lab/week. Involves writing term papers. Corequisite: BIOL 4720L.

BIOL4720L Protistology Laboratory (FA, Odd years) Corequisite: BIOL 4724.

BIOL480V Special Problems (1-6) (FA, SP, SU) For advanced students with adequate preparation. May be repeated.

BIOL485V Field Ecology (1-3) (SP, SU) Project oriented approach employing current field and laboratory techniques, experimental design, and data analysis. Field trip is required.

BIOL5001 Seminar in Biology (FA, SP) Discussion of selected topics and review of current literature in any area of the biological sciences. May be repeated for 2 hours.

BIOL5101 Bibliographic Practicum (FA) Systematic survey of biological resources available on CD-ROM, through electronic library on-line services, and on the Internet and World Wide Web. Prerequisite: senior or graduate standing.

BIOL5263 Cell Physiology (SP) Covers cellular processes involved in growth, metabolism, transport, excitation, signalling and motility, with emphasis on function and regulation in eukaryotes, primarily animals. Lecture 3 hours. Prerequisite: BIOL 2533 and BIOL 2531L and CHEM 3813 and PHYS 2033.

BIOL5261L Cell Physiology Laboratory (SP) Laboratory demonstrations of cell processes involved in growth, metabolism, transport, excitation, signalling and motility. Laboratory 3 hours. Pre- or Corequisite: BIOL 5263.

BIOL529V Research in Physiology (1-6) (FA, SP, SU)

BIOL5334 Biochemical Genetics (SP) Lectures and laboratories based on modern molecular genetic techniques for analyses of eukaryotes and manipulation of prokaryotes. A hands-on course in recombinant DNA techniques: laboratory practices in gene identification, cloning, and characteri-

zation. Lecture 2 hours, laboratory 6 hours per week. Corequisite: BIOL 5330L. Prerequisite: BIOL 3323 (or equivalent) and CHEM 3813 (or equivalent).

BIOL5330L Biochemical Genetics Laboratory (SP) Corequisite: BIOL 5334.

BIOL5353 Ecological Genetics (FA, Odd years) Analysis of the genetics of natural and laboratory populations with emphasis on the ecological bases of evolutional change. Prerequisite: BIOL 3323 and BIOL 3321L and MATH 2554 and STAT 2023 or equivalent.

BIOL539V Research in Genetics (1-6) (FA, SP, SU)

BIOL5433 Principles of Evolution (FA, Even years) Advanced survey of the mechanisms of evolutionary change with special emphasis on advances since the Modern Synthesis. Historical, theoretical, and population genetics approaches are discussed. Recommended: BIOL 3023 and BIOL 3321L and BIOL 3861L. Prerequisite: BIOL 3323 and BIOL 3863.

BIOL5463 Physiological Ecology of Animals (SP, Odd years) Interactions between environment, physiology, and properties of individuals and populations on both evolutionary and ecological scales. Prerequisite: BIOL 3863 and BIOL 4234 and BIOL 4230L.

BIOL549V Research in Vertebrate Morphology (1-6) (FA, SP, SU)

BIOL5503 Ecosystem Ecology (SP, Odd years) Factors controlling ecosystem structure and function. Topics include paleoclimate and species migrations, current species alliances, biogeochemical cycles, and climate change and ecosystem stability. Prerequisite: BIOL 3864.

BIOL5513 Population Ecology (SP) (Formerly BIOL 5514) Survey of theoretical and applied aspects of populations processes stressing models of growth, interspecific interactions, and adaptation to physical and biotic environments. Corequisite: BIOL 5511L. Prerequisite: BIOL 3864.

BIOL5511L Population Ecology Laboratory (SP) (Formerly BIOL 5510L) Demonstration of the models and concepts from BIOL 5513. Pre- or Corequisite: BIOL 5513.

BIOL5523 Physiological Ecology (SP, Even years) Effects of environmental factors on plant growth. Studies of light, temperature, soil, and soil moisture relationships will be emphasized. Prerequisite: BIOL 3864.

BIOL556V Research in Invertebrate Morphology (1-6) (FA, SP, SU)

BIOL557V Research in Histology (1-6) (FA, SP, SU)

BIOL558V Research in Cell Biology (1-6) (FA, SP, SU)

BIOL559V Research in Embryology (1-6) (FA, SP, SU)

BIOL569V Research in Invertebrate Zoology (1-6) (FA, SP, SU)

BIOL579V Research in Vertebrate Zoology (1-6) (FA, SP, SU)

BIOL580V Research in Botany (1-6) (FA, SP, SU)

BIOL581V Research in Microbiology (1-6) (FA, SP, SU)

BIOL5844 Community Ecology (SP, Even years) Survey of theoretical and applied aspects of community processes stressing structure, trophic dynamics, community interactions, and major community types. Corequisite: BIOL 5840L. Prerequisite: BIOL 3864.

BIOL5840L Community Ecology Laboratory (SP, Even years) Corequisite: BIOL 5844.

BIOL585V Field Ecology (1-3) (SP, SU) Project-oriented approach employing current field and laboratory techniques, experimental design and data analysis. Field trip is required. May be repeated.

BIOL589V Research in Field Zoology (1-6) (FA, SP, SU)

BIOL590V Special Topics in Botany (1-6) (FA, SP) Consideration of new areas of botanical science not yet treated adequately in textbooks or in other courses. May be repeated for 6 hours. Prerequisite: 8 hours of biological sciences.

BIOL591V Special Topics in Microbiology (1-6) (FA, SP) Consideration of new areas of microbiological science not yet treated adequately in textbooks or in other sciences. May be repeated. Prerequisite: 8 hours of biological sciences.

BIOL600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

BIOL700V Doctoral Dissertation (1-12) (FA, SP, SU) Prerequisite: graduate standing.

COURSES: BOTANY (BOTY)

BOTY4104 Taxonomy of Flowering Plants (SP, SU) Identifying, naming, and classifying of wildflowers, weeds, trees, and other flowering plants. Emphasis is on the practical aspects of plant identification. Lecture 3 hours, laboratory 3 hours per week. Corequisite: BOTY 4100L. Prerequisite: BOTY 1613 and BOTY 1611L and BIOL 1543 and BIOL 1541L.

BOTY4100L Taxonomy of Flowering Plants Laboratory (SP, SU) Corequisite: BOTY 4104.

BOTY4304 Plant Physiology (FA) Study of plant processes. Lecture 3 hours, laboratory 3 hours per week. Corequisite: BOTY 4300L. Prerequisite: BOTY 1613 and BOTY 1611L and BIOL 1543 and BIOL 1541L and general chemistry.

BOTY4300L Plant Physiology Laboratory (FA) Corequisite: BOTY 4304.

BOTY4424 Mycology (FA) Form and function of the fungi. Lecture 2 hours, laboratory 4 hours per week. Corequisite: BOTY 4420L. Prerequisite: BOTY 1613 and BOTY 1611L and BIOL 1543 and BIOL 1541L.

BOTY4420L Mycology Laboratory (FA) Corequisite: BOTY 4424.

BOTY480V Special Problems (1-6) (FA, SP, SU) May be repeated for 6 hours.

BOTY5323 Plant Growth and Growth Substances (SP, Even years) Concepts and techniques employed in the study of growth and development with emphasis on growth substances. Prerequisite: BOTY 4304 and organic chemistry.

COURSES: MICROBIOLOGY (MBIO)

MBIO4003 Laboratory Techniques in Microbiology (FA) Provides experience with laboratory techniques in microbial physiology, metabolism, and genetics. Laboratory 6 hours per week. Prerequisite: MBIO 2013 and MBIO 2011L and CHEM 3603 and CHEM 3601L and CHEM 3613 and CHEM 3611L.

MBIO4124 Food Microbiology (SP) Microbiology, contamination, preservation, and spoilage of different kinds of foods, food poisoning, sanitation, control, and inspection; microbiology of water; and standard methods for official food and public health laboratories. Lecture 2 hours, laboratory 4 hours per week. (Same as FDSC 4124) Corequisite: MBIO 4120L. Prerequisite: MBIO 2013 and MBIO 2011L and CHEM 1123 and CHEM 1121L or equivalent.

MBIO4120L Food Microbiology Laboratory (SP) Corequisite: MBIO 4124.

MBIO4233 Microbial Genetics (FA) Principles of molecular genetics in microorganisms, including the concepts of DNA structure and function, mutation, transformation, conjugation, transduction, recombination, and genetic engineering. Prerequisite: MBIO 2013 and MBIO 2011L and CHEM 3603 and CHEM 3601L and CHEM 3613 and CHEM 3611L.

MBIO4303 Physiology of Microorganisms (FA) Life processes of microorganisms. Prerequisite: MBIO 2013 and MBIO 2011L and CHEM 3603 and CHEM 3601L and CHEM 3613 and CHEM 3611L.

MBIO4443 Molecular Virology (SP, Odd years) Presents the molecular mechanisms underlying viral life-cycles; tropism and host cell recognition, penetration, genome replication, gene expression, transformation, assembly, nucleic acid packaging, and egress. Emphasis placed on experimental approaches. Lecture 3 hours per week. Prerequisite: (MBIO 4233 or BIOL 3323) and (MBIO 4753 or BIOL 2533) or graduate standing.

MBIO4703 Mechanisms of Pathogenesis (FA) A survey of the events causing human disease at the molecular, cellular and genetic levels. Seeks to develop an appreciation that both the tricks pathogens use add the body's own defenses contribute to pathology. Prerequisite: BIOL 2013 and BIOL 2011L and BIOL 2533.

MBIO4714 Basic Immunology (SP) A general overview of Immunity with emphasis on the underlying cellular, molecular, and genetic events, and discussions of more specialized issues in Immunology, such as disease states involving the Immune system, and other interesting problems in modern Immunology. Lecture 2 hours, laboratory 4 hours per week. Corequisite: MBIO 4710L. Prerequisite: MBIO 2013 and MBIO 2011L (or BIOL 2534 or ZOOL 2213 and ZOOL 2211L or equivalent).

MBIO4710L Basic Immunology Laboratory (SP) Corequisite: MBIO 4714.

MBIO4753 General Virology (SP) An introduction to viral life-cycles, structure, and host cell interactions. Emphasis placed on molecular and biochemical aspects of virology. Two hour lecture and one hour discussion. Corequisite: MBIO 4750D. Prerequisite: MBIO 2013 and MBIO 2011L, (MBIO 4233 or ANSC 3123 or POSC 3123 or BIOL 3323 and BIOL 3321L) and junior standing.

MBIO4750D General Virology Drill (SP) Discussion of research articles and specific relating to lecture in MBIO 4753. Corequisite: MBIO 4753.

MBIO480V Special Problems (1-6) (FA, SP, SU) May be repeated for 6 hours.

MBIO490V Special Topics in Microbiology (1-6) (IR) Consideration of new areas of microbiological knowledge not yet treated adequately in textbooks or in other courses. Prerequisite: 8 hours of biological sciences.

MBIO5264 Soil Microbiology (FA, Odd years) A study of the microorganisms in soil and the biochemical processes for which they are responsible. Lecture 3 hours, laboratory 3 hours per week. (Same as AGRN 5264) Corequisite: MBIO 5260L. Prerequisite: MBIO 2013 and MBIO 2011L.

MBIO5260L Soil Microbiology Laboratory (FA, Odd years) Laboratory exercises related to the study of microorganisms in soil and the biochemical processes for which they are responsible. Laboratory 3 hours per week. (Same as AGRN 5260L) Corequisite: MBIO 5264.

MBIO5343 Advanced Immunology (FA) Aspects of innate, cell-mediated, and humoral immunity in mammalian and avian species. Molecular mechanisms underlying the function of the immune system are emphasized. A course in Basic Immunology prior to enrollment in Advanced Immunology is recommended but not required. Lecture 3 hours per week. (Same as POSC 5343)

MBIO5352L Immunology in the Laboratory (SP) Laboratory course on immune-diagnostic laboratory techniques and uses of antibodies as a research tool. Included are cell isolation and characterization procedures, immunochemistry, flow cytometry, ELISA and cell culture assay systems. Laboratory 6 hours per week. (Same as POSC 5352L, VTSC 5352L) Prerequisite: POSC 5343 or MBIO 5343 or MBIO 5714.

COURSES ZOOLOGY (ZOOL)

ZOOL4623 Advanced Invertebrate Zoology (SP, Odd years) Detailed consideration of selected freshwater and marine invertebrate taxa with emphasis on functional morphology, embryology, natural history and systematics. Lectures, laboratories, and field trips. Corequisite: ZOOL4620L.

ZOOL4620L Advanced Invertebrate Zoology Laboratory (SP, Odd years) Corequisite: ZOOL 4623.

ZOOL4712 Aquaculture (SP, Even years) General survey of principles and techniques of aquaculture. Lecture 2 hours per week. Prerequisite: 8 hours biological science.

ZOOL4933 Special Topics in Zoology (SU) Discussion of recent outstanding zoological research of interest to zoology majors and public school science teachers. May be repeated with different instructor of a maximum of 6 hours of credit. May be repeated for 6 hours. Prerequisite: 8 hours of biological sciences.

ZOOL5504 Experimental Embryology (SP, Even years) Designed to acquaint the student with experimental and theoretical approaches to developmental embryology. Corequisite: ZOOL 5500L. Prerequisite: ZOOL 4544.

ZOOL5500L Experimental Embryology Laboratory (SP, Even years) Corequisite: ZOOL 5504.

ZOOL5514 Developmental Biology (SP) An analysis of the concepts and mechanisms of development emphasizing the experimental approach. Corequisite: ZOOL 5510L.

ZOOL5510L Development Biology Laboratory (SP) Corequisite: ZOOL 5514.

ZOOL5544 Comparative Vertebrate Embryology (FA) Comparative study of the embryology of selected vertebrate types through the mammal with special emphasis on humans. Lecture 2, laboratory 6 hours per week. Corequisite: ZOOL 5540L.

ZOOL5540L Comparative Vertebrate Embryology Laboratory (FA) Corequisite: ZOOL 5544.

ZOOL5643 Invertebrate Phylogeny (SP, Even years) Introduction to the principles and practice of phylogeny reconstruction and rigorous evaluation of animal relationships inferred from molecular and morphological characters. Emphasis will be on high-level phylogeny of invertebrate taxa. Prerequisite: ZOOL 2814 or equivalent.

ZOOL5723 Fish Biology (SP, Odd years) Morphology, classification, life histories, population dynamics, and natural history of fishes and fish-like vertebrates. Lecture 2 hours, laboratory 3 hours per week. Corequisite: ZOOL 5720L. Prerequisite: 12 hours of biological sciences.

ZOOL5720L Fish Biology Laboratory (SP, Odd years) Corequisite: ZOOL 5723.

ZOOL5733 Ichthyology (FA, Even years) Taxonomy, systematics, and museum and collecting methods fresh-water fishes, concentrating on the fishes of North America. Lecture 2 hours, laboratory 1 hour per week. Corequisite: ZOOL 5730L. Prerequisite: ZOOL 2404 or equivalent.

ZOOL5730L Ichthyology Laboratory (FA, Even years) Corequisite: ZOOL 5733.
ZOOL5743 Herpetology (SP, Even years) Morphology, classification and ecology of amphibians and reptiles. Lecture 2 hours, laboratory 1 hour per week. Corequisite: ZOOL 5740L.
ZOOL5740L Herpetology Laboratory (SP, Even years) Corequisite: ZOOL 5743.
ZOOL5763 Ornithology (SP, Even years) Taxonomy, morphology, physiology, behavior, and ecology of birds. Lecture, laboratory, and field work. Corequisite: ZOOL 5760L. Prerequisite: 10 hours of biological sciences.
ZOOL5760L Ornithology Laboratory (SP, Even years) Corequisite: ZOOL 5763.
ZOOL5783 Mammalogy (IR) Lectures and laboratory dealing with classification, morphology, distribution, ecology, behavior, and physiology of mammals. Corequisite: ZOOL 5780L.
ZOOL5780L Mammalogy Laboratory (IR) Corequisite: ZOOL 5783.
ZOOL5814 Limnology (FA, Odd years) Physical, chemical and biological conditions of inland waters. Lecture 3 hours per week, laboratory arranged. Corequisite: ZOOL 5810L. Prerequisite: (CHEM 1123 and CHEM 1121L) or equivalent and 12 hours of biological sciences.
ZOOL5810L Limnology Laboratory (FA, Odd years) Corequisite: ZOOL 5814.
ZOOL5822 Animal Distribution (FA, Even years) Physical, chronological, and biological factors affecting animal distribution, emphasizing terrestrial and fresh-water vertebrates.
ZOOL5833 Animal Behavior (FA, Odd years) Organization, regulation, and phylogeny of animal behavior, emphasizing vertebrates. Lecture, laboratory, and field work. Corequisite: ZOOL 5830L.
ZOOL5830L Animal Behavior Laboratory (FA, Odd years) Corequisite: ZOOL 5833.
ZOOL5914 Stream Ecology (FA, Even years) Current concepts and research in lotic ecosystem dynamics. Lecture, laboratory, field work and individual research projects required. Corequisite: ZOOL 5910L. Prerequisite: some previous course work in ecology is essential.
ZOOL5910L Stream Ecology Laboratory (FA, Even years) Corequisite: ZOOL 5914.
ZOOL5922 Conservation of Endangered Species (SP, Odd years) Biological, bureaucratic, and political reasons for protection of the nation's plants and animals. Conservation biology, ecology, population genetics, and legal implications of protecting selected species in ecosystem are discussed. Lecture 2 hours per week. Prerequisite: 12 hours of biological sciences.

(See Graduate School of Business, page 29)

CELL AND MOLECULAR BIOLOGY (CEMB)

John Kirby
Director
205 Agriculture Hall
575-4446

• University Professors Koeppe, Millett • Distinguished Professor Oosterhuis
• Professors Bottje, Correll, Davis, Felton, Gergerich, Johnson, Morelock, Murphy, Roufa, Stewart, Stripling, West • Associate Professors Bailey, Beitle, Durdik, Erf, Etges, Evans, Ivey, Kirby, Kral, Kreider, Rhoads, Rosenkrans, Sneller, Spiegel, Stites
• Assistant Professor Burgos, Henry, Korth, Okimoto, Parcells, Sakon, Schnell, Turbeville, Turnbull, Yang

Degrees Conferred: M.S. (CEMB)

Areas of Concentration: Graduate studies may be pursued in any area of Cell and/or Molecular Biology, including the study of various aspects of cell function, structure, metabolism, and chemical functions on, within and between cells, the study of biomolecular interactions, the relationships between biomolecular reactions and observed cellular properties, molecular genetics, protein chemistry, biological structures, as well as the use of molecular detection methods to detect or characterize biological states in animal and plant sciences, systematics, forensics and health care.

Admission to Degree Program: All applicants must have a B.A. or B.S. in a basic or applied science. Applicants must present Graduate Record Examination scores for the Verbal, Analytical and Quantitative tests. For admission, a student must have a sponsoring faculty member. The sponsoring faculty member will submit probable thesis subjects to the Program Committee prior to acceptance of the student. Once an applicant has been approved by the Program Committee, applications are forwarded to the Graduate School for application for admission to the Graduate School. Admitted and sponsored students will be responsible for the Graduate School's application fee unless paid by the department of the sponsoring faculty member.

Requirements for the Master of Science degree: For the M.S. degree, the Graduate School requires 30 semester hours, a comprehensive examination, a cumulative GPA of 2.85, and a minimum residence of 30 weeks. All candidates for the M.S. must complete a minimum of 24 hours of post-baccalaureate graduate credits not including seminar and thesis credit hours (18 hours plus CHEM 5813 and CHEM 5843) in Cell and Molecular Biology approved courses and 6 hours of thesis research. In addition, all candidates must enroll every fall and spring semester in the Cell and Molecular Biology designated seminar course. All M.S. candidates must complete a thesis based on their research and pass a comprehensive oral examination based on the thesis. Examination over, and approval of the thesis is by the student's Graduate Thesis Committee. In addition, all candidates must give a public presentation of their thesis work as part of the Cell and Molecular Biology seminar course during their final semester.

COURSES: CELL AND MOLECULAR BIOLOGY (CEMB)

CEMB 590 Special Topics in Cell and Molecular Biology (FA, SP, SU) Consideration of new areas in Cell and Molecular Biology not yet treated adequately in textbooks or in other courses. This course may be repeated, provided subject matter is different for a maximum of 6 hours of credit.
CEMB 5911 Seminar in Cell and Molecular Biology (FA, SP) Discussion of current topics in Cell and Molecular Biology. All graduate students in the Cell and Molecular Biology degree program must enroll every fall and spring semester in this course or an approved alternate seminar course. Prerequisite: graduate standing.
CEMB 600 Master's Thesis (FA, SP, SU) (1-6) Prerequisite: graduate standing.
CEMB 700 Doctoral Dissertation (FA, SP, SU) (1-18) Prerequisite: graduate standing.

DEPARTMENT OF CHEMICAL ENGINEERING (CHEG)

R.E. Babcock
Department Head
3202 Bell Engineering Center
575-4951

• University Professor Turpin • Distinguished Professor Havens • Professors Babcock, Clausen, Penney, Spicer, Ulrich, Welker
• Associate Professors Ackerson, Beitle, Thoma • Assistant Professor Driscoll
• Instructor Myers • Research Professor Cross

Degrees Conferred: M.S.Ch.E. (CHEG) M.S.E., Ph.D. in Engineering (ENGR)

(See Engineering)

The Chemical Engineering Department offers advanced studies and research specialties in all basic areas of chemical engineering. Sponsored research programs encompass transport phenomena, reaction kinetics, thermodynamics, pollutant transport and removal, hazardous materials disposal, and biochemical engineering. Students who have demonstrated excellence in their baccalaureate studies are admitted for graduate study. An undergraduate degree in chemical engineering is preferred; however, advanced degree programs are available for students with degrees in other disciplines (particularly chemistry), providing certain undergraduate prerequisites are satisfied.

The general requirements for an advanced degree in chemical engineering are as outlined by the Graduate School and the graduate faculty of engineering. A student's goal for pursuing an advanced degree and the research topic are given primary consideration in the preparation of the course of study. The student's advisory committee will assist in the definition of a diversified program to ensure competence as a practicing engineer.

A Certificate of Achievement in Electronics Manufacturing is available for students seeking a graduate degree in an engineering discipline. (See page 77)

COURSES: CHEM ENGR (CHEG)

CHEG4263 Environmental Experimental Methodology (FA, SP, SU) Introduction to experimental design, environmental analytical method quality assurance of analytical measurements, sample collection and preservation. Laboratory work necessary to support a field scale tracer experiment will be required. Prerequisite: senior or graduate standing.
CHEG4813 Chemical Process Safety (FA, SP, SU) Application of chemical engineering principles to the study of safety, health, and loss prevention. Fires and explosions, hygiene, toxicology, hazard identification, and risk assessment in the chemical process industries. Prerequisite: senior standing.
CHEG5013 Membrane Separation and System Design (SP) Theory and system design of cross flow membrane process—reverse osmosis, nanofiltration, ultrafiltration, and microfiltration—and applications for pollution control, water treatment, food and pharmaceutical processing. Prerequisite: CHEG 3153.

CHEG5033 Technical Administration (FA, SP, SU) Means and methods of planning, conducting, supervising, coordinating, and financing research, development, and engineering activities. Prerequisite: senior or graduate standing.

CHEG5113 Transport Processes I (FA) Fundamental concepts and laws governing the transfer of momentum, mass, and heat. Prerequisite: CHEG 2313 (or equivalent) and MATH 3404.

CHEG5133 Advanced Reactor Design (FA, SP, SU) Applied reaction kinetics with emphasis on the design of heterogeneous reacting systems including solid surface catalysis, enzyme catalysis, and transport phenomena effects. Various types of industrial reactors, such as packed bed, fluidized beds, and other non-ideal flow systems are considered. Prerequisite: MATH 3404 and CHEG 3333.

CHEG5213 Advanced Chemical Engineering Calculations (FA, SP, SU) Developments of and solution of equations and mathematical models of chemical processes and mechanisms. Prerequisite: CHEG 3333 and CHEG 3253.

CHEG5223 Petroleum Processing (FA, SP, SU) Introduction to petroleum production, field processing, and transportation. Prerequisite: CHEG 4413.

CHEG5273 Corrosion Control (FA, SP, SU) Qualitative and quantitative introduction to corrosion and its control. Application of the fundamentals of corrosion control in the process industries is emphasized. Prerequisite: CHEG 2313.

CHEG5313 Advanced Thermodynamics (FA, SP, SU) Methods of statistical thermodynamics, the correlation of classical and statistical thermodynamics, and the theory of thermodynamics of continuous systems (non-equilibrium thermodynamics). Prerequisite: CHEG 3323.

CHEG5353 Equilibrium Stage Operations (FA, SP, SU) Phase equilibrium in non-ideal and multicomponent systems, digital and other methods of computation are included to cover the fundamentals of distillation, absorption, and extraction. Prerequisite: CHEG 4163.

CHEG5403 Organic Technology (FA, SP, SU) Major unit processes in the organic chemical field with emphasis on industrial applications including the thermodynamic, kinetic, and economic problems associated with the manufacturing and utilization of synthetic organic chemicals. Prerequisite: CHEM 3603 or CHEM 3613.

CHEG5413 Advanced Chemical Engineering Design (FA, SP, SU) Economics and design of chemical plants employing modern optimization techniques. Topics include process synthesis, process analysis, and engineering in the presence of uncertainty. Open-ended complex problems are solved using digital computers. Prerequisite: CHEG 4413.

CHEG5423 Advanced Automatic Control Theory (SP) Complex control systems, including cascade, optimal, direct digital control and adaptive control systems are considered with chemical engineering applications. Prerequisite: CHEG 4423.

CHEG5513 Biochemical Engineering Fundamentals (FA, SP, SU) An introduction to biochemical engineering and the methods of using biochemical systems for the production of food, chemicals, and energy. Topics include enzyme-catalyzed reactions, fermentations kinetics, design and analysis of biological reactors, and transport phenomena applied to bioprocess systems. Prerequisite: CHEG 3143.

CHEG5613 Microelectronics Fabrication and Materials (FA, SP, SU) Overview of microelectronics and semiconductors with emphasis placed on the manufacturing process rather than device physics. Topics include the various types of devices, the manufacturing flow, and criteria for materials selection. No prior knowledge of electronics is required. Prerequisite: ELEG 3903.

CHEG5713 Engineering Materials (FA, SP, SU) Composition and structure of matter with relation to the properties of materials are presented. Prerequisite: senior standing.

CHEG5723 Heat Transfer (FA, SP, SU) Mechanics of heat transfer, followed by a detailed mathematical treatment of heat transfer by conduction, convection, and radiation, singly and in combination, and the application of heat transfer to design problems. Prerequisite: CHEG 3143 and senior or graduate standing.

CHEG5733 Polymer Theory and Practice (FA, SP, SU) Theories and methods for converting monomers into polymers are presented. Topics include principles of polymer science, commercial processes, rheology, and fabrication. Prerequisite: CHEM 3603 or CHEM 3613.

CHEG5753 Air Pollution (FA, SP, SU) Fundamentals of air pollution causes, effects, and measurements, as well as control methods with application to current industrial problems. (Same as CVEG 5753) Prerequisite: graduate standing.

CHEG5801 Graduate Seminar (FA, SP) Oral presentation are given by master's candidates on a variety of chemical engineering subjects with special emphasis on new developments. Prerequisite: graduate standing.

CHEG588V Special Problems (1-6) (FA, SP, SU) Opportunity for individual study of an advanced chemical engineering problem not sufficiently comprehensive to be a thesis. Prerequisite: graduate standing.

CHEG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

CHEG6123 Transport Processes II (SP) Continuation of CHEG 5113.

CHEG6203 Preparation of Research Proposals (IR) Prerequisite: doctoral students only.

CHEG6223 Advanced Chemical Engineering Calculations II (SP) Continuation of CHEG 5213.

CHEG6801 Graduate Seminar (FA, SP) Oral presentations are given by doctoral students on a variety of chemical engineering subjects with special emphasis on new developments. Prerequisite: graduate standing.

CHEG688V Special Topics in Chemical Engineering (1-3) (IR) Advanced study of current Chemical Engineering topics not covered in other course. Prerequisite: doctoral students only.

CHEG700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY (CHBC)

Donald R. Bobbitt
Department Chair
115 Chemistry Building
575-4601

• Distinguished Professors Pulay, Schäfer, Wilkins • University Professors Cordes, Hinton, Koeppe, Millett • Professors Bobbitt, Davis, Durham, Ewbank, Geren, Johnson, Sears • Associate Professors Allison, Fritsch, Paul, Stites, Turnbull • Assistant Professors McIntosh, Peng, Sakon

Degrees Conferred: M.S., Ph.D. in Chemistry (CHEM)

Areas of Concentration: analytical, inorganic, organic, physical, biophysical, and biochemistry.

Prerequisites to Degree Program: In addition to the application for admission to the Graduate School and the transcripts required for Graduate School admission, applicants for admission to the degree programs of the Department of Chemistry and Biochemistry must submit an application for assistantship or fellowship and letters of recommendation from three persons familiar with the applicant's previous academic and/or professional performance. The advanced degree programs are based on an undergraduate program developed in accordance with the standards of the American Chemical Society, see below.

Basic Program for Advanced Degree Candidates: Appropriate programs of advanced courses, examinations, and research are required of all advanced degree candidates. In addition to the material given below, the student is referred to the general Graduate School requirements mentioned earlier in this catalog, and to the bulletin Information for Graduate Students in Chemistry and Biochemistry available from the Department of Chemistry and Biochemistry. The advanced degree programs are based on an undergraduate program developed in accordance with the standards used by the American Chemical Society as criteria in evaluating undergraduate professional education in chemistry.

1. The introductory part of this undergraduate program, consisting of courses in general chemistry and elementary quantitative analysis, organic chemistry and physical chemistry, must be completed prior to official entrance into an advanced degree program. If a graduate student lacks any part of this introductory program, it must be acceptably completed for undergraduate credit within the first four semesters as a graduate student. If the student has the necessary prerequisites, courses for graduate credit may be taken concurrently. Mastery of physical chemistry must be demonstrated by satisfactory performance on placement examinations or in the appropriate physical chemistry courses. In addition, the equivalent of the advanced lecture courses which are part of the University degree program in chemistry, consisting of advanced courses in inorganic, analytical, and a third semester of organic chemistry are required. Courses satisfactorily completed to remove deficiencies in these areas will generally carry graduate credit. The student's advisory committee will determine whether these courses will count as advanced course requirements.
2. While the Department has no foreign language requirement for either the M.S. or Ph.D. degree, students should recognize that they are responsible for the knowledge of scientific literature in their research area regardless of the language in which it is published. Knowledge of a foreign language is thus desirable and encouraged. In cases where it is deemed essential to a student's research, a student's advisory committee may require appropriate foreign language course work.
3. In addition to meeting the above basic minimum B.S. requirements, each advanced degree candidate must present a suitable program of advanced courses and research. In addition to those courses taken in the major area, a minimum of nine graded graduate hours must be taken in courses offered by the Department of Chemistry and Biochemistry on the Fayetteville campus of the University of Arkansas. The courses used to complete this requirement must be approved by the student's advisory committee as appropriate for the student's program. For students in the Ph.D. program, the advisory committee may accept up to nine graded

graduate hours from an M.S. program toward this requirement.

4. Every student must register for a minimum of one credit hour of CHEM 600V or 700V in each term during which the student is present and doing thesis research.
5. Graduate students shall participate in divisional and departmental seminars at the discretion of, and to the satisfaction of, the graduate faculty.

Additional Requirement for Master of Science Degree: A thesis reporting original research will generally be required of all candidates for the Master of Science degree in chemistry. In certain rare cases, with the approval of the graduate faculty of the department, six hours of CHEM 500V may be substituted for the thesis. A detailed written report of the work in CHEM 500V must be prepared and successfully defended before the candidate's M.S. committee. The work will involve an extensive review of the chemical literature of a topic approved by the student's committee. The report will be a comprehensive, interpretive review of the literature similar in quality to that which would appear in a journal published by the American Chemical Society.

Additional Requirements for the Doctor of Philosophy Degree: No definite course requirements or number of hours apply to all students. A doctoral advisory committee is appointed to evaluate the candidate's preparation and to draw up a suitable program of study and research. This committee consists of the student's major professor and at least three other members of the graduate faculty. Under most circumstances, the major professor serves as the chairperson of that committee. There is no foreign language requirement beyond that of Part "3" of the Basic Program.

For chemistry students, the candidacy examination is of the cumulative type. Five cumulative examinations are given each semester in each of the areas of concentration mentioned above. To complete the candidacy examination, seven of these cumulative examinations must be passed within a specified time, usually by the end of the fifth semester of graduate work.

COURSES: CHEMISTRY (CHEM)

CHEM4043 Environmental Chemistry (SP, Even years) Application of chemical principles and techniques to specific environmental problems, and the chemical interrelationships among these problems. Topics include the chemistry of fossil fuels, new energy sources, energy storage concepts, air pollution, mineral resources, solid wastes, water and waste water treatment, pesticides, and toxic materials. Does not carry graduate credit for chemistry majors. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 3613 and CHEM 3611L (or CHEM 3713 and CHEM 3712L) and CHEM 3514 (or CHEM 3453).

CHEM4123 Advanced Inorganic Chemistry I (FA) Reactions and properties of inorganic compounds from the standpoint of electronic structure and the periodic table. Emphasis on recent developments. Prerequisite: CHEM 3514.

CHEM4213 Instrumental Analysis (SP) Provides students, especially those in the agricultural, biological, and physical sciences, with an understanding of modern instrumental techniques of analysis. Lecture 3 hours per week. Prerequisite: CHEM 2262 and CHEM 2272 and CHEM 3613 and CHEM 3611L (or CHEM 3713 and CHEM 3712L) and CHEM 3514 (or CHEM 3453).

CHEM4211L Instrumental Analysis Laboratory (SP) Provides laboratory experience in parallel with the lecture material in CHEM 4213. Laboratory 3 hours per week. Pre- or Corequisite: CHEM 4213.

CHEM4723 Experimental Methods in Organic and Inorganic Chemistry (FA) Introduction to the application of synthetic and spectroscopic methods in organic and inorganic chemistry, including mass spectroscopy, nuclear magnetic resonance, ultraviolet-visible, and infrared spectroscopy. Other laboratory techniques applicable to chemical research will be included. Lecture 1 hour, laboratory 6 hours per week. chemistry students may not receive graduate credit for this course and CHEM 5753. Pre- or Corequisite: CHEM 4720L. Corequisite: CHEM 4720D. Prerequisite: CHEM 3613 and CHEM 3611L (or CHEM 3713 and CHEM 3712L) and CHEM 3504 and CHEM 3514.

CHEM4720D Experimental Methods in Organic and Inorganic Chemistry Drill (FA) Corequisite: CHEM 4723.

CHEM4720L Experimental Methods in Organic and Inorganic Chemistry Laboratory (FA) Corequisite: CHEM 4723.

CHEM4853 Biochemical Techniques (SP) Techniques for handling, purifying and analyzing enzymes, structural proteins, and nucleic acids. Lecture 1 hour, laboratory 6 hours per week. Pre- or Corequisite: CHEM 5813 or CHEM 3813.

CHEM500V Chemistry Research (1-3) (FA, SP, SU) Research problems. May be repeated.

CHEM5101 Introduction to Research (FA, SP, SU) Introduces new graduate students to research opportunities and skills in chemistry and biochemistry. Meets 1 hour per week during which new students receive information from faculty regarding research programs in the department and training in the use of research support facilities available in the department.

CHEM5143 Advanced Inorganic Chemistry II (IR) Chemistry of metallic and non-metallic elements emphasizing molecular structure, bonding and the classification of reactions. Emphasis on recent developments. Prerequisite: CHEM 4123.

CHEM5153 Structural Chemistry (IR) Determination of molecular structure by spectroscopic, diffraction, and other techniques. Illustrative examples will be chosen mainly from inorganic chemistry. Pre- or Corequisite: CHEM 3504 and CHEM 4123.

CHEM520V Science Teachers Workshop (1-3) (IR) A course emphasizing hands-on demonstrations and laboratory exercises for K-12th grade science teachers. Selected current topics from the areas of biochemistry, chemistry, and physical science are discussed in a lecture format; grade appropriate exercises and demonstrations illustrating these topics are presented in a laboratory setting. Course cannot be counted toward the requirements for the B.S., B.A. or any graduate degree in chemistry and biochemistry. May be repeated for 6 hours.

CHEM5223 Chemical Instrumentation (SP, Odd years) Use and application of operational amplifiers to chemical instrumentation; digital electronic microprocessor interfacing; software development and real-time data acquisition. Prerequisite: CHEM 4213 and PHYS 2073.

CHEM5233 Chemical Separations (FA, Even years) Modern separation methods including liquid chromatography (adsorption, liquid-liquid partition, ion exchange, exclusion) and gas chromatography. Theory and instrumentation is discussed with emphasis on practical aspects of separation science. Prerequisite: CHEM 4213.

CHEM5243 Electrochemical Methods of Analysis (SP, Even years) Topics will include: diffusion, electron transfer kinetics, reversible and irreversible electrode processes, followed by a discussion of chronoamperometry, chronocoulometry, polarography, voltammetry and chronopotentiometry. Prerequisite: CHEM 4213 and MATH 2574.

CHEM5253 Spectrochemical Methods of Analysis (FA, Odd years) Principles and methods of modern spectroscopic analysis. Optics and instrumentation necessary for spectroscopy is also discussed. Topics include atomic and molecular absorption and emission techniques in the ultraviolet, visible, and infrared spectral regions. Prerequisite: CHEM 4213.

CHEM5263 Nuclear Chemistry (FA, Odd years) Nuclear structure and properties, natural and artificial radioactivity, radioactive decay processes, nuclear reaction, interactions of radiation with matter. Prerequisite: CHEM 3514.

CHEM5273 Cosmochemistry (SP, Odd years) Laws of distribution of the chemical elements in nature, cosmic and terrestrial abundance of elements; origin and age of the earth, solar system, and the universe. Prerequisite: CHEM 3514.

CHEM5453 Quantum Chemistry I (SP, Odd years) Fundamental quantum theory: Hamiltonian formalism in classical mechanics, Schrodinger equation, operators, angular momentum, harmonic oscillator, barrier problems, rigid rotator, hydrogen atom, interaction of matter with radiation. Prerequisite: CHEM 3504. (Recommended: MATH 3404).

CHEM5463 Quantum Chemistry II (SP, Even years) Continuation of Quantum Chemistry I, Matrix formalism spin, atomic structure, the chemical bond, valence-bond, valence-bond method, molecular-orbital theory, symmetry, diatomic molecules, hybridization, conjugated systems; introduction to molecular spectroscopy, magnetic resonance, ligand-field theory, and theoretical techniques for molecular calculation. Prerequisite: CHEM 3514.

CHEM5473 Chemical Kinetics (SP) Theory and applications of the principles of kinetics to reactions between substances, both in the gaseous state and in solution. Prerequisite: CHEM 3514.

CHEM5603 Theoretical Organic Chemistry (FA) Introduction to the theoretical interpretation of reactivity, reaction mechanisms, and molecular structure of organic compounds. Application of theories of electronic structure; emphasis on recent developments. Prerequisite: CHEM 3514 and CHEM 3713 and CHEM 3712L.

CHEM5633 Organic Reactions (FA) The more important types of organic reactions and their applications to various classes of compounds. Prerequisite: CHEM 3514 and CHEM 3713 and CHEM 3712L.

CHEM5753 Physical Methods in Organic Chemistry (FA) Interpretation of physical measurements of organic compounds in terms of molecular structure. Emphasis on spectroscopic methods (infrared, ultraviolet, magnet resonance, and mass spectra). Prerequisite: CHEM 3712L and CHEM 3713 and CHEM 3514.

CHEM5813 Biochemistry I (FA) The first of a two-course series covering biochemistry for graduate students in biology, agriculture, and chemistry. Topics covered include protein structure and function, enzyme kinetics, enzyme mechanisms, and carbohydrate metabolism. Prerequisite: CHEM 3712L and CHEM 3713 (or CHEM 3613 and CHEM 3611L) and CHEM 3514 (or CHEM 3453 and CHEM 3451L).

CHEM5843 Biochemistry II (SP) A continuation of CHEM 5813 covering topics including biological membranes and bioenergetics, photosynthesis, lipids and lipid metabolism, nucleic acid structure and structure and synthesis, and molecular biology. Prerequisite: CHEM 5813.

CHEM600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

CHEM6011 Chemistry Seminar (FA, SP) Members of the faculty, graduate and advanced students meet weekly for discussion of current chemical research. Weekly seminar sections are offered for the Departmental seminar and for divisional seminars in biochemistry and in analytical, inorganic, nuclear, organic, and physical chemistry. Chemistry graduate students register for the Departmental seminar section and one of the divisional seminar sections each semester they are in residence. Seminar credit does not count toward the minimum hourly requirements for any chemistry graduate degree. Prerequisite: CHEM 3514 and CHEM 3712L and CHEM 3713 and senior or graduate standing.

CHEM619V Special Topics in Inorganic Chemistry (1-3) (IR) Topics which have been covered in the past include: technique and theory of x-ray diffraction, electronic structure of transition metal complexes, inorganic reaction mechanisms, and physical methods in inorganic chemistry. May be repeated.

CHEM629V Special Topics in Analytical Chemistry (1-3) (IR) Topics that have been presented in the past include: electroanalytical techniques, kinetics of crystal growth, studies of electrode processes, lasers in chemical analysis, nucleosynthesis and isotopic properties of meteorites, thermoluminescence of geological materials, early solar system chemistry, analytical cosmochemistry. May be repeated.

CHEM649V Special Topics in Physical Chemistry (1-3) (IR) Topics which have been covered in the past include advanced kinetics, solution chemistry, molecular spectra, nuclear magnetic resonance spectroscopy, and methods of theoretical chemistry. May be repeated.

CHEM6633 Chemistry of Organic Natural Products (IR) Selected topics concerned with structure elucidation and synthesis of such compounds as alkaloids, antibiotics, bacterial metabolites, plant pigments, steroids, terpenoids, etc. Prerequisite: CHEM 5603 and CHEM 5633.

CHEM6673 Organic Reaction Mechanisms (FA, Odd years) A detailed description of the fundamental reactions and mechanisms of organic chemistry. Prerequisite: CHEM 5633.

CHEM669V Special Topics in Organic Chemistry (1-3) (IR) Topics which have been presented in the past include heterogeneous catalysis, isotope effect studies of

organic reaction mechanisms, organometallic chemistry, stereochemistry, photochemistry, and carbanion chemistry. May be repeated.
CHEM6823 Physical Biochemistry (FA, Even years) Physical chemistry of proteins, nucleic acids, and biological membranes. Ultracentrifugation, absorption and fluorescent spectrophotometry, nuclear magnetic resonance spectroscopy, x-ray diffraction, and other techniques. Prerequisite: (CHEM 5813 and CHEM 3514) or graduate standing.
CHEM6863 Enzymes (FA, Odd years) Isolation, characterization, and general chemical and biochemical properties of enzymes. Kinetics, mechanisms, and control of enzyme reactions. Prerequisite: graduate standing (or CHEM 5843 and CHEM 5813).
CHEM6873 Molecular Biochemistry (SP, Odd years) Nucleic acid chemistry in vitro and in vivo, synthesis of DNA and RNA, genetic diseases, cancer biochemistry, genetic engineering. Prerequisite: CHEM 5813 and CHEM 5843.
CHEM6883 Bioenergetics and Biomembranes (SP, Even years) Cellular energy metabolism, photosynthesis, membrane transport, properties of membrane proteins, and the application of thermodynamics to biological systems. Prerequisite: CHEM 5813 and CHEM 5843.
CHEM700V Doctoral Dissertation (1-6) (FA, SP, SU) Prerequisite: graduate standing.

CHILDHOOD EDUCATION (CHED)

Priscilla L. Griffith
Department Head of Curriculum and Instruction
201 Graduate Education Building
575-4209

Graduate Studies Coordinator
204 Graduate Education Building
575-4209

• Professors Griffith, Sullivan o Associate Professor Lefever-Davis • Assistant Professors Beller, Hardy, Mcgee, Kirkpatrick • Instructor Cronan, Riggs

Degree Offered: M.A.T. (CHED)

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree program. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Areas of Concentration: The M.A.T. degree program has seven areas of emphasis: agricultural education, childhood education, middle-level education, physical education, secondary education, special education, and vocational education.

Prerequisites to Degree Program: Enrollments will be limited in upper division professional studies courses in the Childhood Education BSE Program. In addition, a maximum number of 75 students will be accepted into the MAT Program in Childhood Education, contingent upon availability of placements with partnership schools. Specific application procedures and selection criteria are in effect to limit course enrollments and acceptance to the MAT program. Please contact your childhood education faculty adviser for details regarding the selective admission process. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all previous courses
3. Admission to the Graduate School
4. Screening/Acceptance into partner school internship
5. Completion of the pre-education core with a minimum of "C" in all courses
6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Requirements for the Master of Arts in Teaching Degree:
Required M.A.T. Core: 10 hours
CIED 5012, Measurement/Research/ Statistical Concepts for Teachers
CIED 5022, Classroom Management Concepts for Teachers
CIED 5032, Curriculum Design Concepts for Teachers
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Required for Concentration in Childhood Education: 23 hours
CIED 5003, Childhood Seminar
CIED 5063, Contemporary and Futuristic Concerns of Childhood Education
CIED 5073, Case Study in Childhood Education
CIED 508V, Childhood Education Cohort Teaching Internship (6 hours)
CIED 5162, Applied Practicum
CIED 5173, Literacy Assessment
CIED 5183, Readings in Early Childhood Education

DEPARTMENT OF CIVIL ENGINEERING (CVEG)

Robert P. Elliott
Department Head
4190 Bell Engineering Center
575-4954

• Professors Elliott, Knowles, Schemmel, Selvam, Welch • Associate Professors Dennis, Gattis, Gross, Hall, Pleimann, Wang • Assistant Professors Burian, Findlay, Schwarz, Soerens, Tooley

Degrees Conferred:
M.S.C.E. (CVEG)
M.S.En.E. in Environmental Engineering (ENEG)
(See Environmental Engineering)

M.S.T.E in Transportation Engineering (TREG)
(See Transportation Engineering)
M.S.E., Ph.D. in Engineering (ENGR)
(See Engineering)

Requirements for the Master of Science in Civil Engineering Degree

1. Candidates for the degree who present a thesis are required to complete a minimum of 24 semester hours of course work and a minimum of six semester hours of thesis.
2. Candidates for the degree who do not present a thesis are required to complete a minimum of 30 semester hours of course work plus three semester hours credit of CVEG 563V, or CVEG 562V, plus a written Master's Report, completed under the direction of the candidate's major adviser.
3. Candidates for the degree must present a cumulative grade average of 3.00 on all graduate courses and a cumulative grade average of 2.50 on all deficiency courses. The minimum acceptable grade is "C.''
4. Upon admission to the Graduate School and acceptance in a program of study, the candidate will be assigned to a major adviser, who in consultation with the department head will select a graduate committee. The candidate will present to the committee a written statement of professional goals and objectives. The committee, meeting with candidate, will design a suitable graduate program to achieve these goals and objectives and will serve as the examination committee for the thesis/report and the final oral and/or written examination. The committee will meet at least once each semester to review the progress of the student. A positive recommendation by the committee is required for subsequent registration of the student.

COURSES: CIVIL ENGR (CVEG)

CVEG4003 CAD & Visualization for Civil Structures (FA, SP, SU) Design process of infrastructures using 3 Dimensional (3D) Computer Aided Design and Engineering visualization with a highway design emphasis. Students produce a digital video for a designed civil structure as a class project. Develop skills in photo matching for placement of designed structures in real environment. Prerequisite: senior standing.
CVEG4053 Land Surveying (FA, SP, SU) Historical background of property surveys. Detailed consideration of original surveys and the United States Public Land Surveys. Writing adequate land descriptions. Interpretation of old descriptions. Excess and deficiency. Riparian rights. Field practice in relocation of old corners. Prerequisites: senior standing and CVEG 2053.
CVEG4060L Subdivision Planning and Layout Laboratory (FA, SP, SU) Corequisite: CVEG 4063.
CVEG4073 Advanced Aerial Photogrammetry (FA, SP, SU) Geometry of aerial photographs, measurements from photographs, stereoscopic models, photogrammetric instrumentation, and map compilation. Lecture 2 hours, laboratory 3 hours per week. Corequisite: CVEG 4070L. Prerequisite: CVEG 2053.
CVEG4070L Advanced Aerial Photogrammetry Laboratory (FA, SP, SU) Corequisite: CVEG 4073.

CVEG4083 Control Surveys (FA, SP, SU) Sun and Polaris observations for astronomic azimuth, solar access studies; control traversing, leveling, triangulation; state plane coordinate systems. Lecture 2 hours, laboratory 3 hours per week. Corequisite: CVEG 4080L. Prerequisite: CVEG 2053 and CVEG 2051L.

CVEG4080L Control Surveys Laboratory (FA, SP, SU) Corequisite: CVEG 4083.

CVEG4143 Foundation Engineering (FA, SP, SU) Analysis and design of retaining walls, footings, sheet piles, and piles. Determination of foundation settlements in sand and clay. Prerequisite: CVEG 1113 and CVEG 3133.

CVEG4153 Earth Structures (FA, SP, SU) The use of soil as a construction material including compaction, cement, lime, and fly ash stabilization. Special topics include seepage, slope stability, swelling, and collapsible soils. Prerequisite: CVEG 3133.

CVEG4243 Environmental Engineering Design (FA, SP, SU) Application of physical, biological, and chemical operations and processes to the design of water supply and wastewater treatment systems. Prerequisite: CVEG 3223 and CVEG 3243.

CVEG4253 Small Community Wastewater Systems (FA, SP, SU) Design of innovative and alternative wastewater collection, transport, and treatment systems typically suited for rural and small community applications. Recitation 3 hours per week. Prerequisite: CVEG 3243.

CVEG4263 Environmental Regulations and Permits (FA) Topics include federal and state environmental regulations, the permitting process, permit requirements and related issues. Prerequisite: CVEG 4243 and senior standing.

CVEG4303 Reinforced Concrete Design I (FA, SP, SU) Design of reinforced concrete elements with emphasis on ultimate strength design supplemented by working stress design for deflection and crack analysis. Prerequisite: CVEG 2113 and CVEG 3304.

CVEG4313 Structural Steel Design I (FA, SP, SU) Design of structural steel elements by elastic design the Load and Resistance Factor Design method. Intensive treatment of tension members, beams, columns, and connections. Pre- or Corequisite: CVEG 2113. Prerequisite: CVEG 3304.

CVEG4343 Reinforced Masonry Design (FA, SP, SU) Properties of masonry materials and assemblages. Masonry workmanship and quality control. Design of reinforced masonry elements against gravity and lateral loads. Design of masonry connections and joints. Application to 1- and 2-story buildings. Prerequisite: CVEG 4303.

CVEG4353 Timber Design (FA, SP, SU) Selection of timber beams, columns, and beam-columns. Physical properties of wood, analysis and design of timber connections. Truss design, glulam members, timber bridge design, treatment for decay, and fire protection. Pre- or Corequisite: CVEG 2113. Prerequisite: CVEG 3304.

CVEG4363 Prestressed Concrete Design (FA, SP, SU) Analysis and design of prestressed concrete flexural sections by working stress and ultimate strength design methods. Flexural behavior, moment-curvature diagrams, draping, anchorage zone design, torsion and shear, deflections, and prestress losses. Design of composite sections and continuous beams. Prerequisite: CVEG 4303.

CVEG4393 Reinforced Concrete Design II (FA, SP, SU) Optimum design of continuous beams. Design of walls, footings, slender columns, torsion and shear in beams, deep beams, brackets and corbels. Introduction to and design of structural slabs by the direct design method. Prerequisite: CVEG 4303.

CVEG4403 Public Transportation (FA, SP, SU) An introduction to the systems and technologies that provide the public transportation alternatives to the multi-modal transportation systems in urban and rural areas. A comparison of alternatives, procedures for planning, management and operations, and policies of public transportation. Prerequisite: CVEG 3413 or graduate standing.

CVEG4413 Pavement Evaluation and Rehabilitation (FA, SP, SU) Introduction of concepts and procedures for pavement condition surveys; evaluation by nondestructive and destructive testing; maintenance strategies; rehabilitation of pavement systems for highway and airfields; pavement management systems. Prerequisite: CVEG 4433.

CVEG4423 Geometric Design (FA, SP, SU) The geometric design of streets and highways, based on theory and application of driver and vehicle characteristics. Prerequisite: CVEG 3413.

CVEG4433 Transportation Pavements and Materials (FA, SP, SU) Study of the engineering properties and behavior of materials commonly used in transportation facilities as they relate to the design and performance of flexible and rigid pavement systems. Lecture 2 hours, laboratory 3 hours per week. Prerequisite: CVEG 3133 and CVEG 3413 and INEG 3133.

CVEG4430L Transportation Pavements and Materials Laboratory (FA, SP, SU) Corequisite: CVEG 4433.

CVEG4513 Construction Management (SP) Introduction to methods and procedures for management of civil engineering construction projects including organization, plans and specs, cost estimating and bidding, project planning and finance, quality control/ assurance, construction safety, cost management, labor issues, change orders, and subcontractor issues. Prerequisite: senior standing.

CVEG4803 Structural Loadings (FA, SP, SU) Theoretical background to and practical code requirements for various structural loadings. These include dead loads, occupancy loads, roof loads and ponding, snow loads, granular loads, vehicular loads, wind loading, and seismic loads. Prerequisite: CVEG 3304 and CVEG 4303 (or CVEG 4313).

CVEG5123 Measurement of Soil Properties (FA, SP, SU) Consideration of basic principles involved in measuring properties of soils. Detailed analysis of standard and specialized soil testing procedures and equipment. Lecture 2 hours, laboratory 3 hours per week. Prerequisite: CVEG 4143.

CVEG5120L Measurement of Soil Properties Laboratory (FA, SP, SU)

CVEG5143 Transportation Soils Engineering (FA, SP, SU) Advanced study of the properties of surficial soils; soil classification systems; pedology; soil occurrence and variability; subgrade evaluation procedures; repeated load behavior of soils; soil compaction and field control; soil stabilization; soil trafficability and subgrade stability for transportation facilities. Prerequisite: CVEG 3133.

CVEG5163 Advanced Soil Mechanics (FA, SP, SU) Study of consolidation, shear strength, clays, bearing capacity, and other soil mechanics topics. Emphasis on understanding the basis of soil mechanics topics. Prerequisite: CVEG 4143.

CVEG5173 Advanced Foundations (FA, SP, SU) Study of soil-supported structures. Topics include drilled piers, slope stability, pile groups, negative skin friction, foundation design from the standard penetration test and Dutch cone, and other specialized foundation design topics. Prerequisite: CVEG 4143.

CVEG5210L Instrumental Methods for Water and Wastewater Analysis Laboratory(FA, SP, SU)

CVEG5234 Water and Wastewater Analysis (FA, SP, SU) Application of chemistry to environmental engineering. Quantitative determinations of constituents in water and wastewater. Principles of bacteriological laboratory techniques. Lecture 3 hours, laboratory 3 hours per week. Prerequisite: CVEG 3243.

CVEG5230L Water and Wastewater Analysis Laboratory (FA, SP, SU)

CVEG5243 Groundwater Hydrology (FA) Detailed analysis of groundwater movement, well hydraulics, groundwater pollution and artificial recharge. Surface and subsurface investigations of groundwater and groundwater management, saline intrusion and groundwater modeling will be addressed. Prerequisite: CVEG 3223.

CVEG5253 Microbiology for Environmental Engineers (FA, SP, SU) Fundamental and applied aspects of microbiology and biochemistry relating to water quality control, wastewater treatment, and stream pollution. Prerequisite: CVEG 3243.

CVEG5263 Stream Pollution Analysis (FA, SP, SU) The determination and application of deoxygenation and reaeration rates to stream pollution analysis. A study of biological degradation rates for municipal and industrial wastes. Prerequisite: CVEG 3243.

CVEG5283 Solid Waste Management (FA, SP, SU) Collection, processing and disposal of solid waste with emphasis on incineration, and sanitary landfilling systems. Supplementary transportation and transfer systems are included. Hazardous waste disposal design and regulatory considerations are discussed. Prerequisite: CVEG 3243.

CVEG5293 Water Treatment & Distribution System Design (FA, SP, SU) Design of industrial and municipal water treatment plants. Discussion of raw and treated water requirements for the several uses. Distribution system analysis and design including distribution storage and pumping. Prerequisite: CVEG 3243.

CVEG5313 Matrix Analysis of Structures (FA, SP, SU) Energy and digital computer techniques of structural analysis as applied to conventional forms, space trusses, and frames. Prerequisite: CVEG 3304.

CVEG5323 Structural Dynamics (FA, SP, SU) Dynamics response of single and multidegree of freedom systems. Modal analysis. Response spectra. Computer programs for dynamic analysis. Design considerations for structures subjected to time-varying forces including earthquake, wind, and blast loads. Prerequisite: CVEG 3304.

CVEG5343 Highway Bridges (FA, SP, SU) Economics of spans, current design and construction specifications, comparative designs. Possible refinements in design techniques and improved utilization of materials. Prerequisite: CVEG 4313 and CVEG 4303.

CVEG5383 Finite Element Methods in Civil Engineering (FA, SP, SU) An understanding of the fundamentals of the finite element method and its application to structural configurations too complicated to be analyzed without computer applications. Application to other areas of civil engineering analysis and design such as soil mechanics, foundations, fluid flow, and flow through porous media. Prerequisite: graduate standing.

CVEG5403 Advanced Reinforced Concrete II (FA, SP, SU) Design of 2-way slabs, flat slabs, and other floor systems; circular fluid and dry storage tanks; and rectangular tanks, walls, footings, and detailing. Prerequisite: CVEG 4303.

CVEG5413 Transportation and Land Development (FA, SP, SU) Study of interaction between land development and the transportation network. Application of planning, design, and operational techniques to manage land development impacts upon the transportation system, and to integrate land layout with transportation network layout. Prerequisite: graduate standing.

CVEG5423 Structural Design of Pavement Systems (FA, SP, SU) An introduction to the structural design of pavement systems including: survey of current design procedures; study of rigid pavement jointing and reinforcement practices; examination of the behavioral characteristics of pavement materials and of rigid and flexible pavement systems; introduction to structural analysis theories and to pavement management concepts. Prerequisite: CVEG 4433.

CVEG5433 Traffic Engineering (FA, SP, SU) A study of both the underlying theory and the use of traffic control devices (signs, traffic signals, pavement markings), and relationships to improved traffic flow and safety, driver and vehicle characteristics, geometric design, and societal concerns. Also includes methods to collect, analyze, and use traffic data. Prerequisite: CVEG 3413 or graduate standing.

CVEG5443 Transportation Planning Methods (FA, SP, SU) Procedures and methodologies for developing multi-modal transportation plans in urbanized areas. The development and utilization of transportation studies used in transport behavior and modeling. Prerequisite: graduate standing.

CVEG5453 Asphalt Mix Design and Construction (FA, SP, SU) Theory and practice of asphalt concrete mix design for pavements and bases including specifications and construction methods for hot-mixes and surface treatments. Lecture 2 hours, laboratory 3 hours per week. Prerequisite: CVEG 3413 and CVEG 4433.

CVEG5450L Asphalt Mix Design and Construction Laboratory (FA, SP, SU)

CVEG5463 Transportation Network Modeling (FA, SP, SU) An analytical approach to the use of mathematical techniques and computer models to represent urban transportation systems. Deterministic and stochastic methods for trip generation, distribution, modal choice, and assignment. Prerequisite: CVEG 5443.

CVEG5473 Transportation System Characteristics (FA, SP, SU) Introduction to traffic flow theory, including traffic stream interactions and capacity. Applications for planning, design, operations. Prerequisite: CVEG 3413 and graduate standing.

CVEG5483 Transportation Management Systems (FA, SP, SU) Six transportation management systems are explored: pavement, bridge, intermodal, public transportation, safety, and congestion. System approaches are presented. Techniques are introduced on how to optimally allocate resources. Pavement and bridge structure basics are discussed and their performance parameters are presented. Case studies are used to illustrate the interfaces among various modes of transportation. Safety and congestion problems in transportation are addressed.

CVEG5493 Infrastructure Management with GIS & DB (FA, SP, SU) Use of the major components of a Geographical Information System (GIS). Learn to define project schema, create a project build categories and features, and perform database joints. Use of dynamic segmentation and multimedia capabilities. Application of Relational Database Management System (RDBMS) and database interface service to GIS. Introduction to Global Positioning System (GPS). Prerequisite: CVEG 3413.

CVEG562V Research (1-6) (FA, SP, SU) Fundamental and applied research. Prerequisite: graduate standing.
CVEG563V Special Problems (1-6) (FA, SP, SU) Prerequisite: graduate standing.
CVEG5734 Advanced Wastewater Process Design and Analysis (FA, SP, SU) Application of advanced techniques for the analysis of wastewater treatment facilities. Physical, chemical and biological processes for removing suspended solids, organics, nitrogen, and phosphorus. Laboratory treatability studies will be used to develop design relationships. Lecture 3 hours, laboratory 3 hours per week. Prerequisite: CVEG 5234.
CVEG5730L Advanced Wastewater Process Design and Analysis Laboratory (FA, SP, SU)
CVEG5753 Air Pollution (FA, SP, SU) Fundamentals of air pollution causes, effects, and measurements, as well as control methods with application to current industrial problems. (Same as CHEG 5753) Prerequisite: graduate standing.
CVEG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.
CVEG700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF COMMUNICATION (COMM)

Jimmie N. Rogers
Department Chair
417 Kimpel Hall
575-3046

• Professors Frentz, Rogers, Rushing, Smith, Webb • Associate Professors Allen, Amason, Bailey, Brady, Rosteck, Scheide, Wicks • Assistant Professor Warren

Degree Conferred: M.A. (COMM)

Areas of Concentration: Communication, with general studies of the discipline or with specific emphasis areas in: (1) rhetoric and public communication; (2) interpersonal/ small group/organizational communication; or (3) mass communication (television and film studies). Each student will design a specific curriculum of study in consultation with his or her major professor, and it may include one of the above emphasis areas. A student who plans to teach in the public schools may elect a combination of courses appropriate for the teaching area.

Prerequisites to Degree Program: A student entering graduate studies should have a minimum of 24 semester hours in undergraduate credit within the area of communication or closely related studies. A student who presents less than 24 hours may be admitted with deficiencies subject to the decision of the Department. A student may eliminate deficiencies while concurrently enrolling in graduate courses. In addition, a prospective student must supply three letters of recommendation and a writing sample. The student is also encouraged to submit a GRE score.

Requirements for a Master of Arts Degree: A minimum of 30 semester hours in graduate-level courses or 24 hours of course work and a thesis (6 hours). All students should take two graduate courses in communication research methods and at least one course from two of three emphasis areas. Each student must enroll for COMM 5111 during each semester of resident graduate study and must pass a comprehensive examination over the thesis and/or all course work. Hours earned in COMM 5111 will not count towards the minimum hours listed above. With the consent of the major professor, a student may present 6 hours from a cognate field of study outside the department toward the required course work for the degree in communication.

COURSES: COMMUNICATON (COMM)

COMM4113 Legal Communication (FA) Examines communication processes in the legal environment and focuses on communication skills and behaviors among judges, attorneys, litigants, and jurors. Particular attention will be given to verbal strategies and nonverbal messages related to interviews, negotiation, mediation, and litigation and to the rhetorical functions of legal pleadings and judicial opinions.
COMM4143 American Film Survey (FA, SP, SU) A survey of major American film genres, major directors and films that have influenced the development of motion pictures. (Same as ENGL 4143)
COMM4283 Communication in Contemporary Society (FA) An examination of research and theory on the process and effects of communication in modern society.
COMM4323 Communication and Conflict (SP) Study of the processes, effects, and managements of communicative conflict, including a consideration of conflict styles, power, goals, tactics, assessment, self-intervention and third-party intervention. Prerequisite: COMM 1313 and junior standing.
COMM4333 Communication and Gender (SP) Study of the nature, construction, functions, and effects of gender and gender-role stereotypes related to verbal and nonverbal communication, small-group and organizational interaction, and mass medicated images in contemporary culture.
COMM4343 Intercultural Communication (FA) Study of intercultural communication skills, intercultural issues and their impact at home and abroad, and cross-cultural comparisons of communication phenomena from a variety of theoretical perspectives.
COMM4353 American Public Address (IR) Historical and critical study of the leading American speakers, their speeches, the issues with which they were identified. Lectures, discussion, reports, and critical papers. Prerequisite: junior standing.
COMM4373 Political Communication (SP) Study of the nature and function of the communication process as it operates in the political environment. (Same as PLSC 4373)
COMM4383 Rhetoric of the Modern American Presidency (FA, SP, SU) A study of the increasing reliance of contemporary presidents on public persuasion through rhetorical discourse.
COMM4393 Freedom of Speech: Cases & Issues (FA, SP) Study of philosophy, cases, and issues relevant to the first amendment right to the free expression, with focus on issues relevant to internal security, obscenity, pornography, slander, and the regulation of communication.
COMM4683 Documentary Film (FA) A study and analysis of the documentary film as a discrete film form and as an important contribution to the international cinematic scene. Prerequisite: advanced standing.
COMM4793 Directing Forensics (IR) Planning, directing, and coaching co-curricular forensics at the high school or college or both.
COMM4833 Television Writing (FA) Comprehensive analysis of the techniques and styles of television commercials, documentaries and dramatic TV plays. Class projects. Prerequisite: 5 hours radio-television-film and junior standing.
COMM4843 Computer-Mediated Communication (SP) Provides an in depth consideration of the nature of computer-mediated communication by examining its use and effects in interpersonal, work, educational, and societal contexts and in an introduction to the technologies and skills required for navigating the Internet. The course focuses on the social aspects of computer-mediated communication, rather than specific software or hardware technologies.
COMM4853 Telecommunication Policy (SP) Research and discussion of social, ethical, education, cultural, and technological aspects of telecommunications with attention given to changing programming patterns, world systems of broadcasting, data transmission, emerging technology, international politics, and regulatory policies. Prerequisite: junior or senior or graduate standing.
COMM4863 Seminar in Television (SP) Research/discussion of contemporary problems in television. emphasis on the economic and social impact of commercials, news, censorship, children's programs, blacks and women on television, future developments in telecommunications.
COMM4883 Television and American Culture (FA) Historical and critical study of how television shapes American culture and is shaped by it. Attention will be given to the study of television history, programs, and audiences, particularly how race and gender shape content and reception of programming. Prerequisite: COMM 2333.
COMM5111 Colloquium in Communication Research (FA, SP) Presentation, evaluation, and discussion of research proposals or on-going research projects. Graduate students are required to register for this course each semester of residence.
COMM5113 Communication Research Methods I (FA) Emphasizes the assumptions and procedures of historical, critical and ethnographic research methods in communication. Includes the creation of research proposals and the critical assessment of existing interpretive studies in communication.
COMM5123 Communication Research Methods II (FA) Emphasizes the assumptions and procedures of social scientific research methods in communication. Includes the creation of research proposals, the analysis of existing communication data sets, the assessment of existing studies, and the reporting of research.
COMM5133 Mass Communication Inquiry (SP) Introduction to scholarly research in mass communication, including processes and effects, law and policy, critical/cultural studies, and economic analysis. Emphasis will be placed on theories within each area of inquiry.
COMM5193 Seminar in Communication (FA, SP, SU) Research, discussion, and papers focus on one of a variety of communication topics including symbolic processes in communication, philosophy of rhetoric, communication education, criticism of contemporary communication, interpersonal communication, organizational communication, and contemporary applications of rhetoric. Maximum credit is 9 semester hours. Prerequisite: graduate standing.
COMM5303 Seminar in Classical Rhetoric (SP) Systematic investigation of the development of rhetorical theory in the Classical world with emphasis upon the contributions of Plato, Aristotle, Socrates, Cicero and Quintilian. Gives some consideration to the chief treatises of the medieval period. Lectures, oral and written reports, including a major research essay. Prerequisite: graduate standing.
COMM5323 Seminar in Persuasion (FA) Focus is on comparing theoretical accounts of persuasion and research evidence concerning the effects of various factors on persuasion.
COMM5333 Communication Theory (SP) Survey of the theoretical orientations in communication theory with primary focus on conceptual, theoretical, and philosophical issues.
COMM5343 Interpersonal Communication (FA) Theory and research concerning the exchange of information and the mutual influencing of behavior among people. Prerequisite: graduate standing.
COMM5353 Rhetorical Criticism (SP) A seminar in rhetorical criticism. A study of the development of standards of rhetorical appraisal from the foundations of the art of speaking to the modern period; examination of contemporary approaches to rhetorical appraisal. Practice in critical analysis of contemporary address.
COMM5363 Seminar in Small Group Communication (SU) A consideration of recent developments in small group research which relate to problem solving tasks, leadership and other kinds of human interaction through speech communication. Emphasis given to the interpersonal speech transaction and to the emergence of participant roles. (Same as SOCI 5363) Prerequisite: COMM 3303 or SOCI 4193.
COMM5373 Content Analysis (IR) Techniques for observing and analyzing the overt communication behavior of selected communicators. Prerequisite: graduate standing.
COMM5383 Seminar in Political Communication (IR) Research seminar focusing on selected topics such as candidate imagery, diffusion of political information, or political symbolism. (Same as PLSC 5383) Prerequisite: graduate standing.
COMM5393 Seminar in Contemporary Rhetoric (SP) Systematic study of contemporary perspectives on rhetoric including scholars such as Burke, Richards, Weaver, Grassi, MacIntyre, Derrida, and Rorty. Prerequisite: graduate standing.

COMM5403 Organizational Communication Theory (SP) A seminar on the historical development of theory and research into communication processes occurring within an organizational setting. Lecture, discussion, oral and Prerequisite: graduate standing.
COMM5413 Organizational Communication Research (SU) A seminar on conducting applied research within an organizational setting. Prerequisite: COMM 5403 and graduate standing.
COMM5423 Seminar in Mass Media Cognition (FA, SP, SU) Seminar exploring how people learn from written, aural and visual mass media messages. Topics to include attention, memory, comprehension, emotional response, arousal, unconscious processing, picture perception and person perception. Seminar will be concerned with most popular media (e.g., television radio, newspaper, and film), and with several content genres (e.g., entertainment, news, advertising).
COMM5453 Myth and Communication Criticism (SP) Seminar in major theories of mythology, including archetypal and ideological perspectives, and their applications to the criticism of public communicative events. Practice in written critical analysis. Prerequisite: graduate standing.
COMM5503 Communication and Cultural Studies (FA) Examinations of the role of communication in modern culture. Emphasis is upon the production and circulation of meanings with society, and special attention is given to the role of popular and mass media in this process. Prerequisite: graduate standing.
COMM569V Seminar in Film Studies (1-3) (IR) Research, discussion; papers on a variety of film genres and areas including the new American film, the science-fiction film, directors, film comedy, the experimental film, criticism, the film musical. (Same as ENGL 569)
COMM590V Special Problems (1-6) (FA, SP, SU) Credit by arrangement. Prerequisite: graduate standing.
COMM5913 Internship in Communication (FA, SP, SU) Internship in applied communication within public and private organizations. Prerequisite: 15 hours graduate level communication in residence.
COMM600V Master's Thesis (1-6) (FA, SP) Prerequisite: graduate standing.

COMMUNICATION DISORDERS (CDIS)

Jason Andrew
Department Head of Rehabilitation Education and Research

Barbara B. Shadden
Director, Program in Communication Disorders
575-4509

• Professor Shadden • Associate Professor Toner • Assistant Professors Long, Henrickson • Research Associate Professor Aslin • Instructor McGehee

Degree Conferred: M.S. (CDIS)

The undergraduate/graduate curriculum in speech-language pathology includes a total of 76 semester hours of professional studies, a minimum of 36 of which must be taken for graduate credit. Upon approval for admission by the faculty in the program of communication disorders, a program of studies is arranged with the academic adviser and any undergraduate deficiencies are assessed. All degree candidates must meet minimum academic and practicum requirements for the Certificate of Clinical Competence in Speech-Language Pathology, American Speech-Language-Hearing Association.

Prerequisites to Degree Program: Applicants who wish to study for the M.S. degree in speech-language pathology are expected to present a minimum of 36 hours which meet the professional certification standards. These should include 15 semester hours in the nature and acquisition of normal speech, language, and hearing functions; nine semester hours in the general area of speech-language pathology; and six semester hours in the area of audiology. Remaining required hours may have been earned in the general areas of speech-language pathology, audiology, or supportive areas of study as determined at the time of admission. A strong foundation in basic sciences is also required including a minimum of 6 semester hours in biological/physical sciences and mathematics, and 6 semester hours in behavioral/social sciences.

Applicants for graduate study in speech-language pathology must be admitted to the Graduate School and must also meet the following requirements: (1) satisfactory GRE scores, and (2) three letters of recommendation from persons competent to judge applicant's potential for graduate studies. To be considered for admission to the M.S. degree program, applicants must have earned an overall GPA of 3.00 in undergraduate course work or must obtain a minimum composite score of 1200 on the three subtests of the Graduate Record Examinations.

Requirements for the Master of Science Degree: The M.S. degree program in speech-language pathology requires a minimum of five academic semesters to complete, including continuous enrollment in summer session (Su) during the sequence of studies. In addition to the general requirements of the Graduate School, all students must complete a minimum of 36 hours of graduate course work of which a minimum of 21 hours must be in the speech-language pathology content area. An additional nine hours of course work must be completed in either speech-language pathology or audiology content areas. All students are required to complete at least one course in research design. Thesis and non-thesis options are available. Students electing the thesis option may include six hours of CDIS600V as part of the 36-hour requirement in speech-language pathology and audiology. All candidates for the M.S. degree are required to pass a written comprehensive examination.

COURSES: COMM DISORD (CDIS)

CDIS4133 Introduction to Aural Rehabilitation (FA) Study of the technique used in the rehabilitation of speech and language problems of the hearing impaired including the role of amplification, auditory training, and speech reading in rehabilitation. Prerequisite: CDIS 3103.
CDIS4223 Language Disorders in Children (FA) Study of disorders of language acquisition and usage in children and adolescents, with emphasis upon the nature, assessment, and treatment of such disorders. Prerequisite: CDIS 3223.
CDIS4253 Neurological Bases of Communication (FA) A study of the structures and functions of the central and peripheral nervous systems as they relate to human speech, language, and cognition. Prerequisite: CDIS 3213.
CDIS4263 Advanced Audiology (FA) Study of the basic techniques used in audiological assessment of children and adults, including pure tone audiometry, speech audiometry, and special tests of hearing function. Prerequisite: CDIS 3103.
CDIS4273 Communication Behavior and Aging (SP) Study of the effects upon communication of normal aspects of the aging process, from early adulthood throughout the the lifespan. Changes in speech, language, and hearing functioning are identified; common alterations in communicative disorders commonly associated with advanced age are discussed.
CDIS428V Clinical Practicum: Hearing Disorders (1-3) (FA, SP, SU) Practicum in audiology. Pre- or Corequisite: CDIS 4263.
CDIS5102 Research Methodology in Communication Disorders (SU) An examination of methods of research in speech-language pathology and audiology and of the use of bibliographic tools. Focuses on purposes and problems of various forms of communication disorders research, procedures and instruments employed, and reporting of research. Prerequisite: graduate standing.
CDIS5112 Seminar in Early Intervention (FA) Study of a family-centered, transdisciplinary approach to early intervention with infants and toddlers at-risk for communication disorders. Topics include early communication development, service delivery in a family context, coordination with other disciplines, and legislation mandating services. Prerequisite: CDIS 3223 or equivalent, and graduate standing.
CDIS5121 Feeding and Swallowing Disorders Lab (FA) Observation and interpretation of techniques used for assessment and remediation of feeding and swallowing disorders in children and adults. Corequisite: CDIS 5122. Prerequisite: CDIS 3213 and graduate standing.
CDIS5122 Feeding and Swallowing Disorders (FA) Study of the etiology, assessment, and remediation of feeding and swallowing disorders in children and adults. Prerequisite: CDIS 3213 or equivalent, and graduate standing.
CDIS5132 Discourse Analysis and Treatment (SU) Study of discourse behaviors and discourse analysis procedures appropriate for communicatively disordered children and adults, along with review of management approaches associated with impaired discourse performance. Prerequisite: previous course work in language process and disorders, and graduate standing.
CDIS5152 TBI and Right-Hemisphere Disorders (FA) Study of the speech and language disorders commonly resulting from traumatic brain injury and right hemisphere disorders. Prerequisite: CDIS 4253 or equivalent, and graduate standing.
CDIS5163 Seminar in Language Topics (FA, SP, SU) Study of selected topics in normal and disordered language acquisition and/or language use. Implications of current research are reviewed and applied to evaluation and management of language impairment(s). Prerequisite: graduate standing.
CDIS5173 Survey of Disorders of Communication (SU) Cause and therapeutic principles of speech disorders, including articulatory defects, voice disorders, stuttering and defects due to hearing deficiency. Offered for non-majors in communicative disorders-not open to those who have had CDIS 2253. Prerequisite: graduate standing.
CDIS5182 Clinical Assessment of Speech and Language Disorders (FA) Study of the basic diagnostic procedures used in speech-language pathology. Emphasis is placed on criteria for test selection, techniques in test administration, and interpretation of test results. Prerequisite: graduate standing.
CDIS5193 Seminar in Problems of Oral Communication (FA, SP, SU) Investigation of research in selected problems of oral communication; recent developments in speech-language pathology and audiology; individual problems for investigation. Prerequisite: graduate standing.
CDIS5214 Voice and Resonance Disorders (SU) (Formerly CDIS 5213) Study of disorders of phonation and resonation, including etiologies, diagnosis, and intervention strategies. Prerequisite: graduate standing.
CDIS5222 Fluency Disorders (FA) Speech disfluency, including theoretical etiological assumptions and management consideration. Prerequisite: graduate standing.
CDIS5232 Seminar in Misarticulation (SP) Etiology, diagnosis and treatment of disorders of speech articulation. Prerequisite: graduate standing.
CDIS5243 Language Disorders in Adults (SP)

Symbolic communicative breakdown due to neurological trauma; focus on resultant receptive, central processing, and expressive linguistic disabilities, including etiology, neurology, diagnosis and treatment. Primary course emphasis is placed upon aphasia, although other neuropathologies of speech and language in adults are addressed. Prerequisite: graduate standing.

CDIS5253 Motor Speech Disorders (SP) Study of motor speech production disorders related to damage to central or peripheral nervous system motor centers and pathways. Cerebral palsy, adult dysarthria, apraxia, and dysphagia are emphasized. Both theoretical and treatment considerations are addressed. Prerequisite: CDIS 4253 or equivalent, and graduate standing.

CDIS528V Advanced Clinical Practicum: Speech Disorders (1-6) (FA, SP, SU) Practicum activities in speech-language pathology. Prerequisite: graduate standing.

CDIS5293 Augmentative and Alternative Communication (FA) Approaches to communication management with the severely and profoundly handicapped child or adult, with primary emphasis on augmentative and alternative communication assessment and intervention. Prerequisite: graduate standing.

CDIS5381 Diagnostic Practicum (FA, SP, SU) Practicum activities in speech-language assessment. Prerequisite: graduate standing.

CDIS548V Clinical Practicum: Public Schools (1-3) (FA, SP) Practicum activities in speech-language disorders in a public school setting. Prerequisite: graduate standing.

CDIS558V Internship in Speech-Language Disorders (1-6) (FA, SP, SU) Field placement in approved clinical setting for clock hours in speech-language pathology assessment and treatment. Students in the master's program must enroll in 3 credit hours of CDIS 558V during their last semester of graduate studies. Prerequisite: graduate standing.

CDIS590V Special Problems (1-6) (FA, SP, SU) Prerequisite: graduate standing.

CDIS600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

COMPARATIVE LITERATURE (CPLT)

John Locke
Chair of Studies
333 Kimpel Hall
575-4301

Comparative Literature Committee:

• Professors Cory, Duval, Haydar, Levine, Pritchett, Wilkie • Associate Professors Hassell, Locke • Assistant Professor Kahf

For names of faculty teaching Comparative Literature courses, see English and foreign language faculty lists.

Degrees Conferred:
M.A., Ph.D. (CPLT)
M.F.A. in Translation (TRAN)

(See Translation)

The Departments of English and of Foreign Languages and Literatures offer programs designed to provide academic training for teaching courses in two or more literary fields and for teaching world literature and comparative literature courses.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in some of these degree programs as in-state students for fee purposes. See page 163 for details.

Areas of Concentration: Master of Arts-classics, English, German, French, Arabic, and Spanish. Doctor of Philosophy-classics, English, German, French, Arabic, Spanish, and world literature.

Prerequisites to Degree Program: The following materials must be submitted to the Chair of Studies in Comparative Literature:

1. Application for Admission to Graduate Study in Comparative Literature. The form is available from the Chair of Studies.
2. Graduate Record Examination scores on the Aptitude Test (verbal and quantitative) and the Advanced Test in Literature.
3. Scores on other standardized tests, if available.
4. Complete official transcripts of all undergraduate and graduate work.
5. Three letters of recommendation from former teachers, employers, or supervisors.
6. An examination paper from a literature course, including essay answers, or a term paper or other evidence of writing ability.

Requirements for the Master of Arts Degree: The candidate must take a minimum of 36 hours of courses to be selected from offerings in the fields of classics, English, German, Arabic, French, and Spanish, under the following guidelines:

1. A minimum of 12 hours must be taken in each of two of the following language areas: classics, English, German, Arabic, French, and Spanish.
2. A minimum of six hours must be taken in courses which deal with the literatures of several language groups. World literature courses at the 3000 level will satisfy this requirement.
3. All courses selected must be approved by the adviser, who will consult with the Comparative Literature Committee.
4. WLIT 5193, Introduction to Comparative Literature, is required of all candidates.
5. Each master's degree candidate is required to take a comprehensive examination.

Requirements for the Master of Fine Arts in Translation: For a description of the requirements for the M.F.A. in translation, see page 127.

Requirements for the Doctor of Philosophy Degree: The doctoral program in comparative literature is designed so that it may be based upon a master's degree either in comparative literature or in any single field of concentration. The candidate must take a minimum of 66 graduate hours (including credit offered for the M.A. degree but excluding dissertation credit) under the conditions listed below. Candidates must have a 3.00 grade-point average in each of their fields.

1. A candidate will concentrate in three fields which will be world literature and at least two of the following language areas: Arabic, English, French, German, Spanish and classics. A student holding a master's degree in a foreign language from another school will be required to take at least 12 hours in the language at the University of Arkansas.
2. A minimum of 24 hours must be taken in one field of concentration, a minimum of 18 hours must be taken in a second field and a minimum of 15 hours must be taken in a third. One of these fields of concentration must be world literature.
3. The nine remaining required hours may be added to the minimum requirements stated above (1) or may be taken in related fields.
4. Students who wish to take a fourth field of concentration may be permitted to take minimums of 24 hours in one field, 18 hours in a second field, 15 hours in a third field, and nine hours in a fourth field. One of these fields of concentration must be world literature.
5. In addition to hour and distribution requirements, the student must select a comparative literature field or period and genre specialization, such as the epic tradition, modern drama or Renaissance poetry.
6. Each student must demonstrate fluency in at least one foreign language approved by the Comparative Literature Committee, and at least a reading knowledge of a second, before taking the candidacy examinations.
7. The dissertation will be in the comparative literature area of specialization.
8. The program of study for each student will be approved and supervised by a committee of staff members in the fields of concentration.
9. WLIT 5193 is required of all candidates.

COURSES: WORLD LIT (WLIT)

WLIT4123 Survey of Russian Literature from Its Beginning to the 1917 Revolution (IR) The instructor will discuss the historical and cultural backgrounds while focusing on major writers and will deal with literature as an outlet for social criticism. There will be textual analysis. It will be taught in English. (Same as RUSS 4123)

WLIT4133 Survey of Russian Literature Since the 1917 Revolution (IR) The instructor will discuss the historical and cultural backgrounds while focusing on major writers and will deal with literature as an outlet for social criticism. There will be textual analysis. It will be taught in English with readings in English. (Same as RUSS 4133)

WLIT4213 Literature and Eros (IR) Survey of important works from the classical Greeks to contemporary literature which deal with the erotic experience. Study of various theories and cultural definitions of eroticism, especially as distinct from clinical sexuality and romantic sentimentality. (Same as ENGL 3233)

WLIT4273 Literature of India and the Near East (IR) Leading works and genres of the ancient civilizations, the Moslem world and India, and their contribution to the Western literary tradition.

WLIT4293 Literature of China and Japan (IR) Survey of the literary works of the Far East, and of its contribution to the Western Tradition.

WLIT4913 Literary Reflections of the Holocaust (IR) Drawing on fiction, poetry, autobiography, and drama from works written originally in French, Polish, German, Dutch, English, and Yiddish, this course introduces students to the Holocaust through literature. Deals with the adequacy of imaginative literature in the face of atrocity, the comparative effectiveness of fiction versus autobiography, and the dangers of exploitation and trivialization. (Same as HUMN 4913)
WLIT4923 Modern World Drama (IR) Drama from Ibsen to the 1930s. (Same as ENGL 4923)
WLIT4963 Contemporary World Drama (IR) Drama since the 1930s. (Same as ENGL 4963)
WLIT4993 African Literature (IR) A study of modern African fiction, drama, poetry, and film from various parts of Africa in their cultural context. Works are in English or English translation. (Same as ENGL 4253)
WLIT5193 Introduction to Comparative Literature (IR) Literary theory, genres, movements, and influences. (Same as ENGL 5193) Prerequisite: WLIT 1113.
WLIT5233 Form and Theory of Translation (IR) An examination of the principal challenges that confront translators of literature, including the recreation of style, dialect, ambiguities, and formal poetry; vertical translation; translation where multiple manuscripts exist; and the question of how literal a translation should be. (Same as ENGL 5233)
WLIT5483 Germanic and Celtic Backgrounds of Medieval Literature (IR) Literary traditions of Old and Middle English, of Germany, Ireland, Scandinavia, and Wales. (Same as ENGL 5483)
WLIT5593 The Renaissance (IR) Italian forms and writers of the late 15th and 16th centuries and the spread of the Renaissance tradition in Spain, Portugal, France, and Northern Europe up to 1660.
WLIT5623 The English Bible (SP) The several translations of the Bible; its qualities as great literature; its influence upon literature in English; types of literary forms. (Same as ENGL 5623)
WLIT5793 The Enlightenment (IR) Literature of the late 17th and 18th centuries, especially in France and Germany.
WLIT5963 Twentieth-Century Continental Novel (IR) Survey of the continental novel from 1900 to the present. (Same as ENGL 5963)
WLIT600V Master's Thesis (1-6) (FA, SP, SU)
WLIT603V Special Studies in Comparative Literature (1-6) (IR)
WLIT690V Seminar (1-6) (IR)
WLIT699V Master of Fine Arts in Translation Thesis (1-6) (FA, SP, SU)
WLIT700V Doctoral Dissertation (1-12) (FA, SP, SU)

DEPARTMENT OF COMPUTER INFORMATION SYSTEMS AND QUANTITATIVE ANALYSIS (CISQ)

(See Graduate School of Business, page 37).

DEPARTMENT OF COMPUTER SCIENCE AND COMPUTER ENGINEERING (CSCE)

Aicha Elshabini
Department Head
313 Engineering Hall
575-6197

Degrees Conferred:
M.S., Ph. D. in Computer Science (CSCE)
M.S.C.S.E. in Computer Systems Engineering (CENG)
M.S. E., Ph.D. in Engineering (ENGR)
(See Engineering)

• Professors Brewer, Crisp, Lala, Skeith, Starling • Associate Professors Andrews, Bowling, Li • Assistant Professors Apon, Badia, Blank, Parkerson, Simonson, Wessels • Instructors Baker, Johnson, Wiggins

COMPUTER SCIENCE (CSCE)

Prerequisites to Degree Program: Applicants should have completed the equivalent of a Bachelor of Science degree in computer science following the most recent guidelines published by the Association for Computing Machinery. If an applicant has deficiencies in undergraduate coursework, then specific undergraduate courses may be required in addition to the graduate requirements for the degree. An applicant must also present scores on the Graduate Record Examinations (GRE).

Requirements for the Master of Science Degree: The non-thesis option for the degree requires the successful completion of at least three semester hours of CSCE 620V (Research in Computer Science), plus 30 semester hours of computer science courses approved by the candidate's graduate committee. At most, nine of the 30 semester hours may be other than CSCE courses. The thesis option for the degree requires the successful completion of at least six semester hours of CSCE 610V (Master's Thesis), plus 24 semester hours of computer science courses approved by the candidate's graduate committee; at most, nine of the 24 semester hours may be other than CSCE courses. Candidates following either the thesis or the non-thesis option must complete four courses from the CSCE 50*3 sequence.

All candidates must pass a written comprehensive examination in, at most, two attempts. The first attempt may not occur before all of the following qualifying conditions have been satisfied:

1. Candidates must have completed at least 21 hours that are applicable toward the degree. Candidates following the thesis option must be currently enrolled in CSCE 610V.
2. Candidates must have completed at least four courses from the CSCE 50*3 sequence
3. The candidate's cumulative grade-point average on all graduate-level courses must be 3.00 or higher.

All candidates must also satisfy any other conditions specified in the departmental guidelines.

Requirements for the Doctor of Philosophy Degree: In addition to the requirements of the Graduate School and Fulbright College of Arts and Sciences, the following departmental requirements must be satisfied by candidates for a Doctor of Philosophy degree with a major in Computer Science.

A minimum of 54 semester credit hours of graduate level course work (at the 5000 or 6000 level) beyond a Bachelor's Degree of which 24 hours must be beyond any coursework used to fulfill requirements for a Master's Degree.

The coursework must include all courses designated as "core" courses by the Department of Computer Science. Courses that currently carry this designation are CSCE 5003 Advanced Programming Language, CSCE 5023 Architecture of Computer Systems, CSCE 5033 Design and Analysis of Algorithms, and CSCE5043 Artificial Intelligence.

Students are admitted to candidacy on the basis of passing comprehensive examinations written and administered by the graduate faculty in computer science as required by the Graduate School. These examinations must be taken no earlier than the end of the first year of study and no later than the end of the third year, including a second attempt, if necessary. Such examinations will include several sections administered at different times during the year. The score for each section will be "high pass" (numeric score of 4), "pass" (3), "marginal pass" (2), or "fail" (0). An overall score of "pass" (average at least 3.0) is required to pass a qualifying or comprehensive examination. Students who fail this examination will be allowed one re-examination. A second failure will terminate the student's course of study in the computer science doctoral program.

Each student must form a doctoral supervisory committee before registering for dissertation hours. This committee must consist of faculty who hold qualifying status on the graduate faculty, the majority and chair of which hold regular or adjunct appointments in the Department of Computer Science and Computer Engineering.

Each Ph.D. student will be expected to defend both a dissertation proposal and completed dissertation before a dissertation com-

mittee. For the proposal, the student is expected to present a list of goals and a plan of action to accomplish them. Committee members will judge the goals on their scientific merit, originality, and difficulty.

The doctoral program must include a minimum of 18 hours of CSCE 700V Doctoral Dissertation in addition to the coursework specified in item (a).

COURSES: COMPUTER SCI (CSCE)

CSCE4623 Intelligent Robot Control (IR) (Formerly CSCI 4513) Examines software issues surrounding the creation and control of autonomous robots. Techniques include: genetic programming, artificial neural networks, reinforcement learning, and symbolic methods. Programs are run in simulation and on actual robotic controllers. Topics discussed include visual processing, spatial mapping, and learning. Prerequisite: CSCE 4613.

CSCE5003 Advanced Programming Languages (SP) (Formerly CSCI 5003) Abstraction, proof of correctness, functional languages, concurrent programming, exception handling, dataflow and object oriented programming, denotational semantics. Prerequisite: graduate standing.

CSCE5033 Design and Analysis of Algorithms (SP) (Formerly CSCI 5033) Design of computer algorithms, with primary emphasis on the development of efficient implementation. Prerequisite: graduate standing.

CSCE5043 Artificial Intelligence (FA) (Formerly CSCI 5043 and CSEG 5003) Provides students with an introduction to the major subjects and techniques of artificial intelligence. Topics include: machine learning, computer vision, natural language understanding, and AI languages. Prerequisite: CSCE 4613 and graduate standing. z7f"Helvetica-Bold">CSCE5023 Architecture of Computer Systems (FA) (Formerly CSCI 5023) An advanced study of both classical and recent computer hardware and software systems. Prerequisite: CSCE 3213 and CSCE 4413.

CSCE5123 Databased Management systems (IR) (Formerly CSCI 5123) This course is an introduction to database systems for graduate students with no background on databases. We cover data modeling, basic concepts of the relational model, relational languages(algebra, SQL), database design and database implementation. Prerequisite: CSCE 3313 and graduate standing.

CSCE5203 Advanced Database Systems (IR) (Formerly CSCI 5203) Data and storage hierarchies, database models, user language designs, database manipulations. Prerequisite: CSCE 2143 and graduate standing.

CSCE5233 Principles of Compiler Construction (IR) (Formerly CSCI 5233) Lexical analysis, parsing, symbol table construction, intermediate code generation, runtime simulation. Prerequisite: graduate standing.

CSCE5243 Formal Languages (IR) (Formerly CSCI 5243) An advanced continuation of CSCE 4323. Prerequisite: CSCE 4323 and graduate standing.

CSCE5263 Computational Complexity (IR) (Formerly CSCI 5263) Turing machines, recursion theory and computability, complexity measures, NP-completeness, analysis on NP-complete problems, pseudo-polynomial and approximation. algorithms. Prerequisite: graduate standing.

CSCE5283 Graph and Combinatoric Algorithms (IR) (Formerly CSCI 5283) A study of algorithms for graphs and combinatorics with special attention to computer implementation and runtime efficiency. Prerequisites: Math 2103 and a programming language.

CSCE5303 Parallel Programming (IR) (Formerly CSCI 5303) An analysis of parallel computer systems with respect to software engineering. Practical programming experience on pipelined, array, and multi-processor computers. Credit can be earned in only one of these three courses. CSCE 5303 or CENG 5303 or ELEG 5913. Prerequisite: working knowledge of 'C' language and CENG 4413 or equivalent.

CSCE5313 Advanced Operating Systems (IR) (Formerly CSCI 5313) Concurrent processes and process communication; mutual exclusion and synchronization principles; kernel philosophy; resource allocation and deadlock; case studies of specific operating systems. Prerequisite: CSCE 4413 and graduate standing.

CSCE5513 Intelligent Robot Control (IR) (Formerly CSCI 5513) This course is designed to examine software issues surrounding the creation and control of autonomous robots. Techniques include: genetic programming, artificial neural networks, reinforcement learning, and symbolic methods. Programs are run in simulation and on actual robotic controllers. Topic discussed include visual processing, spatial mapping, and learning. Prerequisite: graduate standing

CSCE5713 Multimedia Systems Design (IR) (Formerly CSCI 5713) Overview of digital unified multimedia. Programming methodology involved in integration of all forms of digitized information (e.g., text, sound, graphics, animation, and process control) in a single computer-based interactive environment.

CSCE5723 Client-Server Computing (IR) (Formerly CSCI 5723) Distributed computing paradigms: client-server, peer-to-peer, nomadic; client and server-side components, communications interface technology, interprocess-communications, development hardware and software. Prerequisite: graduate standing.

CSCE5733 Information Agency (FA, SP, SU) (Formerly CSCI 5733) The study of software agents and their deployment on the internet: precursors to agents - viruses and worms, origins of software agents, delegate vs. representative agents, agency of the Internet and Web, operational guidelines for agents, HTTP, transaction security, MUD agency, intelligent agency, applications of agents: indexers, resource managers, search utilities, commercial applications.

CSCE590V Advanced Topics in Computer Science (1-3) (IR) (Formerly CSCI 590) Topics not covered in depth in other courses. Prerequisite: graduate standing.

CSCE5953 Real-time Systems (FA, SP, SU) (Formerly CSCI 5953) A study of real-time system design. The development of real-time systems will be examined from the standpoint of academia, government, and industry. Scheduling, operating systems, and architecture considerations are among other topics to be covered.

CSCE610V Master's Thesis (1-6) (FA, SP, SU) (Formerly CSCI 610)

CSCE620V Research in Computer Science (1-18) (IR) (Formerly CSCI 620) Prerequisite: graduate standing.

CSCE690V Graduate Seminar (1-6) (IR) (Formerly CSCI 690) Concentrated study in selected areas of computer science research. May be repeated for 12 hours. Prerequisite: advanced graduate standing

CSCE700V Doctoral Dissertation (1-18) (FA, SP, SU) (Formerly CSCI 700) May be repeated for 5 hours.

COMPUTER SYSTEMS ENGINEERING (CENG)

Prerequisite to Degree Programs: Extensive training in computers at the undergraduate level is desirable. Deficiencies in undergraduate majors, in both computer architecture and computer software, will be included in the student's program.

Requirements for Graduate Degrees: In addition to the requirements of the Graduate School, the following departmental requirements must be satisfied by candidates for the Master of Science in Computer Systems Engineering degree:

1. Complete a minimum of 24 semester hours of course work and present a thesis for 6 semester hours of credit.
2. Include in the 24 semester hours of course work at least 12 semester hours of 5000- and 6000-level courses in Computer Engineering.
3. Each student must enroll in CENG 5801, Seminar, in addition to the 12 hours at the 5000-6000 level.
4. Any other conditions specified in the departmental guidelines.

COURSES: CMP ENGR (CENG)

CENG4213 Introduction to Computer Architecture (FA, SP, SU) (Formerly CSEG 4983.) Design of a single board computer including basic computer organization, memory subsystem design, peripheral interfacing, DMA control, interrupt control, and bus organization. Corequisite: CENG 4210D. Prerequisite: CENG 3213.

CENG4210D Computer Architecture and Organization Drill (FA, SP, SU) (Formerly CSEG 4980D.) Corequisite: CSEG 4983.

CENG4223 Digital Systems Design (FA, SP, SU) (Formerly CSEG 4943.) Number systems and codes, fundamentals of switching algebra, analysis and design of sequential switching circuits and memory elements. Prerequisite: junior standing.

CENG4343 Programming Windows and the GUI (FA, SP, SU) (Formerly CSEG 4213) Introduction to the basic concepts of graphical user interface (GUI) programming using the Microsoft Windows environment. Discussion of design techniques relating to color, size, shape, location, font, etc. Real-world applications will be programmed using Visual Basic, C and C++. Prerequisite: CENG 4513.

CENG4403 Control Systems (FA, SP, SU) (Formerly CSEG 4403.) Mathematical models of control root-locus, and frequency-response design techniques. Special topics. (Same as ELEG 4403, MEEG 4213) Prerequisite: ELEG 3123.

CENG4423 Computer Systems Analysis (IR) (Formerly CSEG 4933.) Basic concepts of problem analysis, model design, and simulation experiments. Sigma is used and compared to high-level and other simulation languages. Corequisite: CENG 4420D. Prerequisite: CENG 3313 and INEG 3313 or STAT 3013.

CENG4420D Computer Systems Analysis Drill (FA, SP, SU) (Formerly CSEG 4930D.) Corequisite: CENG 4423.

CENG4523 Data-Base Management (FA, SP, SU) (Formerly CSEG 4563) Data-base management systems, types of data-base languages, relational algebra, SQL, compression techniques, E-R diagramming, and applications programs. Drill sessions will be required when this course is taught in the summer term. Corequisite: CENG 2143.

CENG4533 Object Oriented Programming and Design (FA, SP, SU) (Formerly CSEG 4323) Indepth coverage of the methods and techniques of object-oriented design and its applications to database and artificial intelligence. Prerequisite: CENG 3313.

CENG4753 Computer Networks (FA, SP) (Formerly CSEG 4083) Introduction to the basic concept of computer networking. PC & UNIX based networks will be covered. Both hardware & software for such systems will be installed. Topics include both theory of networking & practical hand-on experience with real-world networks. Prerequisite: CENG 2123 and CENG 4513.

CENG4823 Advanced Computer Graphics and Animation (IR) (Formerly CSEG 4743.) Advanced topics in the generation of computer graphics and animation imagery concentrating on non-procedural approaches. Topics include physical modeling, transformations, lighting models, and rendering algorithms. Theoretical issues include the graphics pipeline and rendering equation. Practical issues include the use of industry standard graphics libraries and rendering hardware and efficiency. Prerequisite: CENG 4813.

CENG4883 Introduction to Image Processing (FA, SP, SU) (Formerly CSEG 4683.) Introduction to the basic concepts of image processing; theory and applications. Covers digital methods of image restoration; reformation, extraction and analysis. Corequisite: CENG 4880D. Prerequisite: CENG 2143 and senior standing.

CENG4880D Introduction to Image Processing Drill (FA, SP, SU) (Formerly CSEG 4680D.) Corequisite: CENG 4883.

CENG490V Special Problems (FA, SP, SU) (Formerly CSEG 410) Prerequisite: senior standing.

CENG4953 Minicomputer Applications (FA, SP, SU) (Formerly CSEG 4953) Structure, implementation, and application of minicomputer systems. Microcomputer hardware. Microprogramming. Minicomputer software technology. Design and evaluation of minicomputer systems. Prerequisite: ELEG 3213 and INEG 3313.

CENG5003 Artificial Intelligence (FA, SP, SU) (Formerly CSEG 5003.) Provides students with an introduction to the major subjects and techniques of artificial intelligence. Topics include: machine learning, computer vision, natural language understanding, and AI languages. (Same as ELEG 5103) Prerequisite: CENG 4513 and graduate standing.

CENG5013 Topics in Computer Hardware (FA, SP, SU) (Formerly CSEG 5013.) Advanced features of computer hardware. Topics include: memory design, input and output design, direct memory access techniques, and

electro-optical signal conversion and EPROM applications. Corequisite: CENG 5010L. Prerequisite: CENG 4213.

CENG5010L Topics in Computer Hardware Laboratory (FA, SP, SU) (Formerly CSEG 5010L.) Corequisite: CENG 5013.

CENG5023 Software Engineering I (FA, SP, SU) (Formerly CSEG 5023) A study of design and development used in software and computer systems engineering. Topics include project planning, requirements analysis, software design fundamentals, quality assurance, and software testing and maintenance. Prerequisite: graduate standing.

CENG5033 Software Engineering II (SP) (Formerly CSEG 5033.) A study in software project design and management. The class defines and develops a semester project carrying out the planning, requirements analysis, software and systems design quality assurance, as well as software testing and maintenance. Prerequisite: CENG 5023.

CENG5043 Real-Time Operating Systems (FA, SP, SU) (Formerly CSEG 5043.) A study and implementation of a real-time operating system for process control applications using a single board 68000-based microprocessor system. Prerequisite: graduate standing.

CENG5093 Fault-Tolerant Computing (FA, SP, SU) (Formerly CSEG 5093.) Considerations of both fault-tolerant hardware and software methodologies. Topics include error detection, protective redundancy, fault-tolerant software, measures of fault tolerance, and case studies. Prerequisite: graduate standing.

CENG510V Special Problems (1-6) (FA, SP, SU) (Formerly CSEG 510.) Prerequisite: graduate standing.

CENG5153 Real-Time Data Acquisition Systems (FA, SP, SU) (Formerly CSEG 5053.) The theory and practice associated with taking measurements of the real world for use with computers. Sampling and data analysis techniques. Prerequisite: ELEG 3923.

CENG5213 Interactive Computer Graphics (FA, SP, SU) (Formerly CSEG 5213) Basic concepts involved in the generation and display of computer graphics. Topics include graphics hardware, transformations, modeling, and device independent graphics. Prerequisite: working knowledge of a programming language.

CENG5303 Parallel Programming (FA, SP, SU) (Formerly CSEG 5303) An analysis of parallel computer systems with respect to software engineering. Practical programming experience on pipelined, array, and multiprocessor computers. Credit can be earned in only one of these three courses. CSCE 5303 or CENG 5303 or ELEG 5913. Prerequisite: working knowledge of 'C' language and CENG 4413 or equivalent.

CENG5333 Knowledge-Based Systems (FA, SP, SU) (Formerly CSEG 5333) Expert systems, structured knowledge representation, and rule-based inference systems.

CENG5643 Computer Communications Networks (FA, SP, SU) (Formerly CSEG 5083.) A study of various current data communication techniques used in the computer world. Concepts of digital communications theory as well as packets and protocols are studied. Prerequisite: CENG 4413.

CENG5683 Image Processing (FA, SP, SU) (Formerly CSEG 5203.) Concepts involved in the processing of digital images. Emphasis on image analysis, enhancement, and restoration. Both spatial and frequency domain approaches are presented. Prerequisite: working knowledge of statistics and a programming language.

CENG5801 Seminar (FA, SP, SU) (Formerly CSEG 5801) Oral presentations given by graduate students on subjects dealing with current topics in computer science engineering. Prerequisite: graduate standing.

CENG581V Master's Research Project and Report (1-6) (FA, SP, SU) (Formerly CSEG 581) Required course for report option. Prerequisite: graduate standing.

CENG5923 Research Topics in Computer Architecture (FA, SP, SU) (Formerly CSEG 5923) This course focuses on the design of new high performance central processing units (CPU'S). The design of superscalar, superpipelined, decoupled and multithreaded architectures will be covered. Course materials will be drawn from literature, and will represent the current state of the art. Prerequisite: CENG 4213.

CENG5933 CAD Methods for VLSI (FA, SP, SU) (Formerly CSEG 5933) Introduction to computational methods for the design and implementation of computer aided design (CAD) tools for digital systems engineering. The underlying theory of the tools is emphasized in addition to their application. Prerequisite: proficiency using a modern high-level programming language and CENG 4213.

CENG5943 Computer Arithmetic Circuits (FA, SP, SU) (Formerly CSEG 5943) Examination of fundamental principles of algorithms for performing arithmetic operations in computers. This course provides sufficient theoretical and practical information to prepare the digital design engineer with an awareness of basic techniques for the realization of arithmetic circuits. Pre- or Corequisite: CENG 4213 or equivalent and graduate standing.

CENG5953 Real-time Systems (FA, SP, SU) (Formerly CSEG 5953) A study of real-time system design. The development of real-time systems will be examined from the standpoint of academia, government, and industry. Scheduling, operating systems, and architecture considerations are among other topics to be covered.

CENG5963 Computer Systems Optimization (FA, SP, SU) (Formerly CSEG 5063.) Design considerations and performance analysis of computer and communication systems modeling. Prerequisite: CENG 4513.

CENG610V Master's Thesis (1-6) (FA, SP, SU) (Formerly CSEG 610.) Prerequisite: graduate standing.

CENG700V Doctoral Dissertation (1-18) (FA, SP, SU) (Formerly CSEG 700.)

COUNSELING

(See Counselor Education, next section.)

COUNSELOR EDUCATION (CNED)

Christopher J. Lucas
Department Head of Educational Leadership, Counseling and Foundations
234 Graduate Education Building
575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Professors Farley,Greenwood, Rye • Associate Professor Roland • Assistant Professor Gale • Visiting Assistant Professor Connors

Degrees Conferred:
M.S. in Counseling (CNSL)
Ph.D. (CNED)
Ed.S. (EDUC)

Areas of Concentration: The Counselor Education Program is a CACREP accredited program that prepares professional counselors for elementary and secondary schools, colleges, various community agencies, and private practice. Common course requirements are specified for each emphasis. General requirements for M.S., Ed.S., and Ph.D. applicants are as specified in the Objectives, Regulations, and Degrees section of this catalog. Persons completing all degrees in counselor education are eligible to apply for Licensed Professional Counselor through the Board of Examiners in Counseling for the State of Arkansas and/or for various certifications through the State Department of Education and National Board for Certified Counselors. Persons intending to complete school counselor certification requirements for the state of Arkansas must, in addition to the master's degree, hold a valid teaching certificate, have one year of non-school work experience, have one year of teaching experience, and complete other specified courses within the counseling core. The master's in School, Community Agency Counseling, and the doctoral program are CACREP accredited.

Admission Requirements and Procedures for the Master of Science in Counseling Degree Program: Academic requirements include a 3.00 GPA on all undergraduate and also on any previous graduate course work. Applicants should submit three letters of recommendation, a statement of professional goals and scores on the Graduate Record Examinations or Miller Analogies Test to the Coordinator for Graduate Studies (GRAD 251). Applicants should first submit an application and current transcripts to the Graduate School. An interview with two or more faculty members will be scheduled. Application deadlines are October 15 and March 15. Conditional admission may be granted.

Required Courses:

CNED 5203, Introduction to Community Agency Counseling or CNED 5103, Introduction to School Counseling
CNED 5213, Lifestyle and Career Development
CNED 5303, Individual Appraisal
CNED 5323, Counseling Theory
CNED 5333, Basic Counseling Techniques
CNED 5343, Counseling Practicum
CNED 5363, Dynamics of Group Counseling
CNED 5372, Ethical & Legal Issues in Counseling
CNED 5382, Crisis Intervention Counseling
CNED 5403, Case Management & Counseling
CNED 5513, Counseling and Human Diversity
CNED 574V, Internship (6 semester hours, 600 clock hours)
EDFD 5013, Research Methods in Education
EDFD 5573, Life Span Human Development

Emphasis in Counseling for Agency Settings

Requires 52 graduate hours including:
Counselor education course work and research as specified above.
CNED 6003 Counseling and Addictions
CNED 6023 Family Counseling
Three hours of electives selected with consent of adviser.

Emphasis in College Counseling

Requires 52 graduate hours including: Counselor education and College requirements as specified above, may include

HIED 5003, Overview- American Higher Education

HIED 5033, College Students and Student Personnel Services

Three hours of electives in higher Education

Emphasis in Elementary or Secondary School Counseling

Requires 52 graduate hours including: Counselor education and research courses as specified above.

CNED 560V, Workshop

CNED 5313, Program Organization and Information Management

CNED 6023, Family Counseling

Requirements for the Educational Specialist Degree: This program is flexibly designed for the student's professional goals and requires a special investigative study project. In addition to admission and general degree requirements, candidates for this degree must have completed a three-semester hours course in statistics, CNED 6033, and CNED 674V. Additional course work and/or internship credit is planned in conjunction with the student's adviser and committee.

Doctoral Application Procedures: Applicants for a doctoral program in counselor education may obtain an application packet from the Graduate Coordinator in GRAD 251.

Requirements for the Doctor of Philosophy Degree: Applicants must meet the requirements stated for the applicable degree in the Objectives, Regulations, and Degrees section of this catalog. In addition, doctoral applicants must:

1. Have completed a master's degree in counseling or its equivalent in areas specified by the Council for Accreditation of Counseling and Related Education Programs (CACREP).
2. Present scores on the Graduate Record Examinations general score on three parts (verbal, quantitative, and analytical). Scores are considered as part of the applicant's profile.
3. Present a 3.5 cumulative grade-point average on all previous graduate work or Graduate Record Examinations scores of 1500.
4. Have a minimum of one year, post masters, documented, full-time professional counseling experience, or the equivalent.
5. Have three (3) letters of recommendation (form ORGS-33) from individuals knowledgeable of academic/professional qualifications for advanced graduate study.
6. Be formally interviewed by a majority of the program faculty.
7. Submit an autobiography.
8. Present videotaped evidence of counseling competency.
9. Submit a sample of professional writing.

Candidates for the Doctor of Philosophy in counselor education must meet general degree requirements and complete a minimum of 98 semester hours of graduate study acceptable to their doctoral advisory committee.

Counselor Education Core Courses: CNED 6013, 6033, 6043, 6072, 6343, 6413, 6523, 674V (I&II) 605V (1-6 hours), 699V (2-4 hours).

College of Education Requirements: Dissertation (18 semester hours), research and statistics (15 semester hours), graduate transfer credits (36 semester hours maximum).

Electives: Four courses from CNED 5382, 6003, 6023, 6062, 6083, 6093, 6123, 6203.

In addition, doctoral candidates must demonstrate either reading ability in a scholarly modern language other than English, or proficiency in use of a computer technology related to research in counselor education.

For a specialty focus, each doctoral candidate must complete additional cognate studies (9-12 hours) with advisory committee approval. All doctoral candidates will complete both clinical internships and instructorships with advisory committee approval.

COURSES: COUNSELOR ED (CNED)

CNED4003 Classroom Human Relations Skills (FA, SP, SU) A study of interpersonal skills important to improving teacher-student relationships and achievement in classrooms. Human communication systems related to motivation, achievement, and educator-student relationships are studied. The attainment of effective human relations skills are emphasized.

CNED5103 Introduction to School Counseling (FA, SU) A study of the educational, philosophical, psychological and historical foundations of school counseling. Current practices, issues and trends in elementary, middle-junior high, and secondary levels will be examined.

CNED5203 Introduction to Community Agency Counseling (IR) A study of the counseling profession applicable to a variety of human service settings. Introduction to basic philosophical and psychological foundations of counseling as well as specific traits and skills of counselors.

CNED5213 Lifestyle & Career Development (FA, SP, SU) Theories of career development and counseling, including the use of occupational information sources and career assessment tools and techniques.

CNED5303 Individual Appraisal (FA, SU) Analysis of concepts, methods, and procedures utilized in individual appraisal.

CNED5313 Program Organization and Information Management (SU) Study of client information needs and strategies for effective management of counseling services.

CNED5323 Counseling Theory (FA, SP, SU) Introductory survey and critical analysis of major alternative theoretical perspectives in counseling.

CNED5333 Basic Counseling Techniques (FA, SP, SU) Introduction to basic counseling techniques and skills common to multiple theoretical perspectives.

CNED5343 Counseling Practicum (FA, SP, SU) Supervised counseling practice. Prerequisite: CNED 5333 and CNED 5323.

CNED5363 Dynamics of Group Counseling (FA, SU) Therapeutic and other theoretical information is presented regarding group process and the counselor's role in that process. An experiential group experience is required. Prerequisite: CNED 5333 and CNED 5323.

CNED5372 Ethical and Legal Issues in Counseling (FA, SP, SU) Review of ethical and legal standards governing professional counselor training, research, and counseling practice; including client rights; confidentiality; the client-counselor relationship; and counseling research, training, and supervision. Prerequisite: CNED 5103 and CNED 5203.

CNED5382 Crisis Intervention Counseling (FA, SP, SU) Analysis and application of short-term counseling intervention strategies in crisis situations, with special attention to incidents involving rape, physical, or emotional abuse, divorce, suicidal depression, grief, martial or family instability, and violent conflict. Prerequisite: CNED 5333 and CNED 5323.

CNED5403 Case Management and Counseling (IR) Procedures in case management utilizing both clinical and interview data in assisting children, adolescents, and adults in educational, vocational, personal, and social planning. Prerequisite: CNED 5303 and CNED 5323 and CNED 5333.

CNED5513 Counseling and Human Diversity (FA, SP, SU) Examination of human and cultural diversity, emphasizing issues of race, class, and socioeconomic status, and how they impact our clients as individuals and as family and society members.

CNED560V Workshop (1-18) (FA, SP, SU)

CNED574V Counseling Internship (1-3) (FA, SP, SU) A 300-clock-hour field placement in an approved setting. May be repeated for 6 hours. Prerequisite: CNED 5323 and CNED 5333 and CNED 5343 and CNED 5363 and CNED 5372.

CNED599V Seminar (1-18) (IR)

CNED600V Master's Thesis (1-6) (FA, SP, SU)

CNED6003 Counseling and Addictions (FA, SP, SU) A study of behavioral and substance additions, including an overview of differential treatment. Prerequisite: CNED 5323 and CNED 5333.

CNED6013 Advanced Counseling Theory and Methods (FA, SP, SU) Critical analysis of major theoretical perspectives in counseling, including both group and individual counseling strategies for dealing with affective, cognitive, and behavioral dysfunction.

CNED6023 Family Counseling (FA) A comprehensive exploration of the current theories and techniques of family therapy. Prerequisite: CNED 5323 and CNED 5333.

CNED6033 Advanced Group Theory and Methods (SP) Comparative study of theories and processes of group counseling. Includes supervised experience in group facilitation with video recording and playback. Prerequisite: CNED 5363 or equivalent.

CNED6043 Supervision of Counselors (FA, SP, SU) Analysis, assessment, and practical application of counselor supervision techniques in treatment and training programs. Prerequisite: CNED 674.

CNED605V Independent Study (1-18) (FA, SP, SU)

CNED6063 Counseling and Sexuality (FA, SP, SU) Analysis of theory and practice in issues related to sexual dysphoria, sexuality, and sexual problems. Prerequisite: CNED 574.

CNED6072 Research in Counseling (FA, SP, SU) Review and analysis of research in counseling.

CNED6083 Consultation Theory and Methods (FA, SP, SU) Strategies, practical application, and techniques for effective consultation with parents, teachers, and community agencies.

CNED6093 Counseling Children (FA, SP, SU) Introduction to counseling children including the process, theories, techniques, and materials applicable to children in a pluralistic society. Prerequisite: CNED 5323 and CNED 5333 and CNED 5343.

CNED6123 Advanced Family Counseling Theory and Methods (FA, SP, SU) Critical analysis of theoretical constructs of family counseling emphasizing strategic, solution-focused, and systems models, and indepth study of interventions with families. Supervised experience in couple and family counseling, video, group supervision. Prerequisite: doctoral standing and (CNED 6023 or equivalent) and internship.

CNED6203 Counseling Adolescents (FA, SP, SU) Introduction to counseling adolescents including the process, theories, techniques, and materials applicable to children in a pluralistic society. Prerequisite: CNED 5323 and CNED 5333 and CNED 5343.

CNED6343 Cultural Foundations and Counseling (FA, SP, SU) Study of the effects of culture on case analysis and implications for treatment.

CNED6413 Advanced Individual Appraisal (FA, SP, SU) To provide advanced knowledge and experience

with those psychoeducational instruments and procedures used in conducting school related assessment. Prerequisite: CNED 5303 and CNED 5413 or equivalent.

CNED6523 Gender Issues in Counseling and Human Development (FA, SP, SU) A study of gender and sex role issues pertinent to the counseling profession, and their effect on the development of children, adults, and young and older adults. Students utilize Gender Fair Guidelines for counseling as presented by the American Counseling Association. Prerequisite: CNED 5203.

CNED674V Internship (1-9) (IR) Supervised field placement consent required.

CNED680V Educational Specialist Project (1-6) (FA, SP, SU) An original project, research paper, or report required of all Ed.S. degree candidates. Prerequisite: admission to the Ed.S. program.

CNED699V Seminar (1-18) (FA, SP, SU) Prerequisite: advanced graduate standing.

CNED700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

CREATIVE WRITING (CRWR)

Robert Cochran
Department Chair of English

Donald Hays
Director
333 Kimpel Hall
575-4301

(See English faculty list.)

Degree Conferred: M.F.A. (CRWR)

The program leading to the degree of Master of Fine Arts in Creative Writing provides graduate level training in creative writing and in the study of literature.

Required Courses

A minimum of 42 hours for a candidate with an M.A. degree in English or of 60 hours for a candidate with no M.A. Candidates with a B.A. degree that does not include a major in English may be required to take additional courses.

1) Writing and Theory Courses
   a. Writing Workshop (15 to 24 semester hours)
   b. Form and Theory of Fiction or Poetry (9 hours total: 6 hours in student's genre; 3 hours in second genre)
   c. Contemporary Fiction and Poetry (6 hours in student's genre; 3 hours in second genre)
   d. Readings in Modern or Contemporary Literature (6 hours)
2) Additional Courses, 12 to 24 hours of English at the advanced level.

Comprehensive Examination

A six-hour written examination covering critical terms, theories, and readings in the candidate's genre.

Thesis

An M.F.A. thesis may be either a collection of poems or stories or a novel. It should be of the quality of those works currently published by national magazines, by literary journals, and by legitimate book publishers. The degree will be withheld from any student failing to produce a suitable body of work.

Three hours of credit may be given for a thesis, or six hours of credit to a candidate who has 21 hours of workshop or less.

Final Examination

A two-hour oral examination on the thesis.

All students working toward the degree will plan their specific programs in consultation with their advisers.

All degree requirements must be completed within six consecutive calendar years from the date of first enrollment.

Through an agreement with the Academic Common Market, residents of certain Southern states may qualify for graduate enrollment in creative writing as in-state students for fee purposes. (See page 163 for details).

DEPARTMENT OF CROP, SOIL, AND ENVIRONMENTAL SCIENCES (CSES)

J. L. Barrentine
Department Head
115 Plant Sciences Building
575-2354

• Distinguished Professor Oosterhuis • University Professors Oliver, Scott, Talbert, Wolf • Professors Bacon, Beyrouty, Bourland, Daniel, Gbur, Keisling, Moldenhauer, Norman, Phillips, Rutledge, Scifres, Stewart, West • Adjunct Professors Dilday, Rutger • Visiting Professor Gealy • Associate Professors Counce, Longer, Mauromoustakos, McConnell, Miller, Purcell, Sneller • Visiting Associate Professor Moore • Research Associate Professor Davis • Assistant Professor Burgos • Adjunct Assistant Professors Aiken • Research Assistant Professors Anders, Baker, Mattice, Widick, Wilson • Extension Specialists Ashlock, Baldwin, Chapman, Johnson, Smith

Degrees Conferred: M.S., Ph.D. in Agronomy (AGRN)

Areas of Concentration: Crop sciences, soil sciences and enviromental sciences. Areas of specialization within these concentrations include plant breeding and genetics, biotechnology, environmental science, crop physiology, crop production, weed science, pesticide residue, seed technology, soil chemistry, soil classification, soil fertility, soil microbiology, and soil physics.

Prerequisites to Degree Programs: While extensive undergraduate training in agriculture and physical and biological science is desirable, no specific prerequisites are required. Deficiencies in undergraduate major or prerequisites for advanced courses may be included in the student's program.

Requirements for the Master of Science Degree:

Thesis option-minimum of 24 semester hours of course work as outlined by the student's graduate advisory committee plus six semester hours of thesis credit. The student will be given an oral examination after the thesis is completed.

Non-Thesis option- minimum of 30 semester hours of course work as designated by the student's graduate advisory committee. The student will be given an oral and/or written examination over all course work to be completed for the degree. The non-thesis option is considered a terminal degree in the Department of Crop, Soil, and Environmental Sciences.

Requirements for the Doctor of Philosophy Degree:

After a student has been admitted to the Graduate School and accepted by the department as being qualified for advanced work, the student is assigned to a major adviser. The major adviser will, in consultation with the department head, select a graduate committee. This committee will serve both in an advisory capacity for the student's program and as the dissertation and examination committee. The student's graduate advisory committee will determine the number of hours of course work to be completed for the degree.

The student must take candidacy examinations (prelims) in at least five fields of study after completing approximately two years of graduate study and at least one year before completing all other requirements. Preliminary examinations must be written and oral. Further details regarding requirements for the Doctor of Philosophy degree are available in the Crop, Soil, and Environmental Sciences Department office.

COURSES: AGRONOMY (AGRN)

AGRN400V Special Problems (1-6) (FA, SP, SU) Work on special problems in agronomy or related field.

AGRN4013 Advanced Crop Science (SP) Fundamental concepts of crop physiology, crop improvement, seed science, and crop production systems. Recitation 3 hours per week. Prerequisite: AGRN 2103.

AGRN4043 Environmental Impact and Fate of Pesticides (FA) Environmental issues associated with pesticide use, including fate of pesticides in the environment, ecological impact of pesticides, and exposure risks to humans. Course recommended for students who have 12 hours of biological and /or physical sciences or consent. Lecture 3 hours per week. (Same as ENSC 4043)

AGRN4103 Plant Breeding (FA, Even years) Basic principles involved in plant breeding programs to improve crop plants and seed programs. Lecture 2 hours, laboratory 2 hours per week. Corequisite: AGRN 4100L. Prerequisite: ANSC 3123.

AGRN4100L Plant Breeding Laboratory (FA,

Even years) Corequisite: AGRN 4103.

AGRN4133 Weed Identification, Morphology, and Ecology (FA) Study of weeds as economic pests occurring in both agricultural and nonagricultural situations and including poisonous plants and other specific weed problems. Gross morphological plant family characteristics which aid identification, habitat of growth and distribution, ecology, competition, and allelopathy are discussed. Lecture 2 hours, laboratory 2 hours a week. Corequisite: AGRN 4130L. Prerequisite: AGRN 2103 (or HORT 2003) and AGRN 2003.

AGRN4130L Weed Identification, Morphology, and Ecology Laboratory (FA) Corequisite: AGRN 4133.

AGRN4143 Principles of Weed Control (SP) Advanced concepts and technology used in modern weed control practices and study of the chemistry and specific activity of herbicides in current usage. Lecture 2 hours, laboratory 2 hours per week. Corequisite: AGRN 4140L. Prerequisite: CHEM 2613 and CHEM 2611L and AGRN 2003.

AGRN4140L Principles of Weed Control Laboratory (SP) Corequisite: AGRN 4143.

AGRN4224 Soil Fertility (FA) Study of the soil's chemical, biological and physical properties, and human modification of these properties, as they influence the uptake and utilization of the essential nutrients by plants. Lecture 3 hours, laboratory 2 hours per week. Corequisite: AGRN 4220L. Prerequisite: AGRN 2201L and AGRN 2203.

AGRN4220L Soil Fertility Laboratory (FA) Corequisite: AGRN 4224.

AGRN4234 Plant Anatomy (SP) Advanced training in plant anatomy. Studying the structure, terminology, techniques and function associated with vascular plant anatomy. Corequisite: AGRN 4230L. Prerequisite: BOTY 1613/1611 or BIOL 1543/1541.

AGRN4230L Plant Anatomy Lab (SP) Corequisite: AGRN 4234.

AGRN4253 Soil Classification and Genesis (SP) Lecture and field evaluation of soil properties and their relation to soil genesis and soil classification with emphasis on soils of Arkansas. Lecture 2 hours, laboratory 2 hours per week. Corequisite: AGRN 4250L. Prerequisite: AGRN 2203.

AGRN4250L Soil Classification and Genesis Laboratory (SP) Corequisite: AGRN 4253.

AGRN4263 Environmental Soil Science (SP) Study of the behavior of pesticides, toxic organic compounds, metals, nutrients, and pathogenic microorganisms in the soil/plant/water continuum. Lecture 3 hours per week. (Same as ENSC 4263) Prerequisite: AGRN 3214.

AGRN5001 Weed Science Practicum (SU) Training for membership on weed team, through participation. Prerequisite: graduate standing.

AGRN5013 Crop Physiology (FA, Odd years) Understanding and quantitative measurement of physiological processes, plant responses, and environmental parameters in relation to the production of crops. Prerequisite: BOTY 4304.

AGRN502V Special Problems Research (1-6) (FA, SP, SU) Original investigations on assigned problems in agronomy. Prerequisite: graduate standing.

AGRN5023 Weed Physiology and Herbicide Resistance in Plants (FA, Even years) The reproduction, growth, and development of weeds and the ecological factors affecting these processes; development and mechanisms of herbicide resistance, flow of herbicide-resistance genes; and development of herbicide-resistant crops. Corequisite: AGRN 5020L Prerequisite: AGRN 4143 and (BOTY 4304 or CHEM 5813).

AGRN5020L Weed Physiology and Herbicide Resistance in Plants Lab (FA, Even years) Corequisite: AGRN 5023.

AGRN5033 Plant Nutrition (FA, Even years) Study of water uptake, ion absorption, translocation and metabolism in higher plants. Lecture 3 hours per week. Prerequisite: BOTY 4304 and CHEM 2613 and CHEM 2611L.

AGRN504V Special Topics (1-4) (IR) Topics not covered in other courses or a more intensive study of specific topics in agronomy. May be repeated. Prerequisite: graduate standing.

AGRN5053 Scientific Writing (FA) Open to graduate students, especially those in agricultural and life sciences. The course will cover searching the scientific literature, writing theses, proposals, journal articles, and other scientific documents. Emphasis on style and techniques used in scientific publication. Lecture and workshop 3 hours per week. Prerequisite: graduate standing.

AGRN5103 Scientific Presentations (FA, SP) Experience in procedures required for professional presentations of scientific papers, seminars, posters; and research findings at meetings in conferences, and with discussion groups. Instruction in organization of materials, visual aids, and good speaking habits. Lecture 3 hours per week. Prerequisite: graduate standing.

AGRN5124 Crop Molecular and Physiological Genetics (SP, Even years) Study of genome organization and expression in agronomic and horticultural plants, with emphasis on genes regulating physiological processes. Lecture 3 hours, discussion 1 hour per week. (AGRN 5013 and CHEM 5813 and CHEM 5843 are recommended but not required). (Same as HORT 5124) Corequisite: AGRN 5120D. Prerequisite: BOTY 4304 and ANSC 3123 (or BIOL 3321L and BIOL 3323).

AGRN5120D Crop Molecular and Physiological Genetics Discussion Drill (SP, Even years) Corequisite: AGRN 5124.

AGRN5204 Applied Math Methods in Life Sciences (FA, Odd years) Methods of data presentation and mathematical descriptions of research data in the life sciences including graphical presentations, linear regression, growth equations, kinetics, transport equations, and compartmentalization. Analytical, numerical, and statistical approaches to the solution of research problems in life sciences will be emphasized. Lecture 3 hours, laboratory 2 hours per week. (Same as AGST 5204) Corequisite: AGRN 5200L. Prerequisite: MATH 2564 and AGST 4023.

AGRN5200L Applied Math Methods in the Life Sciences Laboratory (FA, Odd years) Laboratory computer experience designed to reinforce material taught in AGRN 5204. Laboratory consists of a single 2-hour period each week. (Same as AGST 5200L) Corequisite: AGRN 5204.

AGRN5214 Analytical Research Techniques in Agronomy (FA) Preparation and analysis of plant and soil samples utilizing spectrophotometry, isotopes, and chromatographic separation methods. Additionally, measurements are made of photosyntheses, respiration, water relationships, light, and temperatures in whole plants. Lecture 2 hours, laboratory 4 hours per week. Corequisite: AGRN 5210L. Prerequisite: BOTY 4304 and CHEM 2613 and CHEM 2611L.

AGRN5210L Analytical Research Techniques in Agronomy Laboratory (FA) Laboratory experiments designed to reinforce principles of research techniques taught in AGRN 5214. Experiments are conducted by individuals or by teams. Laboratory consists of a single 4-hour period each week. Corequisite: AGRN 5214.

AGRN5224 Soil Physics (SP) Physical properties of soils and their relation to other soil properties, growth of plants and transport of water, oxygen, heat, and solutes such as pesticides and plant nutrients. Lecture 3 hours, laboratory 3 hours per week. Corequisite: AGRN 5220L. Prerequisite: AGRN 2203 and MATH 1203.

AGRN5220L Soil Physics Laboratory (SP)

AGRN5243 Advanced Soil Fertility (SP, Even years) An advanced consideration of the chemical, physical, and biological phenomena which influence the nutrient-supplying power of the soil. Lecture 3 hours per week. Prerequisite: AGRN 4224.

AGRN5264 Soil Microbiology (FA, Odd years) A study of the microorganisms in soil and the biochemical processes for which they are responsible. Lecture 3 hours, laboratory 3 hours per week. (Same as MBIO 5264) Corequisite: AGRN 5260L. Prerequisite: MBIO 2013 and MBIO 2011L.

AGRN5260L Soil Microbiology Laboratory (FA, Odd years) Laboratory exercises related to the study of microorganisms in the soil and the biochemical processes for which they are responsible. Laboratory 3 hours per week. (Same as MBIO 5260L) Corequisite: AGRN 5264.

AGRN5453 Soil Chemistry (FA, Even years) Application of the principles of chemistry to processes of agronomic and environmental importance in soils. Soil clay mineralogy, soil solution thermodynamics, structure and reactivity of humus, surface complexation and ion exchange, electro-chemical phenomena, and colloidal stability. Prerequisite: AGRN 2203 and CHEM 1123 and CHEM 1121L.

AGRN600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

AGRN6113 Herbicide Behavior (FA, Even years) Biochemistry, physiology and behavior of herbicides in plants, soils, and the environment. Lecture 2 hours, laboratory 2 hours per week. Corequisite: AGRN 6110L. Prerequisite: AGRN 4143 and BOTY 4304 and CHEM 3813.

AGRN6110L Herbicide Behavior Laboratory (FA, Even years) Corequisite: AGRN 6113.

AGRN622V Advanced Topics in Soil Science (1-3) (FA, SP) Topics include doctoral-level concepts in soil physics, soil chemistry, and soil microbiology/biochemistry not considered in other soil science courses. May be repeated. Prerequisite: graduate standing.

AGRN6253 Forage-Ruminant Relations (SP, Odd years) Advanced chemical, physical, and botanical characteristics of forage plants, the dynamics of grazing, intake and digestion, and techniques of measuring forage utilization and systems analysis at the plant-animal interface. Lecture 3 hours per week. (Same as ANSC 6253) Prerequisite: ANSC 3143 and AGRN 3113.

AGRN700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: graduate standing.

COURSES: AGRI STAT (AGST)

AGST400V Special Problems (1-6) (FA, SP) Work on special problems of agricultural statistics or related areas.

AGST4011 SAS Programming for Agricultural Sciences (FA, SP) An introduction to the SAS programming language with an emphasis on the reading and restructuring of data files, and the displaying of data in tabular and graphic forms. The course is taught using a hands-on approach.

AGST4023 Principles of Experimentation (FA, SP) Fundamental concepts of experimental and statistical methods as applied to agricultural research. Lecture 3 hours per week. Prerequisite: MATH 1203 or higher level.

AGST500V Special Problems (1-6) (FA, SP, SU) Individual investigation of a special problem in some area of statistics applicable to the agricultural, food, environmental, and life sciences not available under existing courses. May be repeated for 6 hours.

AGST5014 Experimental Design (SP) Types of experimental designs, their analysis and application to agricultural research. Lecture 3 hours and laboratory 2 hours per week. Corequisite: AGST 5010L. Prerequisite: AGST 4011 and (AGST 4023 or STAT 4003).

AGST5010L Experimental Design Laboratory (SP) Corequisite: AGST 5014.

AGST504V Special Topics (1-4) (IR) Topics not covered in other courses or a broader-based study of specific topics in statistics and related areas. May be repeated. Prerequisite: graduate standing.

AGST5204 Applied Math Methods in the Life Sciences (FA, Odd years) Methods of data presentation and mathematical descriptions of research data in the life sciences including graphical presentations, linear regression, growth equations, kinetics, transport equations, and compartmentalization. Analytical, numerical, and statistical approaches to the solution of research problems in life sciences will be emphasized. Lecture 3 hours, laboratory 2 hours per week. (Same as AGRN 5204) Corequisite: AGST 5200L. Prerequisite: MATH 2564 and AGST 4023.

AGST5200L Applied Math Methods in the Life Sciences Laboratory (FA, Odd years) Laboratory computer experience designed to reinforce material taught in AGST 5204. Laboratory consists of a single 2-hour period each week. (Same as AGRN 5200L) Corequisite: AGST 5204.

AGST5713 Applied Regression Analysis for Agricultural Sciences (FA) Analysis of agricultural experiments which contain quantitative factors through regression procedures. Lecture 3 hours per week. Prerequisite: AGST 4011 and (AGST 4023 or STAT 4003).

AGST5803 Case Studies in Biometry (SP) Nonstandard statistical problems arising in the agricultural, food, environmental, and life sciences. Prerequisite: STAT 5113 and STAT 5313 and either (AGST 5014 and AGST 5010L) or STAT 4373.

AGST5901 Statistical Consulting Process (SP) Examines the components of statistical consulting with emphasis on the interpersonal aspects.

AGST5913 Statistical Consulting Practicum (FA) Supervised statistical consulting. Prerequisite: STAT 5313 and AGST 5901 and either (AGST 5014 or STAT 4373).

COURSES: ENVIRMTL SCI (ENSC)

ENSC400V Special Problems (1-8) (FA, SP, SU) Work on special problems in environmental science or related fields. May be repeated for 8 hours.

ENSC4023 Water Quality (FA) Lectures concerning physical, chemical, and biological characteristics of water resources in association with reference systems and point and non-point pollution sources. Regulations pertaining to water quality standards as well as parameter selection and analytical models are discussed. Course recommended for students who have 4 credit hours of Chemistry. Lecture 2 hours per week and laboratory 3 hours per week. Corequisite: ENSC 4020L.

ENSC4020L Water Quality Laboratory (FA) Corequisite: ENSC 4023.

ENSC4033 Water Quality Analysis (SP) Lectures concerning evaluation of water quality parameters with complementary field and laboratory experiences. Principles of parameter selection, quality assurance and quality control,

sampling protocols, field techniques, and instrumentation as well as laboratory analysis methodologies will be emphasized. Lecture 2 hours, laboratory 2 hours per week. Prerequisite: ENSC 4023.

ENSC4263 Environmental Soil Science (SP) Study of the behavior of pesticides, toxic organic compounds, metals, nutrients, and pathogenic microorganisms in the soil/plant/water continuum. Lecture 3 hours per week. (Same as AGRN 4263) Prerequisite: AGRN 3214.

DEPARTMENT OF CURRICULUM AND INSTRUCTION (CIED)

Priscilla L. Griffith
Department Head
Graduate Studies Coordinator
201 Graduate Education Bldg
575-4209

• Professors Besonen, Farah, Graening, Griffith, Sullivan, Taylor, Totten • Associate Professors Digby, Gartin, Imbeau, Johnson, Lefever-Davis, Stockall, Wavering • Assistant Professors, Beller, Collier, Hardy, McGee, Morrow, Kirkpatrick • Instructors Cronan, Jordan, Riggs

Degrees Conferred:

M.A.T. in Childhood Education (CHED)

(See Childhood Education)

M.A.T. in Middle Level Education (MLED)

(See Middle-Level Education)

M.A.T. in Secondary Education (SEED)

(See Secondary Education)

M.Ed. in Elementary Education (ELED)

(See Elementary Education)

M.Ed. in Seconday Education (SEED)

(See Secondary Education)

M.Ed. in Special Education (SPED)

(See Special Education)

Ed. S. (EDUC)

(See Education)

Ph.D. (CIED)

The emphasis of the Doctor of Philosophy degree program in curriculum and instruction will be upon the generation of new knowledge or the reformulation of existing knowledge as a basis for the development of educational theory. The test of knowledge for a person working toward this degree is not conditioned upon ability to improve educational practice but rather upon possible contribution to the development of educational theory. Persons working toward this degree goal may assist in the improvement of practice, but their interests in the results are conditioned primarily by the extent to which they assist in reformulation of their own theoretical base. Highly developed research skills are an essential facet of this degree program.

Prerequisites to Degree Program: Applicants for the degree of Doctor of Philosophy must meet the following requirements in addition to the applicable requirements of the University prior to admission to the degree program:

1. Have a minimum grade-point average (GPA) of 3.50 on all graduate courses.
2. Have a master's degree with a minimum of 33 semester hours in a related area.
3. Have a minimum Graduate Record Examinations scores of 500 on the quantitative section, 500 on the verbal section, and 1500 on the total of the three sections (verbal, quantitative, and analytical) completed no more than five years prior to the date of application.
4. Have completed a minimum of three years full-time professional teaching experience or equivalent employment experiences prior to the application to the doctoral program.
5. Complete a writing assignment designed and evaluated by the specific program area of concentration and administered through the Department of Curriculum and Instruction.
6. Complete a departmental interview concerning personal goals, professional goals, background experiences, and the results from the previously completed writing assignment.

Requirements for the Doctor of Philosophy Degree: After acceptance into the program, the candidate for the Doctor of Philosophy degree must meet the general University degree requirements, complete residency requirements, and complete a minimum of 102 semester hours of graduate study approved by the Doctoral Advisory Committee, including 60 semester hours taken on this campus. The residency requirements are the completion of two consecutive semesters on campus during which the student will complete a one-semester internship in college teaching and a one-semester internship in research.

The program of study for the Doctor of Philosophy candidate must include the following:

1. 33 semester hours or more in an approved master's degree program
2. 15 semester hours in selected concentration (secondary education, elementary education/reading, or special education)
3. 15 hours in research and statistics to include the following six hours:

EDFD 6413, Experimental Design in Education
EDFD 6423, Multiple Regression Techniques for Education
EDFD 6453, Applied Multivariate Statistics
EDFD 6533, Qualitative Research
EDFD 6623, Techniques of Research in Education, and nine additional hours from the following:
EDFD 6653, Measurement and Evaluation
EDFD 699V, Seminars (as approved by advisory committee)
Other 5000- or 6000-level classes with approval of advisory committee
(Note: Prior to enrolling in the above courses, candidates must have completed six hours of prerequisites: EDFD 5013, Research Methods in Education, and EDFD 5393, Applied Educational Statistics, or EDFD 6403, Elementary Statistics and Data Processing.)

4. 12 semester hours of the curriculum and instruction core to include three semester hours of curriculum development, three semester hours in instructional theory, and six semester hours of internship
5. 9-12 semester hours in the cognate field approved by the Doctoral Advisory Committee
6. 18 semester hours or more of dissertation

COURSES: CURR & INSTR (CIED)

CIED5003 Childhood Seminar (FA, SP, SU) (Formerly ELED 5003) This course is designed to synthesize the foundational content presented in the Master of Arts in teaching core courses. It focuses on refinement of the generalized knowledge to accommodate specialized content children. Professional attitudes, knowledge and skills relevant to young children. Professional attitudes, knowledge and skills applicable for today's early childhood educator are addressed. Prerequisite: admission to the CHED M.A.T.

CIED5012 Measurement, Research, and Statistical Concepts for Teachers (SU) An introduction to constructing, analyzing, and interpreting tests, types of research and the research process, qualitative and quantitative techniques for assessment, and descriptive and inferential statistics.

CIED5022 Classroom Management Concepts (FA) A number of different classroom management techniques are studied. It is assumed that a teacher must possess a wide range of knowledge and skills to be an effective classroom manager. Prerequisite: admission to the M.A.T. program.

CIED5032 Curriculum Design Concepts for Teachers (SP) The design and adaptation of curriculum for students in regular and special classrooms. Theoretical bases and curriculum models are reviewed. Concurrent clinical experiences in each area of emphasis are included. Prerequisite: admission to the M.A.T. program.

CIED5042 Reading and Writing Across the Curriculum (FA, SU) This course teaches the integration of reading and writing in the content areas. Reading and writing as integrated strands of the language process is presented in the context of instructional principles and suggested teaching practices. A solid research base is emphasized while keeping the focus on practical application. Prerequisite: admission to the M.A.T. program.

CIED5052 Seminar: Multicultural Issues (SU) This seminar provides an introduction to the major concepts and issues related to multicultural education. The ways in which race, ethnicity, class, gender, and exceptionality influence students' behavior are discussed. Prerequisite: admission to the M.A.T. program.

CIED5063 Contemporary and Futuristic Concerns of Childhood Education (FA) (Formerly ELED 5013) Historical, Contemporary and Future Perspective of Childhood Education. A problecs course in childhood education which deals with historical, current and future concerns. These early childhood concerns include demographic trends, family composition and change,

instructional models, social/political/economic issues, parent/community involvement, and evolving professional roles. Prerequisite: admission to the CHED M.A.T. program.

CIED5073 Case Study in Childhood Education (SP) (Formerly ELED 5023) Provides the students with experience in conducting case studies related to childhood education. In addition, students gain knowledge regarding practices used in ethnographic research. Prerequisite: admission to M.A.T. program.

CIED508V Childhood Education Cohort Teaching Internship (1-6) (FA, SP) May be repeated for 6 hours.

CIED5092 Methods of Instruction for Middle School I-Science (SU) An introductory special methods course for teaching science at the middle level. Emphasize the nature of scientific inquiry and the implications for instruction. Students will develop science lessons that incorporate appropriate and engaging activities for middle level students. Prerequisite: admission to M.A.T. program.

CIED5103 Advanced Middle Level Principles (FA, SP, SU) A more indepth examination of the philosophy, principles, research, and methodologies for middle level education. Reflective activities and site-based field experiences are integrated with course content to provide continuity between theory and practice. Portfolio expectations will be a primary means of course evaluation. Prerequisite: admission to middle level education program.

CIED5113 Reading Across the Middle Level (FA, SP, SU) An overview of methods and materials for teaching reading to early adolescents. Reflective activities and site-based field experiences are integrated with course content to provide continuity between theory and practice. Portfolio expectations will be a primary means of course evaluation. Prerequisite: admission to the middle level education program and CIED 3113.

CIED5124 Writing Process Across the Curriculum (Middle Level) (FA) (Formerly CIED 5123) This course will provide an overview of the research, and methods for incorporating writing across all curriculum. Writing as a process will be emphasized. Reflective activities and site-based field experience will be integrated into the course content. Prerequisite: admission to M.A.T. Program.

CIED5133 Content Based Adaptive Instructional Models (FA, SP, SU) Provides both the theory for and analysis of rationales and models for teaching. Reflective activities and site-based field experiences are integrated with course course content to provide continuity between theory and practice. Portfolio expectations will be a primary means of course evaluation. Corequisite: CIED 5140. Prerequisite: admission to middle level education program.

CIED514V Internship: Middle Level (1-6) (FA, SP, SU) (Formerly CIED 507) The internship for middle level education is an extended field experience in which a preservice teacher integrates knowledge and skills developed in education classes with practice in the field. Prerequisite: admission to the M.A.T. program.

CIED5150 Middle School Practicum (FA, SP, SU) (Formerly CIED 5140) Provides practical experiences in conjunction with specified middle level course. Reflective activities and site-based field experiences are integrated with course content to provide continuity between theory and practice. Portfolio expectations will be a primary means of course evaluation. Prerequisite: enrollment is associated with middle level education courses.

CIED5162 Applied Practicum (FA) (Formerly RDNG 5002) Provides laboratory experiences for RDNG 5123 (Literacy Assessment) and RDNG 113 (Reading in Early Childhood Education. Corequisite: CIED 5183 and CIED 5173. Prerequisite: admission to the M.A.T. program.

CIED5173 Literacy Assessment (FA) (Formerly RDNG 5123) Focuses on assessment of young children's literacy skills. Techniques discussed include informal observation, miscue analysis, and portfolio assessment. Prerequisite: admission to the CHED M.A.T.

CIED5183 Readings in Early Childhood Education (FA) (Formerly RDNG 5113) Will continue to develop understandings of classic studies and will explore the impact these have had on the most recent issues in early childhood education. Prerequisite: admission to the CHED M.A.T.

CIED5193 Methods of Instruction for Middle School II (FA) Second special methods course for teaching science at the middle level. Emphasizes further refinement of teaching skills and methods; the integration of the sciences, mathematic, and technology; and, science, technology, and society (STS) issues. Addresses science for special populations. Prerequisite: CIED 5092 and admission to the M.A.T. program.

CIED5201 Writing Across the Curriculum Practicum (FA, SP, SU) (Formerly SEED 5041) Practicum in which students apply theory to practice. Emphasis placed upon actual application of theory to their own writing, methods for transferring the knowledge of theory to classroom application in their curricular area(s), and curriculum development. Prerequisite: admission to the M.A.T. program.

CIED5211 Reading Across the Curriculum Practicum (FA, SP, SU) (Formerly SEED 5051) Practicum in which students apply theory to practice. Emphasis placed on actual application of theory to their own reading skills, methods for transferring the knowledge of theory to classroom application in their curricular area(s), and curriculum development. Prerequisite: admission to the M.A.T. program.

CIED5221 The Moral Dimensions of Teaching (FA, SP, SU) (Formerly SEED 5061) Explores the moral aspects of the profession of teaching. In particular this course teaches about the value-ladenness of teaching and presents methods to help prospective teachers adequately address moral and value issues. Prerequisite: admission to the M.A.T. program.

CIED5232 Interdisciplinary Studies (FA, SP, SU) (Formerly SEED 5162) Introduction to the nature of interdisciplinary study: curricular content, course planning (topics and themes), instructional strategies, and evaluation and assessment. Prerequisite: admission to the M.A.T. program.

CIED5243 Special Methods of Instruction I (FA, SP, SU) (Formerly SEED 5073) Study of the method and materials in the special content areas. Includes philosophical, cognitive, and psychological dimensions of teaching the content area. The planning of instruction, microteaching, and the development of instructional materials are included. Prerequisite: admission to the M.A.T. program.

CIED5253 Special Methods of Instruction II (FA, SP, SU) (Formerly SEED 5173) Study of the methods and materials in the special content areas. Classroom applications of teaching strategies with analysis of teacher effectiveness in seminar settings. Prerequisite: admission to the M.A.T. program.

CIED5263 Measurement and Evaluation (FA, SP, SU) (Formerly SEED 5183) A study of measurement, testing, and evaluative procedures including types of tests, abuses of tests, test construction, scoring, analysis and interpretation, statistical methods, and alternative evaluation and assessment techniques. Prerequisite: admission to the M.A.T. program.

CIED5273 Research in Curriculum and Instruction (FA, SP, SU) (Formerly SEED 5193) An introduction to inquiry and research in curriculum and instruction. It examines the principles, strategies, and techniques of research, especially qualitative inquiry. Qualitative method in assessment and evaluation are considered. Practicum in educational research and evaluation is done as part of the class. Prerequisite: admission to the M.A.T. program.

CIED528V Secondary Cohort Teaching Internship (1-6) (FA, SP, SU) May be repeated for 6 hours.

CIED5293 Special Methods, Interdisciplinary Section (SP) The third and final part of the middle level special methods course. Provides interns with the knowledge, dispositions, and skills for developing interdisciplinary course of study in conjunction with the members of their interdisciplinary team. Prerequisite: CIED 5092 and CIED 5913 and admission to M.A.T. program.

CIED5303 Teaching the Mildly Handicapped-Elementary (FA, SP, SU) (Formerly SPED 5023) Curriculum, instructional methods and development of materials for mildly handicapped children at the elementary school level. Prerequisite: CIED 3023.

CIED5301L Classroom Management Special Education Laboratory (SU) (Formerly SPED 5021L) Supervised special education field experiences in public school settings with elementary, middle, and secondary age students. Taken concurrently with CIED 5022, Classroom Management Concepts for Teachers. Prerequisite: acceptance into special education cohort group.

CIED5311L Curriculum Design Laboratory (FA, SP) (Formerly SPED 5031L) Supervised special education experience in public school settings with elementary, middle, and secondary age students. Taken concurrently with CIED 5032, Curriculum Design Concepts for Teachers. Prerequisite: acceptance into special education cohort group.

CIED5323 Transition Planning for Persons with Disabilities (SP) (Formerly SPED 5093) Prepares students to plan, evaluate, and implement transition programs within both regular and special classrooms at the elementary, middle and secondary school levels. Prerequisite: admission to the SPED M.A.T.

CIED5333 Teaching Mildly Handicapped - Secondary (FA, SP, SU) Curriculum, instructional methods, and development of materials for mildly handicapped adolescents at the secondary school level. Prerequisite: admission to the SPED M.A.T.

CIED5343 Applied Classroom Management (FA, SP, SU) (Formerly SPED 5053) An advanced course in managing behaviors in students with exceptionalities. Students are provided with experiences in applying theoretical bases of classroom management through identifying, assessing graphing, and analyzing behavioral data and implementing management plans. Ethical issues in classroom management are addressed. Prerequisite: CIED 5301L and CIED 5022 and acceptance into the M.A.T. program.

CIED5353 Clinical Practicum (FA, SP) (Formerly SPED 5063) Supervised clinical experiences in special education programs in public and private schools and community based settings. Clinical experiences are provided with students who have moderate/profound disabilities, students with mild disabilities, and students with serious emotional disorders. Prerequisite: acceptance into the SPED M.A.T. program.

CIED5363 Internship in Teaching (FA, SP, SU) (Formerly SPED 5073) Supervised teaching experiences in special education programs in public and private schools and community-based settings. Students will apply the theory and methodology previously learned in coursework and field profound disabilities, students with mild disabilities, and students with serious emotional disorders. Prerequisite: CEID 5723 and CIED 5353 and acceptance into the SPED M.A.T. program.

CIED5373 Advanced Methods for Teaching Students with Exceptionalities (FA) (Formerly SPED 5083) An advanced course in designing and implementing individualized programs for students with exceptionalities. Students are provided practical experience in applying learning theories and instructional methodologies developed and observed in pervious coursework. Prerequisite: acceptance into the SPED M.A.T. program.

CIED538V Special Education Cohort Teaching Internship (1-6) (FA, SP) Two semesters of 3 hours each. May be repeated for 6 hours.

CIED5403 Early Childhood Education: Rationale and Curriculum (IR) (Formerly ELED 4313) Rationale and curriculum of an early childhood education program, with special attention given curricular frameworks and professional organization policies.

CIED5413 Early Childhood Education: Methods and Materials (IR) (Formerly ELED 4323) An interdisciplinary approach to methods and materials used in early childhood education with emphasis on developmental literacy. Prerequisite: PSYC 3093 and CIED 5403.

CIED5423 Curriculum Reconstruction (FA, SP, SU) (Formerly ELED 5433) Changes in curriculum development and design as related to changing social/economic/political arenas. Theories of curriculum development, implementation and evaluation are researched.

CIED5433 Children's Literature (FA, SP, SU) (Formerly ELED 5453) Issues and trends in children's literature. Contemporary works are evaluated and reviewed based on changing social political conditions. Multicultural approach to children's literature is emphasized. Prerequisite: undergraduate course in children's literature.

CIED5443 Early Childhood Education: History, Purposes, and Programs (IR) (Formerly ELED 5343) An advanced course in early childhood education. Pioneers, theorists and early program in ECE are reviewed, compared and contrasted with contemporary offerings in ECE.

CIED5453 Evaluation Techniques (IR) (Formerly ELED 5473) Evaluation of learning using traditional means of assessment as well as alternative or authentic assessment techniques.

CIED5463 Child Behavior and Development (FA, SP, SU) (Formerly ELED 5363) Advanced study of research and theory. A thematic and case study approach to child behavior and and development which investigates the child's behavior and needs in the school setting. Emphasis on current research. Prerequisite: PSYC 3093.

CIED5473 Advanced Course in Children's Literature (IR) (Formerly ELED 5493) Compares and contrast contemporary award winning books with children's classics, analyzing elements of style. Focuses on use of rhetorical devices. Prerequisite: CIED 3103 and CIED 5433.

CIED5483 Teaching Mathematics (IR) (Formerly ELED 5513) Content, methods, and materials for teaching multiple strands of elementary school mathematics. Emphasis on principles and procedures of a conceptual and integrated approach to learning mathematics. Prerequisite: undergrad coursework in teaching elementary or early childhood mathematics.

CIED5493 Teaching Social Studies (IR) (Formerly ELED 5543) Purpose, content, psychology, materials, and methods for teaching the social sciences in the elementary school. Emphasis on principles and procedures for combining the social studies with other areas of the curriculum in broad unit instruction. Prerequisite: Undergraduate course-

work in teaching elementary or early childhood social studies.

CIED5503 Teaching Science (FA, SP, SU) (Formerly ELED 5553) The influence of science on the community, on the home, and the child. Use of science in the living and learning of the child at school.

CIED5513 Studies Affecting Elementary Education (FA, SP, SU) (Formerly ELED 5563) Examination and critical evaluation of investigations and research which have special significance for elementary education.

CIED5523 Writing for Children (FA, SP, SU) (Formerly ELED 5573) Writing stories, poetry, articles, features and/or books for children and young adults. Revising, editing, and preparing manuscripts for publication. Prerequisite: CIED 5433.

CIED5533 Teaching Language Arts (FA, SP, SU) (Formerly ELED 5593) The place of the language arts in the elementary curriculum. Exploration of materials, content, practices, and methods, used in reading, speaking, listening, and writing experiences.

CIED5553 Problems in Elementary Education (FA, SP, SU) (Formerly ELED 5633) Problems, trends, and issues related to the elementary school.

CIED5563 Guiding Learning Activities (IR) (Formerly ELED 5673) Exploration of models of curriculum, instruction, and assessment that promote student learning at the elementary school level. Development and implementation of various instructional strategies.

CIED5573 Teaching Reading (FA, SP, SU) (Formerly RDNG 5443) Teaching of reading to children; techniques, research, and modern practices.

CIED5583 Correlates of Reading Process (FA, SP, SU) (Formerly RDNG 5483) The developmental program is emphasized through a student of the reading process. Learning theory and research are related to reading instruction and materials through the development and application of evaluative criteria based on an understanding of reading process. Prerequisite: CIED 5573.

CIED5593 Corrective Reading in the Classroom (FA, SP, SU) (Formerly RDNG 5533) Emphasizes the diagnosis and remediation of reading difficulties in the classroom setting. Students are expected to become familiar with cause of reading failure, diagnosis instruments and procedures, principles of report writing, and corrective instructional methods and materials. The course is open to graduate students with instructor's consent. Enrollment limited to 20. Prerequisite: CIED 5793.

CIED5603 Innovations in School Education (FA, SP, SU) (Formerly SEED 5033) An examination of the change process in education with emphasis on those elements which support or hinder change in the schools, and the detailed study of schools innovations on national, state, and local levels.

CIED5613 Contemporary Issues in Education (FA, SP, SU) (Formerly SEED 5053) A study of issues pertaining to the goals, objectives, organization, and curriculum of the schools with an analysis of the teacher's role in dealing with current concerns in these areas.

CIED5623 The School Curriculum (FA, SP, SU) (Formerly SEED 5113) General principles and techniques of selecting and organizing curricular materials.

CIED5633 Analysis of Instruction (FA, SP, SU) (Formerly SEED 5123) A survey of the research and literature related to the systematic study of the field of teaching. An examination of the definitions of teaching and the knowledge base on which teaching is predicated. A study of the implications of the research of effective teaching and the key curricular and instructional issues.

CIED5653 Methods of Middle School Instruction (FA, SP, SU) (Formerly SEED 5243) Philosophy, rationale, and instructional practices of middle school instruction. Prerequisite: graduate standing.

CIED5663 Evaluation of Instruction (FA, SP, SU) (Formerly SEED 5313) Examination of methods and philosophies of evaluation. Consideration will be given to grading, techniques of grading, and construction of behavioral objectives and test items.

CIED567V Teaching Foreign Cultures in Social Studies Curricula (1-6) (FA, SP, SU) (Formerly SEED 570) Extensive examination of foreign cultures (West Europe, USSR, China, Latin America) and methods of teaching about them in secondary school social studies. (Same as PLSC 560)

CIED5683 Adolescent Literature (FA, SP, SU) (Formerly CIED 5003) Content course in adolescent literature including selection, reading, evaluation, and psychological basis of classic and contemporary works. Prerequisite: PSYC 3093 or equivalent.

CIED5696 Interdisciplinary Instruction K-4 (FA, SP, SU) (Formerly CIED 5666) Stresses the learning of science, mathematics, and reading in grades K-4 as active, integrated constructive processes involving experimentation, investigation, communication, reasoning, and problem solving. Builds foundations in content to show connections and relevant applications of these disciplines.

CIED5723 Nature and Needs of Persons with Mild Disabilities (FA, SP, SU) (Formerly SPED 5013) Educational, psychological, and social characteristics of individuals who are mildly handicapped with emphasis on educational modifications. Prerequisite: CIED 3023.

CIED5753 Nature and Needs of Persons with Serious Emotional Disorders (IR) (Formerly SPED 5203) A survey of the educational, psychological, and social characteristics of individuals with serious emotional disorders. Four major categories of behaviors (personality disorders, pervasive developmental disorders, and learning/behavior disorders) are reviewed in relationship to identification, assessment, and program intervention within the public school setting. Prerequisite: CIED 3023.

CIED576V Teaching Severely Handicapped Children (1-6) (IR) (Formerly SPED 521) Methods and materials for teaching students with severe handicaps, including severe mental retardation, serious emotional disturbance, and severe physical disabilities.

CIED5793 Corrective Reading Practicum (FA, SP, SU) (Formerly RDNG 5583) Laboratory experience in which students diagnose reading difficulties and practice remedial measures under the direct supervision of the instructor. Emphasis is given to continuous diagnosis and to the use of commercially produced materials and trade books in remediation. Enrollment limited to 15. Prerequisite: CIED 5593.

CIED5803 Nature and Needs of the Gifted and Talented (FA) (Formerly SPED 5403) Educational, psychological, and social characteristics of gifted and talented children. Prerequisite: graduate standing.

CIED5813 Curriculum Development in Gifted & Talented (SP) (Formerly SPED 5413) Examines the various models for developing curriculum and providing services for students identified for gifted programs. Prerequisite: CIED 5803.

CIED5823 Gifted and Talented (Structured) Practicum (SU) (Formerly SPED 5433) Supervised field experience in gifted education programs, schools, institutions, and other facilities for gifted/talented children. Prerequisite: CIED 5813.

CIED5833 Gifted and Talented (Flex) Practicum (FA) (Formerly SPED 5443) Students design and implement an individualized practicum experience (Type III Renzulli) that provides the opportunity to refine and enhance personal attitudes, beliefs, and skills in gifted education. Prerequisite: CIED 5823.

CIED5873 Assessment of Exceptional Students (FA) (Formerly SPED 5913) Methods and techniques of assessment of children in all areas of exceptionality with emphasis on diagnosis and classification.

CIED5883 Research in Special Education (IR) (Formerly SPED 5923) Review of research in special education including all areas of exceptionality with emphasis on diagnosis and classification.

CIED5893 Organization, Administration and Supervision of Special Education (IR) (Formerly SPED 5933) Procedures, responsiblities and problems of organization, administration, and supervision of special education programs.

CIED5903 Adaptive Instruction (SU) (Formerly CIED 5063) An examination of the general principles and techniques for adapting instruction to meet the needs of various learning styles and learning modalities, especially those with exceptional strengths.

CIED5913 Professionalization of Teaching (FA, SP, SU) (Formerly CIED 5253) Explores the need for reconceptualizing the role and responsibility of career professional teachers and concomitant implications for school improvement and educational change. Reflection and inquiry processes are integrated with course content to increase congruence between theoretical bases and professional barriers. Prerequisite: experience as a practicing educator.

CIED5923 Second Language Acquisition (FA, SP, SU) (Formerly CIED 5303) This is the first of four courses leading to Arkansas approved endorsement for teaching English as a Second Language (ESL). The course gives an introduction to the basics in research and learning theories involved in the acquisition of second languages and cultures, particularly ESL.

CIED5933 Second Language Methodologies (FA, SP, SU) (Formerly CIED 5313) This is the second in a series of four courses leading to Arkansas approved endorsement for teaching English as a Second Language (ESL). The course introduces the basics in approaches, methodologies, techniques, and strategies for teaching second languages, especially ESL. Prerequisite: CIED 5923.

CIED5943 Teaching People of Other Cultures (FA, SP, SU) (Formerly CIED 5323) This is the third in a series of four courses leading to Arkansas approved endorsement for teaching English as a Second Language (ESL). The course focuses on cultural awareness, understanding cultural differences, and instruction methods for integrating second cultures, especially the culture of the United States, into the curriculum. Prerequisite: CIED 5923.

CIED5953 Second Language Assessment (FA, SP, SU) (Formerly CIED 5333) This is the fourth in a series of four courses leading to Arkansas approved endorsement for teaching English as a Second Language (ESL). The course introduces basic methods for testing, assessing and evaluating second language, especially ESL, learners for placement purposes and academic performance. Prerequisite: CIED 5923 and CIED 5933 and CIED 5943.

CIED5963 Reading in Secondary Schools (FA, SP, SU) (Formerly RDNG 5043) Methods and materials of teaching reading in secondary schools with emphasis on remedial and developmental reading problems of students.

CIED599V Special Topics (1-18)

CIED6013 Curriculum Development (FA) (Formerly CIED 6153) Principles and concepts of curriculum and development, with an analysis of the factors basic to planning, the aims of the educational program, the organization of the curriculum, curriculum models, and elements desirable in the curriculum of schools.

CIED6023 Instructional Theory (IR) (Formerly CIED 6203) Study of psychological, anthropological, sociological, and educational theories of instruction and learning. Emphasis is placed on synthesizing a broad range of existing and emerging perspectives in understanding individual, interactional and contextual phenomena of instruction and learning. Prerequisite: EDFD 5373.

CIED6033 Content Specific Pedagogy (IR) (Formerly CIED 6303) This course explores the relationship between the content of courses taught in schools and the pedagogical principles that the teaching of the content requires. Students will discuss and synthesize findings from the research literature and from personal investigation. Prerequisite: CIED 6203.

CIED6043 Analysis of Teacher Education (IR) (Formerly CIED 6403) This course examines issues, problems, trends, and research associated with teacher education programs in early childhood, elementary, special education, and secondary education. Prerequisite: CIED 6203.

CIED6073 Seminar in Developing Creativity (IR) (Formerly CIED 6983) A study of the facets of creativity, how they can be applied to be used in one's everyday life, how they can be applied in all classrooms, and how to encourage the development of these in students.

CIED6083 Piaget's Theory and Instruction (SP, Odd years) Piaget's theory has been applied to classroom instruction in various settings. This course will investigate the theory in depth, study classroom application, and students will devise application. Prerequisite: CIED 6023.

CIED6103 Early Childhood Education Curriculum (FA, SP, SU) (Formerly ELED 6103) Advanced course in curriculum design and evaluation for early childhood education programs. Prerequisite: CIED 5443.

CIED6203 Individual Diagnosis and Remediation in Reading (FA, SP, SU) (Formerly RDNG 6113) Specialized techniques and material for diagnosis and remediation of reading disability. Rationale of the clinical setting is developed through emphasis on an interdisciplinary approach to diagnosis, program planning, and remediation. Enrollment limited to 20. Advanced graduate students only. Prerequisite: CIED 5583 and CIED 5593.

CIED6213 Remedial Reading Practicum (FA, SP, SU) (Formerly RDNG 6123) Each student practices diagnostic and remedial teaching skills by tutoring a child under the supervision of the instructor. Prerequisite: CIED 6203.

CIED6223 Investigations in Reading (FA, SP, SU) (Formerly RDNG 6133) Research techniques and findings in reading are extensively reviewed by the student. Student is expected to culminate activity in this course by identifying a research problem in the field of reading for possible further study. Prerequisite: reading certification.

CIED6233 Organization of Reading Programs (FA, SP, SU) (Formerly RDNG 6143) Study of the problem of organizing the classroom, individual school, and school system, for the improvement of reading instruction. Emphasis is given to the development of program organization rationale based on requirements of the teaching-learning setting.

CIED6313 School Curriculum Planning (FA, SP, SU) (Formerly SEED 6323) The organization and implementation of programs in schools for the purposes of curriculum development, revision and accreditation. Prerequisite: CIED 5623.

CIED6323 Science Seminar (FA, SP, SU) (Formerly SEED 6983) Broaden the perspective of science educators who have the necessary background, knowledge,

and skills to become effective professionals in higher education. Emphasis is on current trends in secondary science, issues developing in secondary science, research in science education, philosophy, and history of science education.

CIED6403 Emerging Issues in Special Education (IR) (Formerly SPED 6013) A study in the complex issues with which professionals in the field of special education must be familiar and prepared to address.

CIED641V Special Topics in Special Education (1-6) (IR) (Formerly SPED 602) Discussion and advanced studies on select topics in special education. Specific focus on recent developments.

CIED6423 Philosophical and Sociological Bases of Special Education (IR) (Formerly SPED 6033) A study of the basic philosophical and sociological bases for current practices in special education. education.

CIED6433 Legal Aspects of Special Education (IR) (Formerly SPED 6123) A study of litigation and legislation in special education, federal and state laws and court cases, and due process hearings.

CIED6443 Advanced Research in Special Education (IR) (Formerly SPED 6923) A study in the planning, implementation, and evaluation of research in special education.

CIED6503 Effective Teaching: Concepts and Processes (FA, SP, SU) This course is designed to assist students in examining a variety of effective teaching practices and conditions found in classrooms and in acquiring knowledge, concepts, and ideas about ways to effectively influence the interests, learning and development of students. Prerequisite: admission to the Ph.D. program.

CIED660V Workshop (1-18) (FA, SP, SU)

CIED6603 Multicultural Education (FA, SP, SU) This course is designed to trace, examine, discuss, and promote understanding of issues related to multicultural education, different views of multicultural education, and the impact of multicultural education upon the schooling process. Emphasis is upon schooling experiences of culturally diverse students, language issues, gender issues, and evaluation issues. Prerequisite: admission to the Ph.D. program.

CIED674V Internship (1-6) (FA, SP, SU)

CIED694V Special Topics (1-6) (FA, SP, SU) (Formerly CIED 602) Discussion and advanced studies on selected topics in curriculum and instruction. Specific focus on recent developments.

CIED695V Independent Study (1-6) (FA, SP, SU) (Formerly CIED 605)

CIED699V Doctoral Seminar (1-3) (FA, SP, SU)

CIED700V Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy

DEPARTMENT OF DRAMA (DRAM)

D. Andrew Gibbs
Department Chair
619 Kimpel Hall
575-2953

- Professors Brusstar, Gibbs, Gross
- Associate Professors Herzberg, Riha
- Assistant Professors Dwyer, Gorden, Martin
- Instructors Leftwich, Tyndall

Degrees Conferred: M.A., M.F.A. (DRAM)

The graduate program in drama provides a general course of advanced studies within the areas of acting, directing, theory and criticism, design, and history. It aims to develop in students a high level of understanding and competence in theatre and drama. Graduates of the program are prepared to move into a variety of occupations or to proceed to doctoral studies or advanced conservatory training in performance and design.

Prerequisites to Degree Programs: A student entering graduate studies in the Department of Drama should have a minimum of 24 semester hours in undergraduate drama/theatre credit. In the event a student does not satisfy this requirement, the student and an adviser will assess the student's needs and establish a plan of study which will prepare the student for advanced degree work. Before being granted full admission, the student must take the Graduate Record Examination. The test should be taken prior to the beginning of graduate studies or, if this is not possible, during the first term of residency.

Requirements for the Master of Arts Degree:

Thesis Option: 24 semester hours in graduate-level course work including the following: Research Techniques in Drama, Dramatic Theory and Criticism, History of the Theatre I, History of the Theatre II, and History of the Theatre III. Additional hours may be selected from within the Department of Drama or, with the consent of the student's major adviser, from courses in a cognate field of study outside the Department of Drama. A thesis (6 semester hours credit) must be a written work approved by an examining committee.

Non-Thesis Option: 30 semester hours in graduate-level course work including the following: Research Techniques in Drama, Dramatic Theory and Criticism, History of the Theatre I, History of the Theatre II, and History of the Theatre III, plus at least six additional semester hours in Drama Department courses. The remaining 9 semester hours may be taken within the Department of Drama or, with consent of the student's adviser, in a cognate field of study outside the Department. Students electing the non-thesis option will demonstrate a high level of proficiency in research and writing by submitting to the examining committee two major research papers. One of these papers will be theoretical or critical and one will be historical. The candidate must also demonstrate proficiency in a major production or research area as determined mutually by student and his or her adviser.

The Comprehensive Examination: Students electing either the thesis or non-thesis option will demonstrate a thorough knowledge and understanding of drama and theatre by passing a written and oral comprehensive examination at the end of their course of studies.

Please note that any departmental requirement may be waived by the faculty upon receipt of evidence of equivalent learning or skill resulting from earlier education or experience.

Admission Procedures: In addition to complying with all Graduate School admission procedures, prospective students should submit to the Department of Drama a statement of goals and an example of research and writing carried out at the undergraduate level.

Requirements for the Master of Fine Arts Degree: The Master of Fine Arts Degree in Drama is considered to be the terminal degree in the creative and performance aspects of Drama. It is awarded in recognition of professional-level achievement in drama as evidenced by successful fulfillment of a prescribed series of creative and academic requirements.

Admission procedures: In addition to meeting the prerequisite requirements described above, all M.F.A. degree applicants will present an audition and/or portfolio for assessment and evaluation prior to consideration for acceptance.

Degree requirements: The Master of Fine Arts degree requires 60 hours of approved graduate-level coursework that is focused in one of three study tracks: **Performance** (Acting and Directing), **Playwriting** or **Design.** Specific course requirements and related production requirements are determined in conference with the particular track adviser. All students will produce a thesis (6 hours credit) prior to graduation. This thesis will take the form of a performance, design or playwriting project with appropriate written research and documentation to support it. Both the proposed thesis project and the final product shall be subject to review and approval by the student's thesis committee.

Each student will be reviewed annually. Departmental faculty will determine whether sufficient progress has been made to warrant continuation into the subsequent year of study and eventual graduation.

A final examination will be administered to all graduating MFA students. This examination will allow students to demonstrate their knowledge and understanding of theatre at a level appropriate to those who have reached the end of their particular course of studies.

Up to 18 hours of credit may be waived for those students entering the M.F.A. program and already holding the M.A. degree in Drama. However, a minimum of 42 hours of graduate-level courses and four (4) regular semesters must be completed on the Fayetteville campus.

Departmental requirements may be waived by the faculty in Drama only upon receipt of evidence of equivalent learning or skill resulting from earlier education or experience. Students not holding a Bachelor's degree in Drama may be required to take supplemental coursework and/or demonstrate proficiency in the creative areas of Drama.

COURSES: DRAM (DRAM)

DRAM406V Playwriting (1-3) (FA) A workshop course for students who wish to attempt original work in the dramatic form. (Same as ENGL 406) May be repeated for 9 hours. Prerequisite: junior standing.

DRAM4533 Stage Lighting II (FA) Intensive study in the aesthetics and application of stage lighting design, with emphasis on specific production situations. Integration of theatrical lighting techniques with dance and music, will be stressed along with indepth study of lighting facilities and equipment. Practical application provided through departmental productions. Prerequisite: DRAM 3733 and senior standing or graduate standing.

DRAM4603 Acting II (SP) Advanced theories and techniques of acting. Prerequisite: DRAM 1223 and DRAM 2653.

DRAM4653 Scene Design I (SP, Odd years) Theory and practice in the art of scenic design, including historical and contemporary styles and procedures. Practical experience gained through work on departmental productions. Prerequisite: DRAM 1333.

DRAM4663 Theatre Planning (IR) A study of significant theatre buildings, modern and historical, and their relationship to contemporary theatre planning. Practical application of theory through design problems and evaluation. Prerequisite: DRAM 4653.

DRAM4673 Theatre Management (FA) Comprehensive study of arts management including personnel, budget audience analysis, fund raising, promotion, operations and organization for professional, academic and community theatre and related performance areas. Practical application through actual production experience in the University Theatre. Prerequisite: junior-level drama major.

DRAM4773 Acting Shakespeare (FA, Even years) Work on the special techniques required for performance of the plays of special techniques required for performance of the plays of Shakespeare and his contemporaries. The cultural and theatrical context required for understanding the scripts. Special attention to the speaking of blank verse. Prerequisite: DRAM 4603.

DRAM478V Theatre Workshop (1-6) (SU) Production of plays for public performance by all members of the workshop. Mornings are spent in instruction and laboratory work preparing sets, lighting, costumes, and properties. Afternoons are spent in instruction in acting and directing, rehearsal of plays in production. Special problems for graduate credit. Prerequisite: junior standing.

DRAM4823 Theatre Graphics and Technology (FA, Even years) An advanced study in theatre drafting, drawing and rendering techniques, and model making skills. Prerequisite: DRAM 1223 and DRAM 1333.

DRAM4833 Scene Painting (SP) A studio class in painting techniques for the theatre. Problems in color, textures, styles, and execution. Prerequisite: DRAM 1333.

DRAM492V Internship (1-12) (IR) Supervised practice in the various arts and crafts of the theatre (e.g., full design responsibility for a box office management; actor apprenticeship in a professional company). Available only to those who have exhausted the regular curricular possibilities in the area of specialization. May be repeated for 12 hours.

DRAM4953 Theatre Study in Britain (FA, SP, SU) Study of the components of stage production through attending and critiquing a wide variety of classical, modern, and avant garde theatre productions in England; includes tours of London and historical British sites and seminars with British theatre artists.

DRAM5113 Scene Design II (SP) Major styles and trends in scene design in relation to periods of dramatic literature. Problems in period and contemporary scene design. Prerequisite: DRAM 4653.

DRAM5123 Theatrical Design Rendering Techniques (FA, SP, SU) Investigation of drawing and painting methods and materials useful to theatrical designers. Integration of graphic communication with overall production conceptualization will be explored through examination of various theatre styles and periods.

DRAM5133 Scene Design III (FA, SP, SU) Work in line, color, and composition using historical conventions as the basis for contemporary theatrical scenic statements. Prerequisite: graduate standing.

DRAM5143 History of Decor for the Stage (FA, SP, SU) An overview of architectural decoration and its application to theatrical design from the Predynastic Period (4400-3200 B.C.) through the Art Deco period with references to contemporary decor. Prerequisite: graduate standing.

DRAM5213 Costume Design (FA, SP, SU) Advanced study of the art and practice of stage costume design. Emphasis on the expression of character through costume. Development of rendering and research skills. Portfolio development.

DRAM5223 Costume Design II (FA, SP, SU) Practical survey of historical costumes and the application of costume history to costume design for the theatre. Exploration of silhouettes, construction details, fabrics and accessories. Costume design and rendering emphasized. Prerequisite: DRAM 5213.

DRAM5233 Costume Design III (FA, SP, SU) Advanced study of costume design including the areas of film, dance, and opera. Exploration of advanced rendering techniques and stylization. Development of portfolio and resume. Prerequisite: DRAM 5723.

DRAM5243 Costume Technology I (FA, SP, SU) A series of projects focusing on methods of costume construction, pattern drafting techniques, millinery, mask making and fabric modification. Other topics may be included as determined by student needs.

DRAM5253 Costume Technology II (FA, SP, SU) Advanced study in methods of costume construction and pattern making techniques with emphasis on tailoring, draping, corsetry and costumes crafts as determined by student needs.

DRAM5263 Costume Shop Management (FA, SP, SU) Comprehensive study of costume shop management including physical space, equipment, personnel, budget and time management techniques. Practical application through actual production experience in the University Theatre.

DRAM5333 Lighting III (FA, SP, SU) Advanced study of design, technology and production development collaboration involved in lighting at the professional level. Theatre, screen and architectural venues will be examined. Dance, musical theatre, legitimate drama and related lighting situations will be explored through class projects and laboratory exercises. Prerequisite: graduate standing.

DRAM5353 Stage Lighting Technology (FA, SP, SU) The thorough examination of the technology of equipment that supports the art of stage lighting design: theory, operating principles and specification of lamps, fixtures, control systems and special effect hardware will be explored. Prerequisite: graduate standing.

DRAM5403 Acting/Directing Theories (FA, SP, SU) Examination of the major forms of acting and directing techniques and theories. Practical application through analysis and scene work, with students functioning as both director and actor throughout the course. Prerequisite: graduate standing.

DRAM5413 Graduate Acting Principles (FA, SP, SU) An intensive study and practical application of acting techniques. Emphasizes the integration of the physical, emotional, and intellectual life of the character through work on monologues, scenes and exercises. Prerequisite: graduate standing.

DRAM5432 Graduate Stage Speech (FA, SP, SU) Training in skills of stage speech including voice production, resonance, articulation, facial structure, physical and vocal energy states and characterization. Standard American and selected European dialects. May be repeated for 4 hours. Prerequisite: graduate standing.

DRAM5443 Graduate Acting: Period Styles (SP) Acting in relation to periods of dramatic literature and cultural influences. Prerequisite: DRAM 4603 and graduate standing.

DRAM5453 Musical Theatre Performance (FA, SP, SU) Theory and techniques of performing a singing role for the theatre. Integrates acting and vocal techniques and examines the relationship between score and text. Prerequisite: graduate standing.

DRAM5463 Audition Techniques (FA, SP, SU) A thorough study and practical application of audition skills and techniques. This course will equip the student with prepared audition pieces and experience in cold reading, on-camera work, and improvisation. The course also explores the practical needs of the actor; from how to get an audition to how to prepare a resume. Prerequisite: graduate standing.

DRAM5473 Graduate Acting: Shakespeare (FA, SP, SU) Analysis of Shakespeare for performance; work on the special techniques required for performance of the plays of Shakespeare and his contemporaries; including cultural and theatrical contexts required for understanding the scripts. Prerequisite: graduate standing.

DRAM5503 Research Techniques in Drama (FA) basic techniques of research and study in the fields of Drama and Theatre with consideration of the necessary interplay of intellectual and intuitive skills in mature artistry. Practice in the logical, semantic, and evidential work of scholarship and in the various research methodologies.

DRAM5513 Graduate Playwriting: Realism (FA, SP, SU) Advanced theory and technique in playwriting emphasizing the realistic mode. Explorations into the manner of expression, plotting the action, and revealing multiple levels of meaning. May be repeated for 6 hours.

DRAM5523 Graduate Playwriting: Non-Realism (FA, SP, SU) Advanced theory and technique in playwriting emphasizing non-traditional playwriting styles such as Expressionism, Surrealism, Epic Theatre and the American Musical. Prerequisite: graduate standing.

DRAM5533 Graduate Playwriting: Special Projects (FA, SP, SU) Advanced study and practice in the area of playwriting. the area of concentration will be determined by the student's specific writing project(s). May be repeated for 6 hours. Prerequisite: graduate standing.

DRAM558V New Script Ensemble (1-3) (FA, SP, SU) An interdisciplinary course for designers, actors, directors, and playwrights. An exploration of techniques and strategies for approaching the new script and realizing the distinctive elements pertinent to developing the new work. Prerequisite: graduate standing.

DRAM5613 Graduate Directing: Realism (FA, SP, SU) (First Offered Fall 1999, Formerly DRAM 5614) Theory and technique of directing realistic drama: script analysis; spatial considerations of composition and picturization; development in production of the Aristotelian concepts of plot, character, thought, diction, music (sound), and spectacle. Prerequisite: graduate standing.

DRAM562V Seminar in Dramatic Art (1-9) (FA, SP, SU) Research, discussion and projects focusing on a variety of topics including theatre management, advanced acting methods, and specialized periods in dramatic literature. Prerequisite: senior or graduate standing.

DRAM5633 Graduate Directing: Non-Realism (FA, SP, SU) Theory and techniques of directing in non-realistic modes. Scene study in the areas of Classical Drama, Expressionism, Epic Theatre, Epic Realism and contemporary staging methods. Prerequisite: graduate standing.

DRAM5653 Directing II (FA, SP) Advanced techniques of stage direction. Prerequisite: DRAM 3653 and graduate standing.

DRAM5723 History of the Theatre I (FA) A comprehensive study of the theatre in different cultures and ages, as an institution, as an art, and as a vision of life.

DRAM5733 History of the Theatre II (SP) A continuation of DRAM 5723.

DRAM5753 History of the Theatre III (SP) An examination of history and theory of modern theatrical styles. Prerequisite: senior or graduate standing.

DRAM5763 Dramatic Criticism (FA) Analysis of critical theories from Aristotle to the present; interrelationships of theatre disciplines as well as the influence of the church, state, and press on dramatic criticism. Prerequisite: senior or graduate standing.

DRAM581V Theatre Production III (1-3) (FA, SP, SU) Participation in the process of production for the University Theatre mainstage at a supervisory level. Areas of involvement may include scenery, lighting, sound, make-up, marketing, etc. May be repeated for 6 hours.

DRAM590V Independent Study (1-3) (FA, SP, SU) Individually designed and conducted programs of reading and reporting under guidance of a faculty member.

DRAM591V Special Topics (1-3) (FA, SP, SU) Classes not listed in the regular curriculum, offered on demand on the basis of student needs and changes within the profession. May be repeated.

DRAM592V Internship (1-12) (IR) Supervised practice in the various arts and crafts of the theatre (e.g. full design responsibility for a production; box office management; actor apprenticeship in a professional company).

DRAM600V Master's Thesis (1-6) (FA, SP) Prerequisite: graduate standing.

DEPARTMENT OF ECONOMICS (ECON)

(See Graduate School of Business, page 38).

COLLEGE OF EDUCATION AND HEALTH PROFESSIONS (EDUC)

(See Graduate Faculty in Education

Degrees Conferred: Ed.S., Ed.D. (EDUC)

The Educational Specialist degree is undifferentiated but has seven areas of specializa-

tion: adult education, counselor education, educational administration, elementary education, higher education, secondary education, and vocational education. For requirements concerning the Educational Specialist see page 25.

The Doctor of Education degree is undifferentiated but has five areas of specialization: adult education, educational administration, recreation, higher education, and vocational education. General requirements concerning the degree of Doctor of Education are found on page 25. Additional details relating to these programs may be found in program area sections which follow.

The University of Arkansas, Fayetteville, is accredited by the National Council for Accreditation of Teacher Education to offer both undergraduate and graduate programs through the doctorate for the preparation of elementary and secondary school teachers and school service personnel including administrators. The College of Education and Health Professions is also a member of the American Association of Colleges for Teacher Education, and the Holmes Group.

EDUCATIONAL ADMINISTRATION (EDAD)

Christopher J. Lucas
Department Head of Educational Leadership, Counseling and Foundations
234 Graduate Education Building
575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Associate Professors Elliott, Murry • Assistant Professors Holt, Hughes, Noggle, Smith

Degrees Conferred:
M.Ed. (EDAD)
Ed.S., Ed.D. (EDUC)

Areas of Concentration: Graduate programs in Educational Administration are designed to prepare qualified persons for a variety of leadership roles. Areas of concentration include: (1) principalships and other school-site administrative and supervisory positions; (2) superintendents and other central administrative personnel; (3) federal and state governmental positions in education; and (4) the educational administration professoriatePrerequisites for acceptance to the program: In addition to meeting University requirements for admission to the Graduate School, all candidates seeking admission to any educational administration program must complete program application procedures, which include submission of proof of a currently valid teaching certificate and three supporting letters of recommendation. All educational specialist and doctoral applicants must submit a Miller Analogies or Graduate Record Examination score, an autobiographical sketch and writing sample, and evidence of a minimum of two years of professional experience. An interview with members of the educational administration faculty to demonstrate compatibility of program course offerings with the applicant's goals and interests is required.

Requirements for the Master of Education Degree: The master's degree in Educational Administration is designed primarily to provide professional preparation for students seeking administrative position in elementary and secondary schools. The 33 graduate semester-hour program (or 27 hours and a thesis) includes a minimum of 18 graduate semester hours of course work in Educational Administration (including an internship), completion of 3 semester hours of adviser-approved course work each in curriculum and educational technology, and 9 semester hours of required College of Education and Health Professions core courses.

Requirements for the Educational Specialist Degree: The specialist degree program in Educational Administration is designed primarily to provide professional preparation for students involved in school-site administration and those individuals who have district-wide administrative responsibilities.

The specialist degree program requires completion of a minimum of 30 graduate semester hours with the number of actual credit hours a function of the previous educational background of each student and his or her goals. This includes fifteen (15) semester hours in educational administration core courses, six (6) semester hours of adviser-approved electives, three (3) semester hours of internship (or equivalent experience), three (3) semester hours of a specialist project, and three (3) semester hours in social foundations of education, statistics, research, or instructional technology. If not previously satisfied, all students must also complete fifteen (15) semester hours of prerequisite course work in educational administration and nine (9) semester hours of the College of Education and Health Professions common core.

Requirements for the Doctor of Education Degree: The doctor of education degree in educational administration requires the completion of a minimum of 96 graduate semester hours. Each student's program of study includes 45 hours in educational administration (18 semester hours from a common doctoral core and satisfaction of M.Ed. and Ed.S. Educational Administration core courses or their equivalent), a minimum of 9 semester hours in courses outside of Educational Administration, 9-12 hours in research and statistics, and a minimum of 18 hours of dissertation.

COURSES: EDUC ADMIN (EDAD)

EDAD5013 School Organization and Administration (IR) Analysis of structure and organization of American public education; fundamental principles of school management and administration.

EDAD5023 The School Principalship (SP, SU) Duties and responsibilities of the public school building administrator; examination and analysis of problems, issues, and current trends in the theory and practice of the principalship. (FA, SP, SU)

EDAD5053 School Law (IR) (Formerly EDAD 6153) Legal aspects of public and private schooling: federal and state legislative statues and judicial decisions, with emphasis upon Arkansas public education.

EDAD5063 School Personnel Administration and Supervision (IR) (Formerly EDAD 6123) Principles, processes, and procedures of school personnel management, supervision, and staff development.

EDAD5093 Effective Leadership in School Settings (FA, SP, SU) Strategic planning, group facilitation and decision making, organizational behavior and development, professional ethics and standards, principles of effective educational leadership.

EDAD5163 Current Educational Issues (IR) Current problems, issues, and trends facing school administrators in Arkansas and the nation.

EDAD574V Internship (1-6) (FA, SP, SU) Supervised in-school/district experiences individually designed to afford opportunities to apply previously-acquired knowledge and skills in administrative workplace settings. May be repeated for 3 hours.

EDAD599V Seminar (1-6) (IR)

EDAD600V Master's Thesis (1-6) (FA, SP, SU)

EDAD6023 School Facilities Planning and Management (IR) (Formerly EDAD 5073) School facilities planning, management, cost analysis, operations, and maintenance of the school plant.

EDAD605V Independent Study (1-3) (FA, SP, SU)

EDAD6053 School-Community Relations (IR) (Formerly EDAD 5083) Community analysis, politics and education; power groups and influences; school issues and public responses; local policy development and implementation; effective communication and public relations strategies.

EDAD6093 School Governance (IR) Analysis of the organizational and governance structures of American public education at national, state, and local levels.

EDAD6103 School Finance (IR) Principles, issues and problems of school funding formulae and fiscal allocations to school districts.

EDAD6173 School Business Management (IR) Fiscal and resource management in public schools: budgeting, insurance, purchasing, and accounting.

EDAD6333 Planning for Educational Change (IR) Overview and analysis of the change process in education.

EDAD6503 Administrative Theory & Leadership (IR) Review of seminal and current theories of effective leadership, administration, and management in school settings; designed to develop diagnostic skills necessary for successful administration of complex educational enterprises.

EDAD6523 Advanced Application of Educational Leadership (IR) A review of seminal and current works on leadership as applied to the educational setting. Provides knowledge of classic and contemporary strategies for leadership.

EDAD6533 Educational Policy (IR) Examination of the research and theory related to the evolution of local, state, and federal governance and educational policy. Emphasis given to the consideration of procedures involving policy formulation, implementation, and analysis.

EDAD6563 Educational Administration and Human Behavior (IR) Examination of research and theory related to the utilization of human resources with educational organizations.

EDAD660V Workshop (1-6) (FA, SP, SU)

EDAD674V Internship (1-6) (FA, SP, SU)

EDAD680V Educational Specialist Project (1-6) (FA, SP, SU) An original project, research project, or report required of all Ed.S. Degree candidates. Prerequisite: admission to the Ed.S. program.

EDAD690V Directed Readings in Educational Administration (1-3) (FA, SP, SU) Selected readings from classical books and authors in the field.

EDAD699V Seminar (1-6) (IR) Prerequisite: advanced graduate standing.

EDAD700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

EDUCATIONAL FOUNDATIONS (EDFD)

Christopher J. Lucas
Department Head of Educational Leadership, Counseling and Foundations
234 Graduate Education Building
575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Professor Lucas • Associate Professors Denny, Mulvenon, Swartz • Assistant Professors Ritter, Turner

Degree Conferred: (none)

The Program Area of Educational Foundations offers graduate courses common to all degree programs in education, and provides specialized studies in education which is not within the purview of other programs in the College of Education and Health Professions.

COURSES: EDUC FOUNDTN (EDFD)

EDFD5013 Research Methods in Education (FA, SP, SU) General orientation course which considers the nature of research problems in education and the techniques used by investigators in solving those problems. Prerequisite: graduate standing.

EDFD5303 Historical Foundations of Modern Education (FA, SP, SU) Critical analysis and interpretation of the historical antecedents of contemporary education, focusing upon the American experience from the colonial period to the present.

EDFD5323 Global Education (IR) Comparative and global analysis of international education with emphasis on cultural education and implications for the future.

EDFD5353 Philosophy of Education (IR) Introduction to the method and attitude essential to effective analysis and interpretation of issues and values within a society reflecting cultural, ethnic, gender, and global diversity. Prerequisite: graduate standing.

EDFD5373 Psychological Foundations of Teaching and Learning (IR) Psychological principles and research applied to classroom learning and instruction. Social, emotional, and intellectual factors relevant to topics such as readiness, motivation, discipline, and evaluation in the classroom.

EDFD5393 Applied Educational Statistics (FA, SP, SU) Basic educational statistics course for master's degree candidates. Includes concepts and operations as applied to frequency distributions, graphing techniques, measures of central tendency, measures of variation, random sampling, and interpretation of statistical results.

EDFD5473 Adolescent Psychology in Education (IR) Study of the adolescent experience with emphasis on the unique psychological problems and tasks of this developmental stage; role of educators in the facilitation of crises resolutions in social, personal and institutional conflicts. Prerequisite: graduate standing.

EDFD5573 Life-Span Human Development (FA, SP, SU) Basic principles of development throughout the human life-cycle. Physical, cognitive, social, emotional, and personality development.

EDFD599V Seminar (1-6) (IR)

EDFD605V Independent Study (1-6) (FA, SP, SU)

EDFD6213 Socio-Cultural Foundations of Educational Policies (IR) Critical examination of current educational aims within the framework of social-cultural-environmental foundations. Provides the student an opportunity for analyzing indepth implications of divergent educational aims for educational procedures and programs.

EDFD6223 Educational Futurism (IR) An integrative, holistic analysis and assessment of potential alternative futures to guide current educational practice. Prerequisite: graduate standing and history or philosophy of education.

EDFD6403 Educational Statistics and Data Processing (FA, SP, SU) Theory and application of frequency distributions, graphical methods, central tendency, variability, simple regression and correlation indexes, chi-square, sampling, and parameter estimation, and hypothesis testing. Use of the computer for the organization, reduction, and analysis of data (required of doctoral candidates). Prerequisite: EDFD 5013 or equivalent.

EDFD6413 Experimental Design in Education (FA, SP) Principles of experimental design as applied to educational situations. Special emphasis on analysis of variance techniques used in educational research. Prerequisite: EDFD 6403 or equivalent.

EDFD6423 Multiple Regression Techniques for Education (FA) Introduction to multiple regression procedures for analyzing data as applied in educational settings, including multicollearity, dummy variables, analysis of covariance, curvi-linear regression, path analysis. Prerequisite: EDFD 6403.

EDFD6453 Applied Multivariate Statistics (SP) Multivariate statistical procedures as applied to educational research settings including discriminant analysis, principal components analysis, factor analysis, canonical correlation, and cluster analysis. Emphasis on use of existing computer statistical packages. Prerequisite: EDFD 6413.

EDFD6533 Qualitative Research (FA, SP) Introduction of non-quantitative methods, including data collection through interviews, field observation, records research, internal and external validity problems in qualitative research. Prerequisite: EDFD 6403.

EDFD6543 Advanced Qualitative Research (SP) Preparation for the conduct of qualitative research, structuring, literature reviews, data collection and analysis, and reporting results. May be repeated for 6 hours. Prerequisite: EDFD 6533.

EDFD6623 Techniques of Research in Education (FA, SP, SU) Use of scientific method in attacking educational problems. Emphasis placed on the planning and design of research studies, collection of reliable and valid data, sampling methods, and analysis and interpretation of data. (Required Prerequisite: EDFD 6403.

EDFD6653 Measurement and Evaluation (IR) Fundamentals of measurement: scales, scores, norms, reliability, validity. Test and scale construction and item analysis. Standardized measures and program evaluation models in decision making. Prerequisite: EDFD 6403.

EDFD668V Practicum in Research (1-6) (FA, SP, SU) Practical experience in educational research on campus, in school systems, or in other agencies in educational program development.

EDFD699V Seminar (1-6) (IR) Prerequisite: advanced graduate standing.

DEPARTMENT OF EDUCATIONAL LEADERSHIP, COUNSELING AND FOUNDATIONS (ELCF)

Christopher J. Lucas
Department Head
234 Graduate Education Building
575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Professors Farley, Gearhart, Greenwood, Hammons, Lucas, Rye • Associate Professors Denny, Elliott, Gohn, Mulvenon, Murry, O'Dell, Roland, Swartz • Assistant Professors Gale, Holt, Hughes, Krawchuk, Noggle, Ritter, Smith, Turner • Adjunct Assistant Professors Conneely, Gordon, Stauffacher • Visiting Assistant Professor Connors • Instructors Cohen, Craig

Degrees Conferred:
M.Ed. in Educational Administration (EDAD)

(See Educational Administration)

M.Ed. in Educational Technology (ETEC)

(See Educational Technology)

M.Ed. in Higher Education (HIED)

(See Higher Education)

M.S. in Counseling (CNSL)

(See Counselor Education)

Ed.S. in Education (EDUC)

(See Counselor Education, Educational Administration, or Higher Education)

Ed.D. in Education (EDUC)

(See Educational Administration or Higher Education)

Ph.D. in Counselor Education (CNED)

(See Counselor Education)

EDUCATIONAL TECHNOLOGY (ETEC)

Christopher J. Lucas
Department Head of Educational Leadership, Counseling and Foundations
234 Graduate Education Building
575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Associate Professors O'Dell, Swartz • Assistant Professor Krawchuk • Instructors Cohen, Craig

Degree Conferred: M.Ed. (ETEC)

The Educational Technology Program prepares students for professional positions as educational technologists of education, business, government, and the health professions.

Prerequisites to Degree Programs: Applicants for the M.Ed. degree must have completed a bachelor's degree and earned a 2.70 GPA in all undergraduate course work or obtain an acceptable score on the Graduate Record Examinations or Miller Analogies Test.

Requirements for the Master of Education Degree: In addition to the general requirements of the Graduate School, students must complete a minimum of 33 hours of graduate course work to include 24 semester hours in educational technology courses and 9 hours from the College of Education and Health Professions common core are required.

COURSES: EDUC TECHNOL (ETEC)

ETEC5062 Teaching and Learning with Computer-based Technologies (SU) Provides students admitted to the Master of Arts in Teaching (M.A.T.) program with the information and experience needed to use computer-based teaching technologies to meet instructional objectives in content area classrooms. Prerequisite: ETEC 2003.

ETEC5063 Practicum in Educational Technology (IR) Provides practical experiences in educational technology. Prerequisite: graduate standing and 15 credit hours completed in educational technology.

ETEC5103 Instructional Systems Analysis and Design (IR) A basic level instructional analysis and design course. Students demonstrate knowledge of specific behavioral, social, and cognitive learning strategies that significantly influence the analysis, design, and evaluation of instructional technology products. Prerequisite: graduate standing.

ETEC5203 History & Systems of Instructional Technology (FA, SP, SU) Provides learners with a comprehensive survey of the major trends, issues, people, processes, and products that have significantly affected the evolution of the field of educational technology.

ETEC5213 Introduction to Educational Media (FA, SP, SU) Instruction in selecting, utilizing and evaluating instructional materials and equipment. Prerequisite: graduate standing.

ETEC5233 Teaching Educational Technology (FA) Provides practical experience in teaching educational courses. Prerequisite: graduate standing.

ETEC5243 Instructional Design Theory & Models (FA) A study of the instructional development process as it pertains to the design and production of instructional materials which use modern technologies. Goal analysis, objectives, evaluation, instructional strategy development, production of an educational product, and revision of the instructional materials are considered. Prerequisite: graduate standing.

ETEC5253 Information Technologies in Education (IR) An intensive examination of the role of telecommunications and distance education technologies and their implications for educational practice. Emphasis is on telecommunications, and distance education technologies in classroom environments.

ETEC5263 Grant Writing in Instructional Technology (FA, SP, SU) Students will have an opportunity to find grant funding sources, write a grant, and submit an actual grant proposal to an agency for consideration. Will survey research in instructional medial over the past 60 years and learn specific criteria for reading and evaluating research reports and articles. Will investigate current issues and topics related to research and grant writing in instructional media.

ETEC5273 Advanced Design of Educational Media (FA, SU) Instruction in the planning and local production of instructional materials. Prerequisite: ETEC 5213.

ETEC528V Field Experiences in Educational Technology (3-6) (IR) Field experience in educational technology settings. Prerequisite: graduate standing and 6 hours of graduate work in educational technology.

ETEC5293 Critical Evaluation of Educational Films (SU) A critical analysis of selected educational films with emphasis on the selection and evaluation process. Appropriate for media specialists, curriculum supervisors, librarians, administrators, classroom teachers and others involved in the purchasing, selection and/or utilization of educational films. Prerequisite: ETEC 5213 or equivalent.

ETEC5313 Principles of Visual Literacy (FA, SP, SU) Provides participants with a sense of how visual images can be employed in the teaching process. The use of black and white photography, darkroom techniques, and color slide photography are vehicles for studying the use of visual images in education.

ETEC5323 Computers as an Instructional Technology (SP) An advanced course in the creation and evaluation of computer courseware for educational purposes. Emphasis is given to instructional design principles as they relate to computer education.

ETEC5343 Assessment & Evaluation in Instructional Technology (FA, SP, SU) Provides learners with a comprehensive survey of the major assessment and evaluation techniques used in the system design and evaluation. Techniques range from needs assessment through summative evaluation.

ETEC560V Workshop (1-3) (IR) This course is designed to enhance the established educational technology curriculum by providing students with special topic content and classroom experiences under the guidance of a faculty member. May be repeated. Prerequisite: graduate standing.

ETEC574V Internship (1-6) (FA, SP, SU) A supervised field placement in educational technology that provides experience consistent with the student's professional goals and training emphasis. Internship experiences are planning and directed under the guidance of a faculty member. On-campus and on-site supervision is required. May be repeated for 6 hours. Prerequisite: graduate standing.

ETEC599V Seminar (3-6) (IR) This course is designed to enhance the established educational technology curriculum by providing students with special topic content and classroom experiences under the guidance of a faculty member. May be repeated for 6 hours. Prerequisite: graduate standing.

ETEC600V Master's Thesis (1-6) (FA, SP, SU)

ETEC605V Special Problems in Educational Technology (1-6) (FA, SP, SU) Individually designed and conducted studies of educational technology under the guidance of a faculty member. Negotiated learning contract with supervising faculty required before enrollment. On-campus supervision required. May be repeated for 6 hours. Prerequisite: graduate standing.

ETEC6223 Strategic Planning and IDT Programs (FA, SP, SU) The course offers readings and experiences intended to develop strategic planning knowledge, values, attitudes, and skills in future instructional design and technology leaders. Topics covered include strategic planning and leadership.

ETEC6253 Information Technologies in Education (IR) An intensive examination of the role of telecommunications and distance education technologies and their implications for educational practices. Emphasis is on techniques of development, utilization and evaluation of telecommunication and distance education technologies in classroom environments. Prerequisite: ETEC 5213.

ETEC6393 Issues and Trends in Instructional Design and Technology (IR) Critical challenges posed as a result of the increasing infusion of technology into the school and training environments are explored. The course prepares students to make and defend policy decisions and become conversant with current trends and issues in the field. Prerequisite: ETEC 5213.

ETEC699V Seminar (1-3) (IR) The seminar is designed to provide advanced graduate students with an opportunity to explore topics related to instructional design in educational and training environments. Prerequisite: graduate standing.

DEPARTMENT OF ELECTRICAL ENGINEERING (ELEG)

Aicha Elshabini
Department Head
3220 Bell Engineering Center
575-3005

• University Professors Brown (W.D.), Schmitt, Yeargan • Professors Ang, Balda, Elshabini, Jones, Kaupp, Naseem, Olejniczak, Schaper, Waite, Yaz • Associate Professors Brown (R.L.), Caldwell, Charlton, Gattis, Mantooth, Martin • Research Assistant Professor Barlow • Adjunct Associate Professors Andrews, Bowling, Thornton • Adjunct Assistant Professors Malshe, Parkerson, Simonson, Tao • Adjunct Professor Ulrich • Adjunct University Professor Salamo • Adjunct Research Professor Vickers

Degrees Conferred:
M.S.E.E. (ELEG)
M.S.T.C.E. (ELEG)
M.S.E., Ph.D. in Engineering (ENGR)

(See Engineering)

Requirements for Graduate Degrees: In addition to the requirements of the Graduate School and the College of Engineering, the following departmental requirements must be satisfied by candidates for advanced degrees in electrical engineering.

1. Candidates for the Master of Science degree who present a thesis are required to complete a minimum of 24 semester hours of course work and six semester hours of thesis.
2. Candidates for the Master of Science degree who do not present a thesis are required to complete a minimum of 36 semester hours of course work.
3. Course work presented for the degree of Master of Science must include ELEG 5801 and a minimum of nine (12 for non-thesis option) additional semester hours at the 5000 or 6000 level in electrical engineering. No more than six hours of ELEG 588V may be presented for degree credit.
4. Master of Science degree or its equivalent is a prerequisite for entry into a Ph.D. program in the Department of Electrical Engineering. The program of study for the Ph.D. degree must satisfy the following:
   a. If the student has completed an M.S. program which includes a thesis, a minimum of 54 hours of course work (excluding thesis credit hours) must be presented in the combined M.S. and Ph.D. programs. If the student has completed an M.S. program without a thesis, a minimum of 66 hours of course work must be presented in the combined M.S. and Ph.D. programs.
   b. A minimum of 24 hours of the course work specified in item (a) must be completed after satisfying all M.S. degree requirements and filing a Declaration of Intent which states the student's intention to become a doctoral candidate.
   c. The course work specified in item (a) must include a minimum of 27 hours of course work at the 5000 and 6000 level in electrical engineering.
   d. The course work specified in item (a) must include ELEG 6801.
   e. The doctoral program must include a minimum of 18 hours of ELEG 700V in addition to the course work specified in item (a).
   f. If the language requirement established by the graduate faculty of the College of Engineering is to be satisfied by course work in a related field, then the doctoral program must include six hours of course work for this purpose in addition to the course work specified in item (a). It is emphasized that the course work specified in items (a) and (b) represent minimums and many students' programs will include more than this minimum, particularly if the prerequisite M.S. degree is not an M.S.E.E.

degree from a recognized graduate school in the United States.

5. Attendance at both ELEG 5801 and ELEG 6801 seminar series is required of all graduate students in electrical engineering.
6. Other conditions as stipulated in departmental guidelines for master's and doctoral degrees.Candidates for the Master of Science in Telecommunications Engineering must have completed courses in Digital Signal Processing (ELEG 3133 and ELEG 3131 or equivalent), Stochastic Signal Processing (ELEG 4133 or equivalent), Electromagnetics (ELEG 3703 or equivalent). Or the candidate's committee will assign one course in each of these areas that must be completed as part of the candidate's degree program. Candidates with non-ABET accredited BS degrees must satisfy the same deficiencies as students pursuing the MSEE or MSE degrees. Further, all candidates must complete the courses: Introduction to Telecommunication (ELEG 5613), Computer Communication Networks (ELEG 5643 or CSEG 5083).

A Certificate of Achievement in Electronics Manufacturing is available for students seeking a graduate degree in an engineering discipline. (See page 77 in this catalog.).

COURSES: ELECTRL ENGR (ELEG)

ELEG4133 Stochastic Signal Processing (FA, SP, SU) Review of system analysis. Probability. Random variables. Stochastic processes. Auto correlation and power spectral density. Systems with random inputs in the time and frequency domain. Applications. (Same as MEEG 4263) Pre- or Corequisite: ELEG 3133.

ELEG4203 Semiconductor Devices (FA, SP, SU) Crystal properties and growth of semiconductors, energy bands and charge carriers in semiconductors, excess carriers in semiconductors, analysis and design of p/n junctions, analysis and design of bipolar junction transistors, analysis and design of field-effect transistors. Prerequisite: MATH 3404.

ELEG4223 Design and Fabrication of Solar Cells (FA, SP, SU) Solar insolation and its spectral distribution; p-n junction solar cells in dark and under illumination; solar cell parameters efficiency limits and losses; standard cell technology; energy accounting; design of silicon solar cells using simulation; fabrication of designed devices in the lab and their measurements.

ELEG4233 Introduction to Integrated Circuit Design (FA, SP, SU) Design and layout of large scale digital integrated circuits using NMOS and CMOS technology. Topics include MOS devices and basic circuits, integrated circuit layout and fabrication, dynamic logic, circuit design, and layout strategies for large scale NMOS and CMOS circuits. Prerequisite: ELEG 3213.

ELEG4243 Analog Integrated Circuits (FA, SP, SU) Theory and design techniques for linear and analog integrated circuits. Current mirrors, voltage to base emitter matching, active loads, compensation, level shifting, amplifier design techniques, circuit simulation using computer-assisted design programs. Prerequisite: ELEG 3223 and ELEG 4203.

ELEG4273 Electronics Manufacturing Processes (FA, SP, SU) Introduction to manufacturing processes and concurrent engineering in the electronics industry. Survey of electronics components and products and the processes of fabrication and assembly. Principles of design, productivity, quality, and economics. Emphasis on manufacturability. Lecture 2 hours, laboratory 2 hours per week. (Same as INEG 4513) Corequisite: ELEG 4270L. Prerequisite: (ELEG 3903 or ELEG 2013) and (INEG 3313 or STAT 3013).

ELEG4270L Electronics Manufacturing Processes Laboratory (FA, SP, SU) Corequisite: ELEG 4273.

ELEG4323 Switch Mode Power Conversion (FA, SP, SU) Basic switching converter topologies: buck, boost, buck-boost, Cuk, flyback, resonant; pulse-width modulation; integrated circuit controllers; switching converter design case studies; SPICE analyses of switching converters; state-space averaging and linearization; switching converter transfer functions. Prerequisite: ELEG 3223 and ELEG 3123.

ELEG4403 Control Systems (FA, SP, SU) Mathematical models of control systems. Performance criteria and stability. Zigler-Niclos, root-locus, and frequency-response design techniques. Special topics. Credit may be for only one of CSEG 4403 and ELEG 4403 or MEEG 4213. (Same as CENG 4403, MEEG 4213) Prerequisite: ELEG 3123.

ELEG4463L Control Systems Laboratory (FA, SP, SU) Experimental study of various control systems and components. The use of programmable logic controllers in the measurement of systems parameters, ladder-logic applications, process-control applications, and electro-mechanical systems. Prerequisite: ELEG 4403.

ELEG4503 Electric Power Distribution Systems (FA, SP, SU) Design considerations of electric power distribution systems, including distribution substations, primary and secondary circuits. Distribution transformer and capacitor applications, voltage regulation, and distribution system protection. Prerequisite: ELEG 3303.

ELEG4513 Power System Analysis (FA, SP, SU) Equivalent circuit representation of power transmission lines. Development of power transmission network equations including symmetrical component method for unbalanced 3-phase circuits. Introduction to the problems of load flow, fault analysis, and transient stability. Prerequisite: ELEG 3123 or ELEG 3903.

ELEG4523 Introduction to Power Electronics (FA, SP, SU) Power electronic systems, power semiconductor switches, Generic power electronic converters: line-frequency diode rectifiers, line-frequency phase-controlled rectifiers and inverters, switch-mode inverters, and zero-voltage and zero-current switching resonant inverters (e.g., resonant and actively-clamped resonant dc-link inverters). Prerequisite: ELEG 3123 and ELEG 3223.

ELEG4563L Power System Laboratory (FA, SP, SU) Computer studies of: transmission line performance, formation of positive-sequence and zero-sequence network matrices, power-flow, economic operation, 3-phase and single-phase faults and transient stability. Prerequisite: ELEG 4513.

ELEG4603 Deterministic Digital Signal Processing System Design (FA) Design of Digital Signal Processing systems with deterministic inputs. Sampling, quantisizing, oversampling, ADC trade-offs, distortion, equalizers, anti-aliasing, coherency, frequency domain design, audio and video compression. Prerequisite: ELEG 3133.

ELEG4623 Communication Systems (FA, SP, SU) Various modulation systems used in communications. AM and FM fundamentals, pulse modulation, signal to noise ratio, threshold in FM, the phase locked loop, matched filter detection, probability of error in PSK, FKS, DPSK. The effects of quantization and thermal noise in digital systems. Information theory and coding. Prerequisite: ELEG 4133.

ELEG4683 Introduction to Image Processing (FA, SP, SU) Introduction to the basic concepts of image processing; theory and applications. Covers digital methods of image restoration; reformation, extraction and analysis. (Same as CSEG 4683) Corequisite: CSEG 4680D.

ELEG4680D Introduction to Image Processing Drill (FA, SP, SU) Corequisite: ELEG 4683.

ELEG4713 Electromagnetic Transmission (FA, SP, SU) Steady state and transient response of lossless and dissipative transmission lines. Wave guides and resonators. Antennas and radiation. Prerequisite: ELEG 3703.

ELEG4933 Minicomputer Applications (FA, SP, SU) Structure, implementation, and application of minicomputer systems. Microcomputer hardware. Microprogramming. Minicomputer software technology. Design and evaluation of minicomputer systems. (Same as CSEG 4953) Corequisite: ELEG 4930D. Prerequisite: ELEG 3213 and INEG 3313.

ELEG4930D Minicomputer Applications Drill (FA, SP, SU) Corequisite: ELEG 4933.

ELEG4943 Digital Systems Design (FA, SP, SU) Number systems and codes, fundamentals of switching algebra, analysis and design of sequential switching circuits and memory elements. (Same as CSEG 4943) Prerequisite: junior standing.

ELEG4963 Field Programmable Gate Array Laboratory (FA, SP, SU) Implementation of digital logic and state machine designs with field programmable gate arrays. Emphasis is on the use of CAD tools for design and synthesis. Corequisite: ELEG 4960L.

ELEG4960L Field Programmable Gate Array Laboratory Lab (FA, SP, SU) Corequisite: ELEG 4963.

ELEG4983 Introduction to Computer Architecture (FA, SP, SU) Design of a single board computer including basic computer organization, memory subsystem design, peripheral interfacing, DMA control, interrupt control, and bus organization. (Same as CSEG 4983) Prerequisite: ELEG 3923.

ELEG5113 Stochastic Digital Signal Processing System Design (SP) Design elements and trade-offs of stochastic DSP systems. Linear prediction, adaptive filters, parametric spectral analysis, speech applications. Design examples, random signal basics, spectral decomposition, noise. Prerequisite: ELEG 3133 and ELEG 4133.

ELEG5153 Real-Time Data Acquisition Systems (FA, SP, SU) The theory and practice associated with taking measurements of the real world for use with computers. Sampling and data analysis techniques. (Same as CSEG 5053) Prerequisite: ELEG 3923.

ELEG5163 Advanced Microcontroller Design Project (FA, SP, SU) Use of development systems as an aid to microcontroller design; the student is expected to design, build, and test a microcontroller-based system to perform a specified task. Corequisite: ELEG 5160L. Prerequisite: ELEG 3923.

ELEG5160L Advanced Microcontroller Design Laboratory (FA, SP, SU) Corequisite: ELEG 5163.

ELEG5173L Digital Signal processing Laboratory (FA, SP, SU) Use of DSP integrated circuits. Lectures, demonstrations, and projects. DSP IC architectures and instruction sets. Assembly language programming. Development tools. Implementation of elementary DSP operations, difference equations, transforms, filters. Prerequisite: ELEG 4603.

ELEG5183L DSP Digital Communications Laboratory (SU) Implementation of digital communication techniques in the Texas Instruments C30 processor. AM, FM, SSB, DSB modulation; data scramblers, bit error rate, PAM, QAM; echo cancellation, full-duplex modems. Pre- or Corequisite: ELEG 4623.

ELEG5193L Advanced DSP Processors Laboratory (SP) Familiarization with, and use of, advanced DSP processors. Parallel processor configurations, timing consideration, specialized programming techniques, complex pipelines. Prerequisite: ELEG 5173L.

ELEG5213 Integrated Circuit Fabrication Technology (FA, SP, SU) Theory and techniques of integrated circuit fabrication technology; crystal growth, chemical vapor deposition, impurity diffusion, oxidation, ion implantation, photolithography and medullization. Design and analysis of device fabrication using SUPREM and SEDAN. In-process analysis techniques. Student review papers and presentations on state of the art fabrication and device technology. Prerequisite: ELEG 4203.

ELEG5233 Solid-State Electronics I (FA, SP, SU) Theoretical treatment of crystal structures and lattices, quantum and statistical mechanics, thermal properties of crystals, free-electron theory of metals and quantum theory of electrons in periodic lattices. Prerequisite: ELEG 4203 and PHYS 3614 and PHYS 3611L.

ELEG5253L Integrated Circuit Design Laboratory I (FA, SP, SU) Design and layout of large scale digital integrated circuits. Students design, check, and simulate digital integrated circuits which will be fabricated and tested in I.C. Design Laboratory II. Topics include computer-aided design, more indepth coverage of topics from ELEG 4233, and design of very large scale chips. Prerequisite: ELEG 4233 and ELEG 4203.

ELEG5263L Integrated Circuit Design Laboratory II (FA, SP, SU) Students test the I.C. chips they designed in I.C. Design Laboratory I and propose design corrections where needed. Topics include gate arrays, bipolar design, I2L, memory design, and microprocessor design. Prerequisite: ELEG 5253L.

ELEG5273 Electronic Packaging (FA, SP, SU) An introductory treatment of electronic packaging from single chip to multichip including materials, electrical design, thermal design, mechanical design, package modeling and simulation, processing considerations, reliability, and testing. Credit can not be earned for both MEEG 5273 and ELEG 5273. (Same as MEEG 5273) Prerequisite: (ELEG 3213 or ELEG 3913) and MATH 3404.

ELEG5293L Integrated Circuits Fabrication Laboratory (FA, SP, SU) Experimental studies of silicon oxidation, solid-state diffusion, photolithographical materials and techniques, bonding and encapsulation. Fabrication and testing of PN diodes, NPN transistors and MOS transistors. Prerequisite: ELEG 5213.

ELEG5313 Power Semiconductor Devices (FA, SP, SU) Carrier transport physics; breakdown phenomenon in semiconductor devices; power bipolar transistors,

thyristors, power junction field-effect transistors, power field-controlled diodes, power metal-oxide-semiconductor field-effect transistors, and power MOS-bipolar devices. Prerequisite: ELEG 4203.

ELEG5403 Systems Theory (FA, SP, SU) A unified state-space approach to continuous and discrete systems. System dynamics, local transition functions, reachability, observability, and global behavior of systems. Prerequisite: ELEG 4403.

ELEG5413 Stochastic Control Systems (FA, SP, SU) Optimal estimation and control of linear dynamic systems with uncertainties. Stochastic processes and models. Prediction, filtering, and smoothing. The Kalman filter, Wiener-Hopf equations, separation principle, and stochastic optimal control. Prerequisite: ELEG 4133.

ELEG5423 Optimal Control Systems (FA, SP, SU) Basic concepts, conditions for optimality, the minimum principle, the Hamilton Jacobi equation, structure and properties of optimal systems. Prerequisite: ELEG 4403.

ELEG5433 Digital Control Systems (FA, SP, SU) Signal processing in continuous-discrete systems. System modeling using the z-transform and state-variable techniques. Analysis and design of digital control systems. Digital redesign for continuous control. Prerequisite: ELEG 4403.

ELEG5443 Nonlinear Systems Analysis and Control (FA, SP, SU) Second-order nonlinear systems. Nonlinear differential equations. Approximate analysis methods. Lyapunov and input-output stability. Design of controllers, observers, and estimators for nonlinear systems. (Same as MATH 5443) Prerequisite: ELEG 4403 or MATH 5303.

ELEG5453 Adaptive Filtering and Control (FA, SP, SU) Models for deterministic systems. Parameter estimation. Adaptive control. Stochastic models. Stochastic state and parameter estimation. Adaptive control of stochastic systems. Prerequisite: ELEG 3143 and ELEG 4403.

ELEG5513 Electric Power Quality (FA, SP, SU) The theory and analysis of electric power quality for industrial and commercial power systems. Specific topics include: grounding, shielding, wiring considerations, instrumentation, site surveys and analysis, case studies, specification and selection of power system components, and recommended design and installation practice. Prerequisite: ELEG 3303 and MATH 3404.

ELEG5533 Power Electronics and Motor Drives (FA, SP, SU) V-1 characteristics of insulated Gate Bipolar Transistors (IGBTs) and MOS-controlled Thyristors (MCTs), design of driver and snubber circuits, induction-, permanent magnet-, and brushless dc-motor drives; and resonant inverters. Prerequisite: graduate standing or (ELEG 3223 and ELEG 3303).

ELEG5613 Introduction to Telecommunications (FA) Overview of Public and Private Telecommunication Systems; Traffic Engineering; Communications Systems Basics, Information Technology, Electromagnetics, Data Transmission" Prerequisite: ELEG Graduate Standing or ELEG 3133.

ELEG5623 Information Theory (FA, SP, SU) Continuous and discrete source and channel models, measure of information, channel capacity, noisy-channel coding theorem, coding and decoding techniques. Prerequisite: ELEG 4133 or ELEG 4623.

ELEG5633 Detection and Estimation (FA, SP, SU) Binary and multiple decisions for single and multiple observations; sequential, composite, and non-parametric decision theory; estimation theory; sequential, non-linear, and state estimation; optimum receiver principles. Prerequisite: graduate standing.

ELEG5643 Computer Communications Networks (FA, SP, SU) A study of various current data communication techniques used in the computer world. Concepts of digital communications theory as well as packets and protocols are studied. (Same as CSEG 5083) Prerequisite: CSEG 2533.

ELEG5653 Artificial Neural Networks (FA, SP, SU) A study of neural networks implementations using a system perspective and mathematics exposition suitable for systems implementation and simulation. Simple and multilayer networks, associative memory, and self organizing networks. Applications to signal processing, controls, and character

ELEG5673 Pattern Recognition (FA, SP, SU) Introduction to the basic concepts of pattern recognition, its theory and application. Subjects will include: trainable pattern classifiers, discriminant functions, parametric training methods, nonparametric training methods, feature selection, feature ordering, cluster analysis. Prerequisite: ELEG 4133.

ELEG5683 Image Processing (FA, SP, SU) Concepts involved in the processing of digital images. Emphasis on image analysis, enhancement, and restoration. Both spatial and frequency domain approaches are presented. (Same as CSEG 5203) Prerequisite: working knowledge of statistics and a programming language.

ELEG5713 Antennas and Radiation (FA, SP, SU) Radio frequency antennas, control of radiation patterns, antenna impedance and antenna feeding systems. Prerequisite: ELEG 3713.

ELEG5733 Remote Sensing Systems (FA, SP, SU) Analysis of remote sensors operating in 3 widely used EM spectral regions: Visible and near IR, thermal IR, and microwave. Emphasis on understanding generic types of remote sensors serving these spectral bands, their data products, and applications. Prerequisite: ELEG 3703 and ELEG 3123.

ELEG5743 Radar Systems (FA, SP, SU) Methods of discrimination and ambiguity in the measurement of range, angle and velocity. Analysis of search, tracking, MTI, SLAR, and SAR systems. Characterization of return from complex targets. Prerequisite: ELEG 3713.

ELEG5753 Synthetic Aperture Radar Systems (FA, SP, SU) Synthetic aperture radar (SAR) imaging techniques are important for terrestrial and planetary remote sensing. Evaluates SAR technology and focuses on parameters crucial to image quality. Antennas, aperture synthesis, correlation processing, noise statistics, and image quality are all analyzed. Prerequisite: ELEG 3123 and ELEG 3713 and ELEG 4133.

ELEG5801 Graduate Seminar (FA, SP, SU) Papers presented by candidates for the Master of Science degree in electrical engineering on design problems, or new developments in the field of electrical engineering.

ELEG587V Special Topics in Electrical Engineering (1-3) (FA, SP, SU) Consideration of current electrical engineering topics not covered in other courses. Prerequisite: graduate standing.

ELEG588V Special Problems (1-6) (FA, SP, SU) Opportunity for individual study of advanced subjects related to a graduate electrical engineering program to suit individual requirements.

ELEG5913 Parallel Programming (FA, SP, SU) An analysis of parallel computer systems with respect to software engineering. Practical programming experience on pipelined, array, and multiprocessor computers. Credit can be earned in only one of these three courses. CSCI 5303 or CSEG 5303 or ELEG 5913. (Same as CSCI 5303, CSEG 5303) Prerequisite: working knowledge of 'C' language and CSEG 4513 or equivalent.

ELEG5933 CAD Methods for VLSI (FA, SP, SU) Introduction to computational methods for the design and implementation of computer aided design (CAD) tools for digital systems engineering. The underlying theory of the tools is emphasized in addition to their application. (Same as CSEG 5933) Prerequisite: proficiency using a modern high-level programming language and CSEG 4983.

ELEG5943 Computer Arithmetic Circuits (FA, SP, SU) Examination of fundamental principles of algorithms for performing arithmetic operations in computers. This course provides sufficient theoretical and practical information to prepare the digital design engineer with an awareness of basic techniques for the realization of arithmetic circuits. (Same as CSEG 5943) Pre- or Corequisite: CSEG 4983 or equivalent and graduate standing.

ELEG5963 Computer Systems Optimization (FA, SP, SU) Design considerations and performance analysis of computer and communication systems modeling. (Same as CSEG 5063) Prerequisite: CSEG 2723.

ELEG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

ELEG6213 Semiconductor Surfaces (FA, SP, SU) Semiconductor surfaces: Structure and reactivity of the surface, surface space-charge region, surface states, scattering. Experimental methods, the MOS capacitance vs. voltage technique, current-voltage measurements, photoelectric emission. Prerequisite: ELEG 5233.

ELEG6233 Solid State Electronics II (FA, SP, SU) Indepth theoretical treatment of semiconductor material and devices. Topics to be covered include carrier statistics, transport behavior, bulk material properties, junction characteristics and metal-semiconductor contacts. Prerequisite: ELEG 5233.

ELEG6273 Advanced Electronic Packaging (FA, SP, SU) An advanced treatment of electronic packaging concentrating on multichip modules. Topics covered include electrical design, thermal design, mechanical design, package modeling and simulation, computer-aided engineering and design, processing limitations on MCM performance, reliability, testing, and economic considerations. (Same as MEEG 6273) Prerequisite: ELEG 5273.

ELEG6801 Graduate Seminar (FA, SP, SU) Papers presented by candidates for the Doctor of Philosophy degree in electrical engineering on current research or design problems in the field of electrical engineering.

ELEG700V Doctoral Dissertation (1-18) (FA, SP, SU)

ELEMENTARY EDUCATION/ READING (ELED, RDNG)

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201 Graduate Education Building
575-4209

• Professors Griffith, Sullivan • Associate Professor Lefever-Davis • Assistant Professors Beller, Hardy, Kirkpatrick, McGee • Instructors Cronan, Riggs

Degrees Conferred:
M.Ed. (ELED)
Ed.S. (EDUC)

Requirements for the Master of Education Degree: Candidates for the master's degree in elementary education must submit a score on the Miller Analogies Test or the Graduate Record Exam during the first twelve hours of course and must complete a minimum of 33 hours of graduate course work: 21 hours from courses in elementary education (ELED) with 15 hours from five of the following eight areas-language arts, mathematics, science, children's literature, social studies, early childhood education, reading (RDNG) or general elementary education; 3 hours of electives; and 9 core hours, including EDFD 5013 (Research Methods in Education) and three hours from each of the areas listed below. The required research course(EDFD 5013) is to be taken during the first 12 hours of degree coursework. (The major adviser must approve all courses.)

1. EDFD 5373, Psychological Foundations of Teaching and Learning
   EDFD 5473, Adolescent Psychology in Education
   EDFD 5573, Life-Span and Human Development
2. EDFD 5303, Historical Foundations of Modern Education
   EDFD 5353, Philosophy of Education
   EDFD 5323, Global Education

All candidates who receive the master's degree in elementary education must pass the master's comprehensive examination and a second assessment and be eligible, upon completion of degree requirements, to receive a regular certificate to teach in Arkansas elementary schools.

Requirements for the Educational Specialist Degree: This degree program is designed to provide the candidate with opportunities to develop in-depth competency related to particular needs. Generally, students

seeking an Ed.S. degree are interested in some special phase of elementary education such as children's literature, early childhood education, language arts, mathematics, reading, science, or social studies. The student must complete a total of 60 graduate hours which is planned with an adviser and approved by an advisory committee. In addition to the specialized courses in elementary education, the program must include EDFD 5393 (Applied Educational Statistics), an investigative project, and nine hours of cognate study.

COURSES: ELMNTARY ED (ELED)

ELED560V Workshop (1-18) (IR)
ELED599V Seminar (1-18) (IR)
ELED600V Master's Thesis (1-6) (IR)
ELED605V Independent Study (1-18) (FA, SP, SU)
ELED680V Ed.S. Project (1-18) (FA, SP, SU)
ELED700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

Reading (RDNG)

Courses at the graduate level are designed for experienced teachers who have the goal of improving professional competence in reading and of qualifying for the Arkansas certificate as a K-12 Reading Specialist. (For a listing of these and other CIED courses, See page 67.)

COURSES: READING (RDNG)

RDNG560V Workshop (1-18) (IR)
RDNG574V Internship (1-18) (IR)
RDNG599V Seminar (1-18) (IR)
RDNG605V Independent Study (1-6) (FA, SP, SU)

COLLEGE OF ENGINEERING (ENGR)

(See Graduate Faculty in Engineering)

Degrees Conferred: M.S.E., Ph.D. (ENGR)

The University of Arkansas offers instruction in engineering leading to the degrees of Master of Science in Biological and Agricultural, Chemical, Civil, Computer Systems, Electrical, Environmental, Industrial, Mechanical Engineering, Operations Research, and Transportation Engineering. Descriptions and requirements of these degree programs may be found under separate departmental headings.

A Master of Science in Engineering (M.S.E.) degree is available for students who wish to take a broader range of courses than is usually permitted for the designated degrees listed in the previous paragraph, or for those students who wish to pursue a curriculum emphasizing engineering management. Students in the M.S.E. degree program must select one of the following areas of emphasis:

Biological and Agricultural Engineering
Chemical Engineering
Civil Engineering
Computer Systems Engineering
Electrical Engineering
Engineering Management
Environmental Engineering
Industrial Engineering
Mechanical Engineering
Operations Research
Transportation Engineering

Graduate courses in engineering are offered by the faculty of the College of Engineering at the University of Arkansas, Fayetteville, at the Graduate Resident Center for Engineering in Little Rock that will satisfy both the academic requirements and the 30-week residence requirement for the Master of Science in Engineering degree. This degree is awarded by the University of Arkansas, Fayetteville.

Prerequisites to the Master of Science in Engineering Degree: Students with a B.S. degree from any engineering program accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology are normally accepted into the M.S.E. program without deficiencies. Other students are required to have credit for the basic mathematics (through differential equations), chemistry, and physics courses required for undergraduate degrees in engineering. Additional courses are usually required to resolve deficiencies in a student's preparation for graduate engineering courses.

Requirements for the Master of Science in Engineering Degree: The general minimum requirements of the Graduate School for Master of Science degrees must be met (page 22). The graduate faculty of the College of Engineering has established the following specific requirements for the Master of Science in Engineering degree:

1. Satisfactory completion of (a) 24 semester hours of course work and a thesis, (b) 30 semester hours of course work plus a three semester hour technical project and report, or (c) 36 semester hours of course work.
2. A minimum cumulative grade-point average of 3.00. Minimum grades of "B'' are required on 80 percent of the graduate hours taken for credit towards the M.S.E. degree.
3. Satisfactory completion of a comprehensive examination.

The program of study for each candidate will be determined by conference with the major professor and with advice from the candidate's graduate committee. Completion of a thesis is exceptionally difficult for off-campus students and is not encouraged except in unusual circumstances.

Requirements for the Doctor of Philosophy Degree: A student will be allowed to undertake a program leading to the degree of Doctor of Philosophy if the student has:

1. demonstrated ability to conduct an independent research program;
2. made an average above "B'' on all graduate courses attempted;
3. passed both a written and oral qualifying examination.

The general requirements for the Doctor of Philosophy degree are presented elsewhere in this catalog. The graduate faculty of the College of Engineering has established the following additional requirements:

1. Each doctoral student must satisfy a language requirement in one of the following ways:
   a. demonstrate a reading knowledge of a foreign language which has been recommended by his Doctoral Advisory Committee, or
   b. complete six semester hours of course work in a related field consistent with the student's program of study and career goals, and acceptable to the Doctoral Advisory Committee.
2. The doctoral student must satisfactorily complete at least 30 semester hours of course work beyond the minimum requirements for a master's degree. It is emphasized that 30 hours is a minimum requirement and many students' programs include more than this minimum.

The student's advisory committee will make all decisions relating to the student's program of studies, examinations, and graduation, subject to review and approval by the Engineering Academic Programs Committee and the Dean of the Graduate School.

Requirements for the Certificate in Electronics Manufacturing: The College of Engineering offers a non-degree Certificate of Achievement in Electronics Manufacturing for students seeking undergraduate or graduate degrees in the College. The objectives of the program are to introduce electronics manufacturing as a career option and to prepare engineers for entry-level participation in the world electronics industry that is characterized by rapid technological change, intense global competition, and team-based activity. The following courses are available in this program:

CHEG 5613, Microelectronics Fabrication and Materials
ELEG 5213, Integrated Circuit Fabrication Technology
ELEG 5273/MEEG 5273, Electronic Packaging
ELEG 5293L, Integrated Circuits

Fabrication Laboratory
ELEG 6273/MEEG 6273, Advanced Electronic Packaging
INEG 4513/ELEG 4273, Electronics Manufacturing Processes
INEG 4533, Application of Machine Vision
INEG 4563, Application of Robotics
INEG 5423, Engineering in Global Competition
MEEG 4443, Thermal and Vibration Analysis and Testing of Electronics

A student who completes INEG 4513/ELEG 4273 and any two of the other courses in the program will receive the Certificate of Achievement in Electronics Manufacturing.

DEPARTMENT OF ENGLISH (ENGL)

Robert Cochran
Interim Department Chair
333 Kimpel Hall
575-4301

• Distinguished Professors Guilds • University Professor Williams • Professors Booker, Candido, Cochran, Duval, Heffernan, Montgomery, Quinn, Talburt, Wilkie • Associate Professors Adams, Burris, Giles, Hays, Locke, MacRae, Marren, Sherman, Slattery, Stephens • Visiting Associate Professors Meschery, Shomer • Assistant Professors Armstrong, Jimoh, Kahf • Adjunct Assistant Professor McCray

Degrees Conferred:
M.A., Ph.D. (ENGL)
M.F.A. in Creative Writing (CRWR)

(See Creative Writing)

Areas of Concentration: Master of Arts-history and criticism of literature in English; Master of Fine Arts-drama, fiction, poetry; Doctor of Philosophy-Medieval, Renaissance to 1660, Restoration and eighteenth century, nineteenth century, twentieth century; American literature to 1900, twentieth-century American literature; linguistics; and criticism.

Prerequisites to Degree Program: The following materials must be submitted to the Director of Graduate Studies, Department of English, by applicants to the M.A. and Ph.D. programs:

1. Application for Admission to Graduate Study in English. The form is available from the Director of Graduate Studies.
2. Graduate Record Examination scores on the Aptitude Test (verbal and quantitative) for applicants to the M.A. and Ph.D. programs. GRE score on the Advanced Test in Literature also required for applicants to the Ph.D. program.
3. Scores on other standardized tests, if available. TOEFL scores if applicable.
4. Complete transcripts of all undergraduate and graduate work.
5. Three letters of recommendation from former teachers, supervisors, or employers.
6. A writing sample, preferably a piece of literary criticism.

Requirements for the Master of Arts Degree: In addition to the general requirements of the Graduate School, the Department stipulates that the following conditions be met:

1. Each master's candidate must present 30 hours of course work or 24 hours of course work and a thesis. Each candidate must satisfy the department's course distribution requirement by taking the following courses:
   a. At least one three-hour course in medieval English literature.
   b. At least one three-hour course in Early Modern Literature.
   c. At least one three-hour course in two of the following three fields (six hours minimum): Restoration and Eighteenth-Century British Literature, Nineteenth-Century British Literature, Modern British Literature.
   d. At least one three-hour course in two of the following fields (six hours minimum): American Literature to 1900, Modern American Literature, Post-World War II Literature in English.

   Course work submitted for the M.A. must include at least one seminar.
2. Each master's candidate must demonstrate a reading knowledge of a language other than English that is relevant to the study of literature in English. French, German, Italian, Spanish, Russian, Ancient Greek, and Latin are the normally acceptable choices to meet the foreign language requirement, although other languages may be used with the approval of the Director of Graduate Studies. This requirement should be met as early as possible in the student's program of study, and in no case later than one week prior to the end of classes in the semester in which the student intends to graduate. (For details about how this requirement may be satisfied, see section two under "Requirements for the Doctor of Philosophy degree," below.)
3. Each master's candidate must have a cumulative GPA of at least 3.33 for the total number of hours presented for the degree. The grade point will be determined on the following scale: A, 4.00; A-, 3.66; B+, 3.33; B, 3.00; etc. The plus and minus ratings are recorded on the student's records in the Department of English only and do not appear on the official records in the Registrar's Office.
4. Each master's candidate must pass a comprehensive examination and a formal thesis defense.

Requirements for the Master of Fine Arts in Creative Writing: For a description of the requirements for the M.F.A. in creative writing, see page 65.

Requirements for the Doctor of Philosophy Degree: In addition to the general requirements of the Graduate School, the Department stipulates that these requirements be met:

1. A student who begins doctoral study with an M.A. from another university or with an M.F.A. must take any courses required for the M.A. here which were not taken elsewhere, but these deficiency courses may, with the consent of the student's adviser, count toward the 24-hour course requirements.
2. Each doctoral candidate is required to demonstrate a reading knowledge of at least two languages other than English that are relevant to the study of literature in English. French, German, Italian, Spanish, Russian, Ancient Greek, and Latin are the normally acceptable choices to meet the foreign language requirement, although other languages may be used with the approval of the Director of Graduate Studies. Doctoral candidates who can document that they have met a foreign language requirement at the University of Arkansas or another accredited M.A. program need demonstrate a reading knowledge of only one language in addition to that used to meet the M.A. foreign language requirement. This requirement should be met as early as possible in the student's program of study, preferably before registration for doctoral dissertation hours. Students who elect the medieval period as the field of specialization must also demonstrate a reading knowledge of Latin, Old English, and Middle English.

   For either the M.A. or Ph.D. degree, reading knowledge must be demonstrated in one of the following ways:
   a. The student passes a test of reading knowledge as administered through the Department of Foreign Languages and Literature or by a member of the faculty of another department in the University who is competent to assess reading knowledge in the given language. The Department of Foreign Languages administers testing either in conjunction with Ph.D. reading courses (course number 3063) in French,

German, Latin, or Spanish; or through individual examinations. Students wishing to be examined in a foreign language should contact the Department of Foreign Languages well before the test to familiarize themselves with the different requirements of each language program.

b. The student presents evidence of having completed the equivalent of one semester of graduate or upper-level undergraduate study in foreign language (in the given language) with a grade of "B" or above at an accredited college or university.

c. The student documents that the language in question is his or her native language and that he or she has native fluency in the language.

3. By the time they take the candidacy examinations, students must have completed the Graduate School residence requirement and the departmental course requirements or be registered for courses which, if passed, will complete these requirements.
4. To strengthen and support a field of specialization, each student may take up to six hours of graduate course work in other departments. Subject to the approval of the student's adviser, these hours will count toward the 24-hour course requirement for the degree.
5. With the consent of the Graduate Studies Committee, students will declare a field of specialization. This declaration will be made prior to the completion of the candidate's first year of doctoral studies; it must be made before arranging to take the written candidacy examinations. The field of specialization must be one of the seven period fields (Medieval, Renaissance to 1660, Restoration and Eighteenth Century, Nineteenth Century, Twentieth Century, American literature to 1900, and Twentieth-Century American literature), or Linguistics, or Criticism.
6. Students in the doctoral program are required to complete 24 semester hours of course work for graduate credit beyond the M.A. degree. This work must include at least one course in critical theory, a course in philology, and at least four seminar courses, at least one of which must be in the field of specialization.
7. Each student must pass the following candidacy examinations:
   a. A four-hour written examination in the field of specialization.
   b. A two-hour oral examination which will cover a major author and a genre. Students may retake only once any examination they fail.
8. Students must notify the Director of Graduate Studies in the Department of their intention to take the candidacy examinations a month before the end of the term preceding the date of the examinations, which will be scheduled by the student in consultation with the committees administering the examinations. At the time they take the candidacy examinations, students must have a grade-point average of 3.50 for courses taken beyond the master's degree. The grade point will be on the following scale: A, 4.00; A-, 3.66; B+, 3.33; B, 3.00; etc. The plus and minus ratings are recorded on the student's record in the Department of English only and do not appear on the official record in the Registrar's Office.
9. Within the time limits specified by the Graduate School, each student must submit a dissertation acceptable to the student's dissertation committee.

Secondary Emphasis in Rhetoric and Composition: Students earning the Doctor of Philosophy in English or the Master of Fine Arts in Creative Writing may choose Rhetoric and Composition as a field of secondary emphasis. Students who choose this option are required to do the following:

1. Take Composition Pedagogy (ENGL 5003), Topics in Rhetoric and Composition (ENGL 6003), and English Language and Composition for Teachers (ENGL 4003) or Classical Rhetoric (COMM 5303).
2. Teach five different writing courses offered by the English Department.
3. Pass a one-hour oral examination in the area.

COURSES: ENGLISH (ENGL)

ENGL4003 English Language and Composition for Teachers (FA) Subject matter and methods of approach for the teaching of composition in high school.

ENGL4073 Film Writing Workshop (IR) A workshop in writing the screenplay with close attention given to student manuscripts and adaptations. Prerequisite: advanced standing.

ENGL4123 Language and Public Policy (IR) Semantic distortion in politics and commerce-mass media, government, professional jargon, language of sexism, classism, war, etc.

ENGL4173 Backgrounds of English Literature (IR) Backgrounds of English literature which will be of particular value to teachers. Extensive use of slides, films, and recordings to acquaint the student with various movements, ideas, events, and influences which constitute the cultural context for the literary works.

ENGL419V Literature in Relation to Other Disciplines (1-3) (IR) Relationships between literature and such related fields as science, politics, psychology, history, and art. May be repeated for 6 hours.

ENGL4253 African Literature (IR) A study of modern African fiction, drama, poetry, and film from various parts of Africa in their cultural context. Works are in English or English translation. (Same as WLIT 4993)

ENGL4323 American Realism and Naturalism (IR) American poetry and fiction between the Civil War and World War I. The origins and characteristics of Realism and Naturalism are discussed, and the relationship between the schools examined. Authors include Mark Twain, James, Howells, Dunbar, Chopin, Crane, Chesnutt, Wharton, Freeman, Robinson, Dreiser, Garland, and others.

ENGL4333 African American Literature (IR) Historical and critical survey of African American literature in its social and cultural context.

ENGL4343 The Modern Southern Novel (IR) Examination of the works of such authors as Faulkner, McCullers, O'Connor, Warren, and Wolfe both as works of art and as representative products of a significant cultural region.

ENGL4363 Modern American Poetry from 1900 to 1960 (IR) Twentieth-century American poetry from Frost and Eliot to 1960.

ENGL4383 Literature of the South (IR) Literature about the South by Southern writers in America from the Colonial period to the present.

ENGL4433 Middle English Literature (IR) English literature (other than the works of Chaucer) from 1200 to 1500.

ENGL4713 Eighteenth-Century Literature to 1750 (IR) Poetry, drama, the essay, and prose fiction from 1700 to 1750.

ENGL4723 Eighteenth-Century Literature After 1750 (IR) Poetry, drama, the essay, and prose fiction from 1750 to 1800.

ENGL4813 Poetry of the Romantic Period (IR)

ENGL4833 Poetry of the Victorian Period (IR)

ENGL4853 British Literature of the Nineteenth Century (IR) Selected major works of poetry, drama, fiction, and non-fiction prose of the nineteenth century.

ENGL4903 British Short Story (IR) Survey of the British short story in the nineteenth and twentieth centuries, with emphasis on the major writers.

ENGL4923 Modern World Drama (IR) Drama from Ibsen to the 1930s. (Same as WLIT 4923)

ENGL4933 Contemporary American and British Novel (IR) English and American novels since 1940.

ENGL4943 Modern British Novel (IR) The novel in England and Ireland from 1900 to 1940.

ENGL4963 Contemporary World Drama (IR) Drama since the 1930s. (Same as WLIT 4963)

ENGL4973 Twentieth-Century Non-Fiction Prose (IR) Twentieth century non-fiction prose as literature; selected works such British and American writers as H. Adams, Agee, Capote, Cleaver, Hemingway, Lawrence, C.S. Lewis, Mailer, Orwell, Stein, and Woolf.

ENGL4993 Modern British Literature (IR) Poetry, drama, fiction, and the essay from 1890 to 1940.

ENGL5003 Composition Pedagogy (FA) Introduction to teaching college composition. Designed for graduate assistants at the University of Arkansas.

ENGL5013 Creative Writing Workshop (IR)

ENGL5023 Writing Workshop: Fiction (IR)

ENGL5033 Writing Workshop: Poetry (IR)

ENGL5043 Translation Workshop (IR) Problems of translation and the role of the translator as both scholar and creative writer; involves primarily the discussion in workshop of the translations of poetry, drama, and fiction done by the students, some emphasis upon comparative studies of existing translations of well-known works. Primary material will vary. (Same as FLAN 504) May be repeated for 15 hours. Prerequisite: reading knowledge of a foreign language.

ENGL5063 Internship in Publishing (IR) Practical experience and instruction in copyediting and stylistics, promotional copywriting, and production. Conducted at the University of Arkansas Press and designed for students who plan careers in publishing. May be repeated for 6 hours.

ENGL507V Creative Non-Fiction Workshop (1-3) (IR) The theory and practice of the "New Journalism" with a study of its antecedents and special attention to the use of "fictional" techniques and narrator point of view to make more vivid the account of real people and real events.

ENGL510V Readings in English and American Literature (1-6) (IR) Open to Honors candidates and graduate students. May be repeated.

ENGL5143 English Teachers' Workshop: Literature (IR) Primarily for high school teachers of English. Review of principles of literary criticism, literary movements; intensive study of representation works from each genre.

ENGL5183 The Structure of Present English (SP) Structural analysis of the language.

ENGL5203 Introduction to Graduate Studies (IR) Students learn to carry out and report on literary research. Practical assignments introduce them to the reference collections, professional journals, and microform texts with which scholars work. Meanwhile, advanced explication and composition exercises work on perfecting the students' control over the design and style of the articles they write.

ENGL5233 Form and Theory of Translation (IR) An examination of the principal challenges that confront translators of literature, including the recreation of style, dialect, ambiguities, and formal poetry; vertical translation;

translation where multiple manuscripts exist; and the question of how literal a translation should be. (Same as WLIT 5233)

ENGL5243 Special Topics (IR) Designed to cover subject matter not offered in other courses. May be repeated.

ENGL5253 Modern Criticism (IR) Critical theory and practice from 1900 to the present.

ENGL5263 Form and Theory of Fiction: I (IR) Such aspects of the genre as scene, transition, character, and conflict. Discussion is limited to the novel.

ENGL5273 Form and Theory of Poetry: I (IR) An examination of perception, diction, form, irony, resolution, and the critical theories of the major writers on poetry, such as Dryden, Coleridge, and Arnold.

ENGL5283 Form and Theory of Fiction: II (IR) Second part of the study of the techniques of fiction. Discussion is limited to the short story. Prerequisite: ENGL 5263.

ENGL5293 Form and Theory of Poetry: II (IR) Second part of the study of the techniques of poetry; independent study of a poet or a problem in writing or criticism of poetry. Prerequisite: ENGL 5273.

ENGL5333 Major American Poets (IR) Intensive study of two or more major poets. May be repeated.

ENGL5343 The American Novel to 1900 (IR)

ENGL5353 The American Novel from 1900 to 1960 (IR)

ENGL5363 Henry James (IR) A study of the major works of Henry James.

ENGL5373 William Faulkner (IR)

ENGL5433 Chaucer (IR)

ENGL5483 Germanic and Celtic Backgrounds of Medieval Literature (IR) Literary traditions of Old and Middle English, of Germany, Ireland, Scandinavia, and Wales. (Same as WLIT 5483)

ENGL5503 English Poetry and Prose of the Sixteenth Century (IR)

ENGL5613 Seventeenth-Century Literature to 1660 (IR)

ENGL5623 The English Bible (IR) The several translations of the Bible; its qualities as great literature; its influence upon literature in English; types of literary forms. (Same as WLIT 5623)

ENGL5633 English Drama from Its Beginning to 1642 (IR) Early forms, Tudor drama, Shakespeare's contemporaries, and Stuart drama to the closing of the theatres.

ENGL5653 Shakespeare: Plays and Poems (IR)

ENGL569V Seminar in Film Studies (1-9) (IR) Research, discussion; papers on a variety of film genres and areas including the new American film, the science-fiction film, directors, film comedy, the experimental film, criticism, the film musical. (Same as COMM 569)

ENGL5913 Topics in Twentieth-Century British Literature (IR) Subject matter changes depending on student interest and faculty expertise. May be repeated.

ENGL6003 Topics in Rhetoric and Composition (IR) Examination of various topics in rhetoric and composition through the intensive study of contemporary research, theory, and practice.

ENGL6123 Seminar: Folklore (IR)

ENGL6193 The Development of English (FA) Intensive course in the fundamentals of linguistic study and their application to the history of English from prehistoric times to the present.

ENGL6303 Seminar: Studies in American Literature to 1900 (IR)

ENGL6313 Seminar: Studies in Twentieth-Century American Literature (IR)

ENGL6343 Seminar: Studies in American Prose (IR)

ENGL6403 Seminar: Medieval Literature (IR)

ENGL6413 Old English (FA)

ENGL6423 Beowulf (SP) May be counted to fulfill a part of medieval requirement for doctorate.

ENGL6433 Middle English (IR)

ENGL6503 Seminar: Renaissance Literature (IR)

ENGL6603 Seminar: Seventeenth-Century Literature (IR)

ENGL6653 Seminar: Shakespeare (IR)

ENGL6703 Seminar: Eighteenth-Century Literature (IR)

ENGL6813 Seminar: The Romantic Movement (IR)

ENGL6823 Seminar: Victorian Literature (IR)

ENGL6903 Seminar: Modern Literature (IR)

ENGL6913 Seminar: Contemporary Literature (IR)

ENGL698V Master's Thesis (1-6) (FA, SP, SU)

ENGL699V Master of Fine Arts Thesis (1-6) (FA, SP, SU)

ENGL700V Doctoral Dissertation (1-18) (FA, SP, SU)

DEPARTMENT OF ENTOMOLOGY (ENTO)

W.C. Yearian
Department Head
321 Agriculture Building
575-2451

• University Professors Meisch, Musick, Stephen, Yearian • Professors Felton, Johnson (D.T.), Kring, McLeod, Steelman, Steinkraus, Tugwell, Young • Adjunct Professors Burleigh, Johnson (D.R.), Katayama, Marsh, Thompson • Associate Professor Whitfield • Research Associate Professor Cameron • Adjunct Associate Professor Allen • Adjunct Assistant Professor Lorenz • Research Associate Bernhardt

Degrees Conferred: M.S., Ph.D. (ENTO)

Areas of Concentration: Pest management, insect pathology, veterinary/medical entomology, insect-plant interactions, arthropod-animal interactions, biological control, taxonomy, systematics, physiology, insect biology and insect ecology.

Prerequisites to Degree Program: Applicants for graduate degrees must meet all requirements for admission to the Graduate School. In addition, applicants are evaluated by the departmental admissions committee. Acceptance into the departmental program is based on grade-point average (GPA), letters of recommendation, résumé and whether or not a vacancy exists in the student's area of interest. To be accepted for the Master of Science degree, an undergraduate background in physical and biological sciences is essential. An undergraduate major in entomology is not required. A cumulative GPA of 3.00 is highly desirable.

To be accepted for work toward the Ph.D. degree, the student must have a master's degree from an accredited institution in entomology or a closely-related field. A cumulative GPA of 3.25 for courses taken at the graduate level is highly desirable.

Requirements for the Master of Science Degree: Students studying for the Master of Science degree with a limited undergraduate background in entomology may be expected to complete substantially more than the minimum number of credit hours (30) required for the degree. A thesis, reporting original research, and a final comprehensive oral examination are required.

Requirements for the Doctor of Philosophy Degree: A major requirement for the Ph.D. degree is a dissertation based on original research in some area of entomology. A "curriculum enrichment'' program consisting of at least six hours in foreign languages, statistics, computer science, technical writing, or other similar subject matter approved by the student's graduate advisory committee and the head of the Department is required. These hours are in addition to the usual prescribed course work. Written and oral candidacy examinations covering the student's program of study are required. A final oral examination over course work and in defense of the dissertation is required.

COURSES: ENTOMOLOGY (ENTO)

ENTO4013 Insect Behavior and Chemical Ecology (SP, Even years) Basic concepts in insect senses and patterns of behavioral responses to various environmental stimuli. Previous knowledge of basic entomology is helpful, but not required. Lecture 2 hours, laboratory/discussion 2 hours per week. Corequisite: ENTO 4010L.

ENTO4010L Insect Behavior and Chemical Ecology Laboratory (SP, Even years) Corequisite: ENTO 4013.

ENTO4024 Insect Diversity and Taxonomy (FA) Principles and practices of insect classification and identification with emphasis on adult insects. Corequisite: ENTO 4020L.

ENTO4020L Insect Diversity and Taxonomy Laboratory (FA) Corequisite: ENTO 4024.

ENTO4033 Immature Insects (SP, Even years) Identification of immature forms of insects and their phylogentic relationships. Lecture 1 hour per week. Laboratory 2-two hour sessions per week. Corequisite: ENTO 4030L. Prerequisite: ENTO 4024.

ENTO4030L Immature Insects Laboratory (SP, Even years) Identification of immature forms of insects and their Phylogenetic relationships. Corequisite: ENTO 4033.

ENTO4043 Apiculture (SP, Odd years) (First offered Fall 2001, Formerly ENTO 3113) Review of social behavior of insects and its exemplification in Honeybees. Previous knowledge of basic entomology is helpful but not required. Lecture 2 hours, laboratory 2 hours per week. Corequisite: ENTO 4040L.

ENTO4053 Insect Ecology (FA, Even years) To develop understanding of important ecological concepts through study of dynamic relationships among insects and their environment. To become familiar with the literature of insect ecology, and interpretation and critique of ecological research. Previous knowledge of basic entomology and/or ecology will be assumed. Corequisite: ENTO 4050L.

ENTO4050L Insect Ecology Laboratory (FA, Even years) Corequisite: ENTO 4053.

ENTO4123 Insect Pest Management I (SP, Odd years) Study of principles and concept of insect pest management. Areas covered include survey of arthropod pests and damage, population dynamics, damage thresholds, physcological units, prediction models, surveillance, arthropod sampling, strategies and tatics utilized to maintain pest populations below economic injury levels. Prerequisite: ENTO 3013.

ENTO4120L Insect Pest Management I Laboratory (FA, Odd years) Corequisite: ENTO 4123.

ENTO4130L Advanced Applied Entomology Laboratory (FA, Even years) Corequisite: ENTO 4133.

ENTO500V Special Problems (1-4) (FA, SP, SU) May be repeated for 4 hours. Prerequisite: graduate standing.

ENTO5013 Morphology of Insects (FA, Odd years) Origin, evolution, and functional significance of external insect structure. Structure and function of major internal systems. Previous knowledge of basic entomology is helpful, but not required. Lecture 2 hours, laboratory 4 hours per week. Corequisite: ENTO 5010L.

ENTO5010L Morphology of Insects Laboratory (FA, Odd years) Corequisite: ENTO 5013.

ENTO511V Special Topics (1-4) (IR) Topics not

covered in other courses or a more intensive study of specific topics in entomology. May be repeated. Prerequisite: graduate standing.

ENTO5123 Biological Control (FA, Even years) Theoretical and practical basis for biological control of arthropod pests and weeds via parasites, predators, and pathogens. Lecture 2 hours, laboratory 2 hours per week. Corequisite: ENTO 5120L.

ENTO5120L Biological Control Laboratory (FA, Even years) Corequisite: ENTO 5123.

ENTO600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

ENTO6071 Seminar (FA, SP) Fall: special topics not covered in regular course work. Spring: critical review of research papers in entomology. Seminar will be taken by graduate student majors for both semesters. May be repeated for 6 hours.

ENTO6113 Insect Physiology (SP, Even years) General and comparative physiology of insects. Previous knowledge of basic entomology is helpful, but not required. Lecture 2 hours, laboratory 3 hours per week. Corequisite: ENTO 6110L.

ENTO6110L Insect Physiology Laboratory (SP, Even years) Corequisite: ENTO 6113.

ENTO6213 Insect Toxicology (SP, Odd years) Toxicology of chemicals to insects and humans including techniques of testing collecting data, and factors that influence reactions to different classes of insecticides. Previous knowledge of organic physiological chemistry is helpful, but not required. Lecture 2 hours, laboratory 2 hours per week. Corequisite: ENTO 6210L.

ENTO6210L Insect Toxicology Laboratory (SP, Odd years) Corequisite: ENTO 6213.

ENTO700V Doctoral Dissertation (1-8) (FA, SP, SU) Prerequisite: graduate standing.

ENVIRONMENTAL DYNAMICS (ENDY)

Allen McCartney
Program Director
113 OZARK
575-6603

Faculty:

Anthropology:
• Professors Limp, McCartney, Rose, Sabo
• Associate Professors Kay, Mainfort, Ungar
• Research Assistant Professor Farley

Arkansas Archeological Survey:
• Director Green

Geosciences:
• Professors Hehr, Stahle, Steele • Associate Professors Cleaveland, Davidson, Dixon, Guccione • Adjunct Professor Brahana
• Assistant Professors Boss, Davis

Cooperating Faculty:

Agronomy:
• University Professor Scott • Professor Rutledge • Associate Professor Miller

Anthropology:
• Professor Schneider

Archeological Survey:
• Professors Rolingson, Schambach
• Associate Professors Early, House, Jeter, Mitchem, Stewart-Abernathy
• Assistant Professor Morrow

Biological Sciences:
• Professors James, Smith
• Associate Professors Brown, Spiegel
• Assistant Professor Sagers

Chemistry/Biochemistry:
• Professors Bobbitt, Durham

Geosciences:
• Professor Zachry

History:
• Distinguished Professor West

Landscape Architecture:
• Department Chair Hanna • Professor Crone

Mathematical Sciences:
• University Professor Dunn

Psychology:
• Professors Knowles, Schroeder

Rural Sociology:
• Professors Farmer, Voth

Degree Conferred: Ph.D. (ENDY)

Environmental Dynamics is the study of complex interactions between natural systems and human activity. It requires an interdisciplinary research approach and integration with the power, efficiency, and economy of advanced computer-based technologies. Emphasis is placed upon the identification and interpretation of short-term and long-term cycles that underlie Earth-climate-human interactions over time. Primarily, the program is staffed by faculty from the departments of Anthropology and Geosciences and associated research institutes and laboratories including: the Center for Advanced Spatial Technologies, the Arkansas Water Resources Center, the Tree-Ring Laboratory, the Bioarcheology Laboratory, the Archeology Laboratory, and the Arkansas Archeological Survey. Faculty from other departments and colleges, such as Biological Sciences, Landscape Architecture, and Agronomy, also share an interest in human and natural ecology and participate in the program

Requirements for Admission:

Applicants should hold a master's degree in an environmental field such as Anthropology, Geography, Geology, Biological Sciences, Environmental Engineering, or Agronomy. Further, these students will be required to have at least a 3.2 GPA in graduate courses. Applicants without the master's degree but with exceptionally strong qualifications may be admitted directly into the ENDY program, but must complete the master's requirements. Admission into the program will be by committee evaluation. In addition to fulfilling the requirements for admission to the Graduate School, applicants must also supply the following materials:

1. Three recommendations from individuals familiar with the applicant's academic or work history who can give candid assessments of the applicant's ability to perform at the Ph.D. level.
2. A three page statement outlining the applicant's plans for an ENDY degree program, relevance of previous academic or work experience, current research interests or employment that bears on degrees, special skills, fieldwork experience, familiarity with interdisciplinary work (if any), and future career goals.
3. An example of the applicant's writing such as a publication reprint, report, major term paper, undergraduate honors thesis, chapter from MA/MS thesis, or similar document that demonstrates the applicant's organizational skills, research ability, familiarity with a body of literature, ability to report clearly on an academic topic, and/or general writing skills.
4. TOEFL (Test of English as a Foreign Language) and TSE (Test of Spoken English) scores for international students whose native language is not English.
5. GRE scores and other relevant information that would assist the Admissions Committee in selecting applicants to the program.

Requirements for the Degree:

During the first semester of study, all students will be assigned an advisory committee to determine the student's particular program of study. Students will be required to integrate components of the physical, social, and biological sciences into their Ph.D. program. The advisory committee will determine the courses required and assist the student in balancing courses in the three areas.

Students become candidates for the doctorate only upon passing written and oral comprehensive exams. The examination must be passed at least nine months before graduation.

Each candidate must complete a doctoral dissertation on a topic determined through collaboration with a major professor and dissertation committee. This dissertation must be a scholarly and significant original contribution to knowledge within the field of Environmental Dynamics.

A final oral examination is required and must be taken at least two weeks before graduation. The examination will be concerned primarily with the candidate's dissertation, but may include other aspects of the graduate work.

Individually tailored programs of study will be designed with the expectation that the student will complete a minimum of 24 hours of course work beyond the master's level, to include two required seminars (ENDY 5113 Global Change, and ENDY 6013 Seminar in Environmental Dynamics) and ENDY/ ANTH/GEOL 5053 Quaternary Environments. In addition, 18 hours of dissertation research are required.

COURSES: ENVR DYNAMIC (ENDY)

ENDY4043 Water Resource Issues (SP) Human impact on the quantity and quality of water resources including impact of agriculture, industrial, and municipal uses, and a comparitive policies and water resource development, past and present. (Same as GEOL 4043)

ENDY5023 Digital Remote Sensing (SP) Theoretical and applied aspects of the manipulation and interpretation of environmental phenomena recorded by digital remote sensing instruments. Emphasis is on techniques of digital image enhancement and transformation, image geocoding & supervised & unsupervised classification of multispectral image data from Earth-orbiting platforms. Prerequisite: GEOL 4413 or equivalent.

ENDY5033 Advanced Geographic Information Systems (SP) Advanced vector operations and analysis. Topics will include topological analysis, network analysis, geocoding, conflation, implications of source and product map scale, map generalization, error mapping, and cartographic production. Prerequisite: (ANTH 4563 or GEOL 4563) or equivalent.

ENDY5043 Spatial Analysis and Modeling (FA) Advanced spatial analysis in the raster domain. Topics include advanced map and image algebra operations, integration & remotely sensed data, raster-to-vector and vector-to-raster conversations. Prerequisite: (ANTH 4453 or GEOG 4453) or equivalent.

ENDY5053 Quaternary Environments (FA) An interdisciplinary study of the Quaternary Period including dating methods, deposits soils, climates, tectonics and human adaptations. (Same as ANTH 5053, GEOG 5053, GEOL 5053)

ENDY5063 Paleoclimatology (SP) The earth's climate history over the last 2 million years and the influence various factors have had on it; compilation and paleoclimatic histories and methods of dating climatic effects. Prerequisite: GEOG 4363 or equivalent.

ENDY5113 Global Change (FA) Examines central issues of global change including natural and human induced climate change, air pollution, deforestation, desertification, wetland loss urbanization, and the biodiversity crisis. The U.S. Global Change Research Program is also examined. (Same as GEOG 5113) Prerequisite: graduate standing.

ENDY5153 Environmental Site Assessment (IR) Principles, problems, and methods related to conducting an environmental site assessment. An applied course covering field site assessment, regulatory documentation, and report preparation. (Same as GEOL 5153) Prerequisite: GEOL 4033.

ENDY5533 Marine Geology (SP) Geological principles as applied to the study of the world's ocean basins. Course includes basic theories of ocean basin evolution, continental margin evolution, coastal geologic processes, and methods of study of deep sea records of global change and paleoceanography. (Same as GEOL 5533) Prerequisite: graduate standing.

ENDY6013 Environmental Dynamics (IR) Required course for ENDY doctoral candidates. Overview of Earth Systems: Lithosphere; Hydrosphere, Atmosphere, Biosphere, Cryosphere, and human interaction across Earth systems. Emphasis on understanding of processes within Earth systems and interactions across Earth Systems as they pertain to global self-regulation, secular variation, climate stability, development and sustainability of human societies. Prerequisite: graduate standing.

ENDY6023 Seminar in Environmental Dynamics (IR) Seminar examining specific contemporary topic of topics in Environmental Dynamics. Topics will change with each offering. May be repeated for 6 hours. Prerequisite: graduate standing.

ENDY689V Special Problems in Environmental Dynamics (1-6) (FA, SP, SU) Independent study of a topic related to environmental dynamics under the guidance of tan ENDY faculty member. May be repeated for 6 hours.

ENDY6991 Environmental Dynamics Colloquium (FA, SP) Weekly meetings for discussion of current research in environmental dynamics. Graduate students must register for colloquium each semester. Colloquium credit does not count towards minimum hours required for the doctorate. Prerequisite: graduate standing. May be repeated for 6 hours.

ENDY700V Doctoral Dissertation (1-18) (FA, SP, SU) May be repeated for 18 hours. Prerequisite: graduate standing.

ENVIRONMENTAL ENGINEERING (ENEG)

Robert P. Elliott
Department Head of Civil Engineering
4190 Bell Engineering Center
575-6028

James C. Young
Coordinator of Environmental Engineering Studies

• Professors Cross (CHEG), Young (CVEG) • Associate Professors Costello (BAEG), Gross (CVEG), Thoma (CHEG) • Assistant Professors Batzer (MEEG), Burian (CVEG), Edwards (CVEG), Nutter (MEEG), Soerens (CVEG)

Degree Conferred: M.S.En.E (ENEG)

The Master of Science in Environmental Engineering is a multi-discipline degree program designed for students from a multitude of academic areas. Regardless of undergraduate discipline each candidate for the degree must complete a number of basic undergraduate engineering courses. In general graduates of engineering programs will have completed most, if not all, of these courses and can expect to be accepted with little or no undergraduate prerequisite requirements. However, the prerequisite requirements for graduates of programs other than engineering can be quite significant.

To more readily accommodate students with diverse academic backgrounds, qualified undergraduate students at the University can apply for acceptance into an integrated undergraduate/graduate program of study after completing 72 credit hours towards the baccalaureate degree. The integrated undergraduate/graduate program allows the student to complete some graduate requirements prior to completion of the baccalaureate degree and receiving full admission to the Graduate School. The integrated program consists of four elements: 1) the requirements for the baccalaureate degree sought by the student, 2) a program of general education, mathematics, science, and basic engineering topics, 3) an 18 credit hour series of basic environmental engineering to provide a breadth of knowledge in the general subject matter, and 4) completion of graduate credit in a defined area of environmental engineering specialization. Depending upon the baccalaureate there can be significant overlap between the requirements of elements 1, 2, and 3. For example with appropriate course selection, an engineering BS degree can fulfill all requirements of elements 1, 2, and 3.

Program Objectives: The objectives of the MSEnE program are to prepare graduates for careers in environmental engineering practice with government agencies, engineering firms, or industries and to provide a foundation for continued study at the post-masters level.

Application to Integrated Program: Application for acceptance into the integrated undergraduate/graduate program may be submitted either directly to the Coordinator of Environmental Engineering Studies or by referral from the student's undergraduate academic department. Requests for acceptance into the integrated program will be approved only with concurrence from the student's undergraduate academic department. Once accepted the student must apply for admission to the Graduate School through normal application procedures. The applicant must identify an environmental engineering faculty adviser who will help develop the integrated course of study.

After completing 90 credit hours of study towards the baccalaureate degree, students accepted into the integrated degree program may concurrently enroll in undergraduate and graduate level courses. Such enrollment must be consistent with the integrated course of study developed with the faculty adviser.

Admission Criteria: The following are the minimum criteria for admission to the MSEnE degree program:

GPA 3.00 or higher
TOEFL 550 or higher
GRE scores no less than 430 Verbal, 650 Quantitative, and 520 Analytical

Degree Requirements: All MSEnE degree candidates, regardless of previous degree status, must demonstrate completion of the Basic Engineering Education and Environmental Engineering Breadth requirements listed below. Candidates who do not possess a degree from a program accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) must also satisfy the basic level ABET accreditation requirements. These include completion of no less than 48 credit hours of approved engineering topics and demonstrating, to the satisfaction of the student's graduate study committee, that they possess those abilities and characteristics required of graduates from ABET accredited engineering programs.

Exceptions to these degree requirements may be requested by means of a petition outlining the reasons for the exceptions and presenting an alternate plan for completing the program. The petition shall be subject to the approval of the student's graduate study committee and the Coordinator for the Environmental Engineering Studies. Credit for courses taken at another institution is subject to the approval of the Coordinator of Environmental Engineering Studies. In particular, advanced engineering courses (3000,

4000,and 5000-level at the University of Arkansas) normally will not be accepted for transfer from institutions or degree programs that are not accredited by ABET.

I. Basic Engineering Education Requirements

General Education Topics .....Credit Hours
Recommended Courses
Humanities/social science.....15
Acceptable to undergraduate program
English composition 6
ENGL 1013 and 1023

Mathematics and Basic Science Credit Hours
Recommended Courses
Calculus & differential equations.....15
MATH 2554, 2564, 2574, & 3404
Statistics and probability.....3
INEG 3313 or STAT 3013
General Chemistry.....4
CHEM 1123 & 1121L
University Physics (calculus based).....4
PHYS 2053 & 2051L
Microbiology.....4
MBIO 2013 & 2011L
Organic Chemistry 4
CHEM 3504 or CHEM 3603 & 3601L
Earth Science.....2
GEOL 3002 or AGRN 2203

Basic Engineering Topics .....Credit Hours
Recommended Courses
Statics.....3
MEEG 2003
Dynamics.....3
MEEG 2013
Fluid Mechanics 3
CHEG 2133 or MEEG 3503
Engineering Economics 2
CVEG 3022 or INEG 3413
Computer Applications.....3
CVEG 1113 or CSEG 1913

II. Environmental Engineering Breadth Requirements (18 hours required)

Required Topics.....Credit Hours
Recommended Courses
Fundamentals of Env. Eng.....3
CVEG 3243
Reactor Design 3
CHEG 3333
Thermodynamics.....3
CHEG 3143 or MEEG 2403
Applied Hydraulics 3
CVEG 3213, CHEG 3153 or MEEG 4483

Elective Topics (6 hours required).....Credit Hours.....Recommended Courses
Chemical Process Safety.....3
CHEG 4813
Hydrology 3
CVEG 3223
Environmental Eng. Design 3
CVEG 4243
Occupational Health and Safety 3
INEG 4223
Principles of Epidemiology. 3
HLSC 5613
Environmental Health 3
HLSC 6553
Note: The 4000 level and above courses listed above carry graduate credit and may be used in partial fulfillment of the graduate degree requirement provided they have not previously been used for credit toward a BS degree and they are approved the student's graduate study committee.

III. Environmental Engineering Specialization (MSEnE graduate program)

Thesis Option:
30 hours of graduate-level course work including 24 hours from one of the following specialty areas plus 6 hours of research resulting in a written Master's Thesis.

Non-Thesis Option:
33 hours of graduate-level course work including 30 hours from one of the following specialty areas plus 3 hours of independent study resulting in a written Master's Report.

Specialty Areas and Approved Courses:
Students are expected to select the required hours of graduate courses from one of the two following specialty areas and listing of approved courses. Other courses will be considered on petition to the student's graduate study committee and the Coordinator of Environmental Engineering Studies.

Pollution Prevention and Control Specialty Area
- CHEG 4263, Environmental Experimental Methodology
- CHEG 4813, Chemical Process Safety
- CHEG 5513, Biochemical Engineering Fundamentals
- CVEG 4243, Environmental Engineering Design
- CVEG 4263 Environmental Regulations and Permits
- CVEG 5234, Water and Wastewater Analysis
- CVEG 5243 Groundwater Hydrology
- CVEG 5253, Microbiology for Environmental Engineers
- CVEG 5273, Advanced Pollution Control
- CVEG 5283, Solid Waste Management
- CVEG 5753 or CHEG 5753, Air Pollution
- MEEG 4453, Industrial Waste and Energy Management
- MEEG 4473, Indoor Environmental Control
- MEEG 4483, Thermal Systems Analysis and Design
- MEEG 4603, Basic Nuclear Engineering
- MEEG 4623, Radiation Protection and Shielding
- MEEG 4813, Air Pollution Abatement
- MEEG 4843 Environmentally Conscious Design and Manufacturing

Natural and Water Resources Specialty Area
- BAEG 4113, Risk Analysis for Biological Systems
- BAEG 4903, Water Resource Engineering
- BAEG 4913, Bio-Environmental Engineering
- CVEG 4253, Small Community Wastewater Systems
- CVEG 4263 Environmental Regulations and Permits
- CVEG 5234, Water and Wastewater Analysis
- CVEG 5243 Groundwater Hydrology
- CVEG 5253, Microbiology for Environmental Engineers
- CVEG 5263, Stream Pollution Analysis
- CVEG 5283, Solid Waste Management
- CVEG 5293, Water Treatment & Distribution System Design
- CVEG 5734, Advanced Wastewater Process Design and Analysis
- GEOL 4033, Hydrogeology
- AGRN 5224, Soil Physics

At least 18 of the 30+ credit hours presented for the MSEnE degree credit hours must be 5000 level or higher and the cumulative grade point average on all graduate courses presented for the degree must be at least 3.00. The cumulative grade point average on the basic engineering education and environmental engineering breadth courses must be at least 2.70.

Candidates for the degree must pass a comprehensive final examination that will include either a defense of the candidate's Thesis or a presentation and discussion of the candidate's Master's Report. The examination is to be prepared and administered by the student's graduate adviser.

EUROPEAN STUDIES (EUST)

Raymond Eichmann
Department Chair of Foreign Languages
425 Kimpel Hall
575-2951

COURSES: EUROPEAN STD (EUST)

EUST470V Special Topics (1-6) (IR) An examination of pertinent issues in Europe. May be repeated.
EUST470VH Honors Special Topics (1-6) (IR) An examination of pertinent issues in Europe. May be repeated.

DEPARTMENT OF FINANCE (FINN)

(See Graduate School of Business, page 39)

DEPARTMENT OF FOOD SCIENCE (FDSC)

Terry Siebenmorgen
Department Head
Food Science Building
272 Young Avenue
Fayetteville, AR 72704
501-575-4605
FAX: 501-575-6936

• Dinstinguished Professor Morris
• Professors Buescher, Crandall, Hettiarachchy, Johnson, Kenney, McCoy, Siebenmorgen • Associate Professor Proctor
• Research Associate Professor Howard
• Adjunct Associate Professor Freeman
• Assistant Professors Meullenet, Wang
• Research Assistant Professors Howell, Yang
• Adjunct Assistant Professor Lehigh
• Adjunct Extension Specialist Brady

Degree Conferred: M.S., Ph.D. (FDSC)

MASTER OF SCIENCE

Areas of Concentration: This program covers a wide range of disciplines and commodities. Specific areas of concentration include post-harvest physiology; product and process development; methodology and assessment of quality attributes of raw and processed products; food biochemistry; food microbiology; lipid, protein, and carbohydrate chemistry; food enzymology and waste management..

Prerequisites to Degree Program: The student must have a B.S. degree from an accredited institution with a grade-point average of no less than 3.0, suitable preparation in food science or related areas and be acceptable to the department.

Requirements for the Master of Science Degree: Aside from deficiencies, a minimum of 24 semester hours of course work and 6 semester hours of thesis are required for the M.S. degree. At least 12 course credits of the 24 credits required must be from 5000 or higher level courses. In addition to coursework, the student will be required to conduct research and prepare an acceptable thesis. Upon admission to this program the candidate will be assigned to a major adviser, who in consultation with the department head will select a graduate committee. This committee will assist with developing a suitable program for the candidate and will serve as the examination committee.

DOCTOR OF PHILOSOPHY

Areas of Concentration: This interdepartmental program covers a wide range of disciplines and commodities. Specific areas of concentration include raw products physiology; physiology; post-harvest physiology; product and process products; food biochemistry; food microbiology; lipid, protein, and carbohydrate chemistry; food enzymology and waste management.

Prerequisites to Degree Program: Applicants for acceptance into the interdepartmental doctoral program in food science must meet all of the requirements for admission to the Graduate School and the Department of Food Science. Applicants must have a thesis M.S. degree in food science or a related area from an accredited institution, suitable academic preparation in food science and related physical and biological science and a minimum grade-point average of 3.0 in all previous graduate work.

Requirements for the Doctor of Philosophy Degree: Upon acceptance to this program, the student will be assigned to a major adviser from the department representing the student's selected area of concentration. The major adviser in consultation with the student and with the respective department head will select at least two suitable graduate faculty members from outside the student's own department to complete a committee of five members. The graduate advisory committee chaired by the major adviser will be responsible for supervision of the student's program development, and will serve as the examination committee for candidacy, dissertation and final examinations.

Student's course work and dissertation topic will be supervised by the graduate advisory committee. Under normal conditions, 39 semester hours of course credit beyond the M.S. degree and a minimum of 18 semester hours of Ph.D. dissertation research credit will be required. Requirements include a minimum of 25 hours of 5000 and 6000 level courses and participation in the Food Science Colloquium. The student must maintain a grade-point average of 3.00 or higher in all academic work beyond the M.S. degree. General requirements pertaining to declaration of intent, admission to candidacy and residency are in accordance with the requirements set forth by the Graduate School of the University of Arkansas.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this degree program as in-state students for fee purposes. See page 163 for details.

COURSES: FOOD SCIENCE (FDSC)

FDSC400V Special Problems (1-4) (FA, SP, SU) Investigation of assigned problems in food science. Prerequisite: junior standing.

FDSC4032 Postharvest Food Losses (SP, Odd years) Causes, principles and practices responsible for losses of raw and processed foods. Factors responsible for causing food losses and methods appropriate for reducing losses in technologically advanced and developing countries are discussed. Lecture 2 hours per week.

FDSC4114 Food Analysis (SP, Even years) Methods of analysis, instrumentation, and laboratory techniques for measuring the chemical composition of raw and value-added products. Lecture 3 hours, laboratory 2 hours per week. Corequisite: FDSC 4110L. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L and CHEM 3813.

FDSC4110L Food Analysis Laboratory (SP, Even years) Laboratory exercises providing students with experience of analytical techniques and instrumentation used in food analysis. Laboratory exercises in Food Analysis. Laboratory 2 hours per week. Corequisite: FDSC 4114. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L and CHEM 3813.

FDSC4124 Food Microbiology (SP) Microbiology, contamination, preservation, and spoilage of different kinds of foods, food poisoning, sanitation, control, and inspection; microbiology of water; and standard methods for official food and public health laboratories. Lecture 2 hours, laboratory 4 hours per week. (Same as MBIO 4124) Corequisite: FDSC 4120L. Prerequisite: MBIO 2013 and MBIO 2011L and CHEM 1123 and CHEM 1121L.

FDSC4120L Food Microbiology Laboratory (SP) Corequisite: FDSC 4124.

FDSC4203 Quality Evaluation and Control (SP, Odd years) Definition of grades and standards of quality by chemical, physical, and sensory techniques. Lecture 2 hours, laboratory 2 hours per week. Corequisite: FDSC 4200L. Prerequisite: CHEM 1123 and CHEM 1121L and (FDSC 3103 or FDSC 3202 or HESC 1213).

FDSC4200L Quality Evaluation and Control Laboratory (SP, Odd years) Corequisite: FDSC 4203.

FDSC4223 Risk Analysis for Biological Systems (FA, Odd years) Principles of risk assessment including exposure assessment and dose response, and risk management. Methods of risk analysis modeling and simulation with computer software. Applications of risk analysis in animal, food, and environmental systems. (Same as POSC 4223) Prerequisite: STAT 2023 (or STAT 2303 or AGST 4023) and BAST 2903 (or BAEG 1022).

FDSC4304 Food Chemistry (FA) Water, carbohydrates, lipids, proteins, vitamins, and minerals in foods; biochemical and functional properties, enzymes, food additives (emulsifiers, pigments, colors, flavors, preservatives, and sweeteners) and texture as related to properties in food systems and during processing. Lecture 3 hours, laboratory 3 hours per week. Corequisite: FDSC 4300L. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L and CHEM 3813.

FDSC4300L Food Chemistry Laboratory (FA) Laboratory experiments have been designed to complement material covered in FDSC 4304. Demonstrates principles of chemical changes in food during processing. Provides opportunities for developing critical thinking and problem solving skills. Laboratory 3 hours per week. Corequisite: FDSC 4304. Prerequisite: CHEM 1123 and CHEM 1121L and CHEM 2613 and CHEM 2611L and CHEM 3813.

FDSC4413 Sensory Evaluation of Food (FA, Odd years) Principles and procedures for sensory evaluation of food. Appropriate uses of specific tests are discussed, along with physiological, psychological, and environmental factors affecting sensory verdicts. Lecture 2 hours, laboratory 2 hours per week. Corequisite: FDSC 4410L. Prerequisite: PSYC 2013 or STAT 2013 or CISQ 2013.

FDSC4713 Food Product and Process Development (FA, Odd years) Multidisciplinary approaches for developing new food products and processes; in the context of an industry-sponsored project. Group dynamics and interpersonal skills. Factors that influence product and process development. Analysis and modeling applied to food process design. Lecture 2 hours and laboratory 3 hours per week. Corequisite: FDSC 4710L. Prerequisite: FDSC 3103 and FDSC 4203 or FDSC 4304.

FDSC4710L Food Product and Process Development Laboratory (FA, Odd years) Multidisciplinary approaches for developing new food products and processes in context of an industry-sponsored project. Group dynamics and interpersonal skills. Factors that influence product and process development. Analysis and modeling applied to food process design. Lecture 2 hours and laboratory 3 hours per week. Corequisite: FDSC 4713.

FDSC5001 Seminar (FA, SP) Presentation and discussion of graduate student research. Prerequisite: graduate standing.

FDSC5023 Raw Products and Postharvest Physiology (SP) Examination of postharvest handling practices affecting the raw product quality of major horticul-

tural processing crops. Lecture 2 hours, laboratory 2 hours weekly. Corequisite: FDSC 5020L. Prerequisite: CHEM 3813.

FDSC5020L Raw Products and Postharvest Physiology Laboratory (SP) Corequisite: FDSC 5023.

FDSC509V Special Problems Research (1-4) (FA, SP, SU) Original investigation on assigned problems in food science. Prerequisite: graduate standing.

FDSC5603 Enology (FA) Examination of factors influencing wine grape quality with emphasis on wine and grape regions, grape composition, and fermentation. Lecture/discussion 3 hours per week. Prerequisite: CHEM 3813.

FDSC5703 Fermented Foods (FA, Odd years) Examination of factors influencing the fermentation of food and beverage, and methods to control the microbiological stability and quality of these products. Lecture/discussion 3 hours per week. Prerequisite: CHEM 3813 and FDSC 4124.

FDSC600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

FDSC602V Special Topics (1-3) (IR) Discussions focused on selected topics of particular fields of raw product physiology and food processing. chemistry, physiology, microbiology, evaluation, sensory analysis and preservation. May be repeated. Prerequisite: graduate standing.

FDSC6033 Applied Biochemistry of Fruits and Vegetables (SP, Even years) Biochemical characteristics, functions, regulation and impact of components in raw and processed foods of plant origin. Lecture/discussion 3 hours per week. Prerequisite: CHEM 3813.

FDSC6101 Colloquium in Food Science (FA, SP) Presentation and discussion of papers and topics by doctoral students and graduate faculty in the interdepartmental food science program. Prerequisite: graduate standing.

FDSC6503 Chemistry of Cereal and Oilseed Products (IR) Structure and function of proteins and carbohydrates in food products derived from cereals and oilseeds with emphasis on rice and soybeans. Lecture 3 hours per week. Prerequisite: CHEM 3813.

FDSC700V Doctoral Dissertation (1-6) (FA, SP, SU) The doctoral program in food science is an interdepartmental program offered by the departments of Food Science, Animal and Poultry Sciences, and Human Environmental Sciences. Prerequisite: graduate standing.

DEPARTMENT OF FOREIGN LANGUAGES (FLAN) (FREN-GERM-SPAN)

Raymond Eichmann
Department Chair
425 Kimpel Hall
575-2951

• Professors Cory, Eichmann, Haydar, Hanlin, Levine, Pritchett, Ricker, Williams • Associate Professors Bell, Christiansen, Fredrick, Hassel, Horton, Locke, Tucker, Turner z• Assistant Professors Arenberg, Badia, Restrepo, Summers • Instructor Summers

Degree Conferred: M.A. (FREN, GERM, SPAN)

Areas of Concentration: French, German, and Spanish. Supporting courses are offered in Greek and Latin.

Prerequisites to Degree Program: The student must have a B.A. degree or equivalent from an accredited institution with suitable preparation in the chosen foreign language and be accepted by the Department. Deficiencies in undergraduate major or prerequisites for advanced courses may be included in the student's program.

Requirements for the Master of Arts Degree: Aside from deficiencies, a minimum of 36 semester hours of course work (36-48 hours in French) is required for the degree (for requirements for degree in French, see below). Each candidate must pass a comprehensive examination covering course work and a reading list. Upon admission to this program the candidate will be assigned an adviser who, in consultation with the candidate, will design a suitable program for the candidate. The adviser, in consultation with other members of the Department, will select an examination committee for the comprehensive oral and written examinations. Detailed program descriptions, including reading lists and examination procedures, are available from the Department.

Requirements for the Master of Arts Degree in French: Candidates for the Master of Arts Degree in French shall opt for one of two areas of concentration:

Option A: French Studies Concentration. Minimum of 36 hours required, 18 of which should be in literature courses approved by the graduate adviser. This option is considered a terminal one for the degree.

Option B: Literature Concentration. Candidates for this option must fulfill the 36 hour requirement of Option A and must complete 12 additional hours of literature courses approved by the graduate adviser, 6 of which must be 600V for presentation of a Master's thesis. Candidates holding teaching assistantships may have their assistantships renewed for a 3rd year.

Any course substitutions must be approved by the French graduate adviser.

COURSES: FOREIGN LANG (FLAN)

FLAN4003 Special Language I (FA) Under the number, various oriental, African, or other less commonly-taught languages will be offered from year to year. Prerequisite: junior standing.

FLAN4013 Special Languages II (SP) Continuation of Special Language I. Prerequisite: FLAN 4003 or equivalent.

FLAN4713 Language and Culture (FA, SP, SU) Anthropological approaches to the description and analysis of languages and their extension into ethnographic semantics with emphasis on cognitive models and their sociological correlates. (Same as ANTH 4713, COMM 4713)

FLAN504V Translation Workshop (1-6) (IR) Problems of translation and the role of the translator as both scholar and creative writer; involves primarily the discussion in workshop of the translations of poetry, drama, and fiction done by the students, some emphasis upon comparative studies of existing translations of well-known works. Primary material will vary. (Same as ENGL 5043) Prerequisite: reading knowledge of a foreign language.

FLAN505V Workshop (1-3) (IR) Specialized professional problems and topics in foreign language based career areas. May be repeated for 3 hours.

FLAN5063 Teaching Foreign Languages on the College Level (IR) Focus on basic methodological concepts and their practical application to college foreign language instruction.

FLAN5083 Developments in Second Language Teaching (IR) A review of techniques, strategies, and methodologies and a survey of recent developments in second language teaching.

FLAN575V Special Investigations (1-6) (FA, SP) May be repeated for 6 hours.

COURSES: ARABIC (ARAB)

ARAB4053 Arabic Readings (FA, SP, SU) Develops skill in description, analysis, and argumentation through weekly reading and writing assignments within a workshop atmosphere. Selected readings from various styles of standard Arabic, ranging from newspapers to literary texts.

ARAB470V Special Topics (1-6) (FA, SP, SU) May be offered in a topic not specifically covered by courses otherwise listed. May be repeated.

ARAB575V Special Investigations (1-3) (FA, SP, SU) May be repeated.

COURSES: MID EST STUD (MEST)

MEST4003 Middle East Studies Colloquium (FA, SP, SU) An interdepartmental colloquium with an annual change in subject required of all students in the Middle East studies program. May be repeated for 6 hours. Prerequisite: sophomore standing.

MEST4003H Honors Middle East Studies Honors Colloquium (FA, SP, SU)

COURSES: FRENCH (FREN)

FREN4003 French Grammar and Composition (FA) Prerequisite: FREN 3003 or FREN 3103.

FREN4033 French for Oral Proficiency (SP) Three hours per week of conversation practice for the advanced undergraduate. Prerequisite: FREN 3003 or FREN 3103.

FREN4063 Applied Linguistics: Phonology, Morphology, and Syntax (FA) Prerequisite: FREN 3003 and FREN 3103.

FREN4113 Special Themes in French Literature (IR) Topics not normally covered in period courses. Sample topics: "The Comic Tradition in French Literature," "French Cinema." Topics announced one semester in advance. Prerequisite: FREN 3113.

FREN4203 Quebec Studies (IR) A study of Quebec's culture, institutions, economy, literature and cinema. Prerequisite: FREN 3113.

FREN4203H Honors Quebec Studies (IR) A study of Quebec's culture, institutions, economy, literature and cinema. Prerequisite: FREN 3113.

FREN4213 French Civilization (SP) Prerequisite: FREN 3113.

FREN4223 A Survey of French Literature I (FA, SP, SU) A survey of French literature, its forms and themes in the 19th and 20th centuries. Prerequisite: FREN 3113.

FREN4233 A Survey of French Literature II (FA, SP, SU) A survey of French literature, its forms and themes in the 19th and 20th centuries. Prerequisite: FREN 3113.

FREN4333 Business French (FA) Introduction and orientation to the French world of business and commerce through the study of vocabulary, forms, and formulas and expression used in commercial correspondence. Prerequisite: FREN 3113.

FREN4343 Business French: Quebec (SP) Introduction to French Business Language in the context of North America, focusing on Quebec and its economy. May be repeated for 6 hours. Prerequisite: FREN 3113

FREN470V Special Topics (1-6) (IR) May be offered in a topic not specifically covered by courses otherwise listed. May be repeated for 6 hours.

FREN5003 French Grammar and Phonetics (IR) Systematic review of principles of French grammar and syntax; Comprehensive presentation of French phonetics.

FREN5213 French Culture & Civilization (IR) An analysis of French cultural symbols and attitudes as observed in their historical economical, political, social, educational, and linguistic aspects.

FREN5333 Old French Literature (IR) An intensive study of French Medieval Literature from the Chanson de Gestes to Vilon, including an indepth analysis of the genres and their evolution, and of the major authors of the times.

FREN5433 French 16th Century Literature (IR) A survey of representative writers of the sixteenth century.

FREN5533 French 17th Century Theatre (IR)

FREN5543 French 17th Century Literature (IR) A survey of representative writers of the seventeenth century.

FREN5673 French 18th Century Literature (IR)

FREN5703 Special Topics (IR) May be offered in a subject not specifically covered by the courses otherwise listed. May be repeated for 6 hours.

FREN5723 The Development of French

Romanticism (IR)
FREN575V Special Investigations (1-6) (IR) May be repeated.
FREN5783 The French Nineteenth Century Novel (IR)
FREN5813 French 20th Century Theatre (IR)
FREN5833 French 20th Century Novel (IR)
FREN600V Master's Thesis (1-6) (IR)

COURSES: GERMAN (GERM)

GERM4033 Conversation (SP) Three hours per week of conversation practice for the advanced undergraduate. Prerequisite: GERM 2013.
GERM4123 The German Novelle (IR) An intensive study of the novelle as a genre from its origin to the present. Prerequisite: GERM 3013.
GERM4133 The German Drama (IR) A study of the development of the forms and themes of the German drama from the middle ages to the present. Prerequisite: GERM 3013.
GERM4143 German Lyric Poetry (IR) A study of the forms and themes of German lyric poetry from the middle ages to the present. Prerequisite: GERM 3013.
GERM4213 German Civilization (IR) Prerequisite: GERM 2013 or equivalent.
GERM4223 German-Speaking Countries in the 20th Century (FA, SP, SU) Continues the introduction to German culture and civilization begun with GERM 4213 with emphasis on the emergence in the 20th century contemporary Austria, Switzerland, and a unified Germany.
GERM470V Special Topics (1-3) (IR) May be offered in a topic not specifically covered by courses otherwise listed. May be repeated for 6 hours.
GERM5223 Early German Literature: Middle Ages to the Enlightenment (FA, SP, SU)
GERM5273 German Literature: Enlightenment, Storm and Stress, and Classicism(FA, SP, SU)
GERM5323 German Literature: Romanticism and Realism (FA, SP, SU)
GERM5343 Early Modern German Literature: Late 19th and Early 20th Century (FA, SP, SU)
GERM5363 German Literature after 1945 (FA, SP, SU)
GERM5703 Special Topics (FA, SP, SU) May be offered in a subject not specifically covered by the courses otherwise listed. May be repeated for 6 hours.
GERM575V Special Investigations (1-6) (FA, SP, SU) May be repeated.
GERM600V Master's Thesis (1-6) (FA, SP, SU)

COURSES: GREEK (GREK)

Courses numbered 4023 and above are given as needed, approximately every third year.

GREK4023 Greek Poetry or Plato (IR) Selections from the Elegiac, Iambic, and Lyric poets. Plato's Apology and Crito. Prerequisite: GREK 2013 or equivalent.
GREK4033 Herodotus or Thucydides (IR) Readings of Herodotus, Book VII, and Thucydides, Book VI; collateral readings on the Persian and Peloponnesian Wars. Prerequisite: GREK 2013 or equivalent.
GREK4043 Greek Drama (IR) Readings of 2 tragedies and one comedy; a study of the Greek theatre. Prerequisite: GREK 2013 or equivalent.
GREK475V Special Investigations (1-6) (FA, SP, SU) May be repeated.
GREK575V Special Investigations (1-6) (IR) May be repeated for 12 hours.

COURSES: LATIN (LATN)

Courses numbered 4003 and above are given as needed, approximately every third year.

LATN5633 Medieval Latin (IR) Selections from medieval writers from the 4th to the 17th century. Prerequisite: LATN 3003 or equivalent.
LATN575V Special Investigations (1-6) (IR) May be repeated.

COURSES: RUSSIAN (RUSS)

RUSS4003 Advanced Russian I (FA, SP, SU) Advanced Russian reading, conversation, and composition. Review of grammar and syntax. Prerequisite: RUSS 3013.
RUSS4013 Advanced Russian II (FA, SP, SU) Advanced Russian reading, conversation, and composition. Review of grammar and syntax. Prerequisite: RUSS 4003.
RUSS4123 Survey of Russian Literature from Its Beginning to the 1917 Revolution (FA) The instructor will discuss the historical and cultural backgrounds while focusing on major writers and will deal with literature as an outlet for social criticism. There will be textual analysis. It will be taught in English. (Same as WLIT 4123)
RUSS4133 Survey of Russian Literature Since the 1917 Revolution (FA) The instructor will discuss the historical and cultural backgrounds while focusing on major writers and will deal with literature as an outlet for social criticism. There will be textual analysis. It will be taught in English with readings in English. (Same as WLIT 4133)
RUSS470V Special Topics (1-3) (IR) May be offered in a topic not specifically covered by courses otherwise listed. May be repeated for 6 hours.
RUSS575V Special Investigations (1-6) (FA, SP, SU) May be repeated.

COURSES: RUSSIAN STD (RSST)

RSST4003 Russian Studies Colloquium (SP) An interdepartmental colloquium with an annual change in subject of investigation, required of all students in the Russian Studies program. May be repeated for 6 hours. Prerequisite: sophomore standing for Russian studies majors and honors students.
RSST4003H Honors Russian Studies Colloquium (SP)
07-2 COURSE - COURSE W/RULES (HELV. BOLD 7/8): ANIMAL SCI (ANSC)

COURSES: SPANISH (SPAN)

SPAN4003 Advanced Grammar (SP) For majors and advanced students covering the problematic areas of Spanish syntax and usage. Prerequisite: SPAN 3003 and SPAN 3103.
SPAN4033 Advanced Conversation (SP) Three hours per week of conversation practice for the advanced undergraduates. Prerequisite: SPAN 3033 and SPAN 4003.
SPAN4063 Applied Linguistics: Phonetics and Phonology (SP) Prerequisite: SPAN 3003.
SPAN4103 Monuments of Spanish Literature (FA) Survey of the major works of Spanish literature from {El Cid{ through the 20th century. Prerequisite: SPAN 3113.
SPAN4133 Survey of Spanish-American Literature (SP) Monuments of Spanish-American literature from the Colonial period to the present, with a concentration on the period from 1888 to the present. Prerequisite: SPAN 3113.
SPAN4213 Spanish Civilization (SP) Prerequisite: SPAN 3113.
SPAN4223 Latin American Civilization (FA) Prerequisite: SPAN 3113.
SPAN4233 Modern Mexico: Culture & Society (FA, SP, SU) A wide-ranging exploration of culture and society in Mexico today, its unity and diversity, as tradition confronts the processes of modernization and globalization. Includes an historical survey, but focuses on contemporary issues, such as relations with U.S. This course will be taught in Spanish. Prerequisite: SPAN 3113.
SPAN4243 Literature and Culture in the Hispanic United States (FA, SP, SU) An exploration of the history and culture, art and politics of the major Hispanic groups in the United States. Focus on contemporary attitudes and issues. Prerequisite: SPAN 3113.
SPAN4253 Latin American Cinema and Society (IR) This course examines key issues in Latin American culture and history through films, documentaries, and literary and cultural texts. Topics included are: Human Rights, Ethnicity, Gender, Revisions of the past. Prerequisite: SPAN 3113.
SPAN4333 Business Spanish I (SP) Enhances ability to relate to Spanish-speaking business environments by providing a solid foundation in vocabulary and discourse related to functional business areas such as organization of a company structure, management, banking and accounting, capital investment, personnel and office systems, production of goods and services, marketing, finance, and import-export. Prerequisite: SPAN 3003.
SPAN470V Special Topics (1-3) (IR) May be offered in a topic not specifically covered by courses otherwise listed. May be repeated for 6 hours.

Graduate standing or consent is prerequisite to courses numbered above 5000.

SPAN5003 Workshop in Advanced Intensive Spanish (IR) Improvement of language proficiency in areas of listening and speaking. Includes a review of grammar, phonetics, and vocabulary (with cultural enrichment) as needed, with stress on oral practice and presentation. Prerequisite: adequate functional use of the language.
SPAN5013 Advanced Stylistics and Composition (IR) Systematic review of principles of Spanish grammar and syntax and the development of writing skills. Focus on methods of teaching Spanish grammar.
SPAN5203 Medieval Spanish Literature (IR) From the 'Jarchas' to the {Celestina{.
SPAN5233 Golden Age Novel (IR) Major works of Spanish prose fiction from the 16th and 17th centuries, with close reading of major works.
SPAN5243 Golden Age Poetry and Drama (IR) History and development of those genres in the 16th and 17th centuries, with close reading of major works.
SPAN5253 Colonial Literature and Culture (FA, SP, SU) An introductory course to the history, culture and literature of colonial Spanish America from 1492 until 1810. The course will cover representative colonial and indigenous texts and their contexts including Renaissance, Baroque, and travel literature of the Eighteenth Century. The course will be taught in Spanish.
SPAN5273 Nineteenth Century Prose (IR) From the costumbristas through Blasco Iba`n~ez, with emphasis on the novel.
SPAN5283 Nineteenth Century Drama and Poetry (IR) From Romanticism to the Generation of 1898.
SPAN5343 Advanced Survey of Spanish Literature Since 1898 (IR) intensive survey of the literature of Spain from the Generation of 1898 to the present. Prerequisite: graduate standing.
SPAN5363 Spanish American Literature (1492-1900) (IR) Representative of works of Spanish American prose and poetry, including selections from indigenous literatures, the {cron`icas{, and colonial literature up to the movement of {modemismo{.
SPAN5383 Twentieth Century Spanish American Poetry (IR) From the development of modernism to the present day.
SPAN5393 19th Century Spanish American Literature (FA, SP, SU) Study of representative literary works from Independence (1810) to 1900's. The course covers Neoclassicism, Romanticism, Realism/Naturalism, and Modernism and the role of literature in the nation-building process. The course will be taught in Spanish.
SPAN5403 Spanish American Theatre (FA, SP, SU) Historical examination of the theatre in Spanish America, with close analysis particularly of representative works and movements in the 20th century.
SPAN5433 Cervantes: {Don Quijote{ (IR) A close reading of Spain's greatest literary masterpiece.
SPAN5453 Cinema and Literature (IR) This course examines several Latin American and Spanish texts and their film adaptations as well as the main film making trends in the Hispanic world.
SPAN5463 20th Century Spanish American Literature (FA, SP, SU) Critical survey of major movements and outstanding and representative works in 20th century prose and poetry, from the Mexican Revolution and the avant-garde to the contemporary boom and post-boom.
SPAN5533 Mexican Literature (FA, SP, SU) An exploration of the special features and particular qualities if Mexican literature, as one of the most representative and complex of the Latin American national literatures. Includes an historical survey, but each class will focus on selected topics and issues especially in modern Mexican literature and culture.
SPAN5603 History of the Spanish Language (IR) Spanish from its origins to the present; relations between Spanish and the other romance languages.
SPAN5703 Special Topics (IR) May be offered in a subject not specifically covered by the courses otherwise listed. May be repeated for 6 hours.
SPAN575V Special Investigations (1-6) (IR) May be repeated.
SPAN5803 Seminar (IR) Seminar subjects vary from year to year. Available subjects, given as needed, include the Old Spanish Language, {Poema de mfo Cid{. Golden Age Poetry, the {Celestina{, 20th century Spanish drama, and the romances. May be repeated for 6 hours.
SPAN600V Master's Thesis (1-6) (IR)
07-2 COURSE - COURSE W/RULES (HELV. BOLD 7/8): GEOGRAPHY (GEOG)

FRENCH
(See Foreign Languages)

GENERAL AGRICULTURE (GNAG)

Nolan Arthur
Program Chair
205 Agriculture Building
575-2035

Faculty members are from all the agricultural sciences.

Degree Conferred: M.S. (GNAG)

Students desiring general education in agriculture may pursue a course of study leading to the master's degree in general agriculture. The general program requires a minimum of 15 semester hours of graduate-level course work in the Dale Bumpers College of Agricultural, Food and Life Sciences. The total 30-hour program, including work outside the general fields of agriculture, will be outlined by the student's graduate committee in terms of individual needs. A supervisory committee provides guidelines to determine the student's eligibility to enter the program and what course deficiencies, if any, should be assessed. As a minimum, an applicant must meet all of the requirements for admission to the Graduate School. A major adviser is selected by the student, the Chair of the General Agriculture program, with approval of the Dean of the Graduate School. The major adviser should be from the department in which the heaviest concentration of agricultural courses (at least 9 hours) will be developed. The major adviser, in consultation with the student, will recommend four additional faculty members, one of whom will be from the supervisory committee and one outside of the major interest department to serve as the student's graduate committee.

To meet the 30-week residence requirement for the master's degree, 24 semester hours of the University of Arkansas, Fayetteville, courses may be taken at off-campus locations. At least six semester hours of course work must be completed in a minimum of six weeks of residence on the Fayetteville campus. This may be accomplished by taking courses in two 3-week sessions in the same summer or in different summers. Each student will complete one three-hour special problem in which a technical paper will be developed. A student cannot receive credit for more than six hours of special problems or directed study for this degree. Special problems cannot be used to satisfy the six-hour on-campus requirement.

This program is not intended to prepare a student for a doctoral degree.

GENERAL ENGINEERING (GNEG)

COURSES: GENERAL ENGR (GNEG)

GNEG5003 Topics in Engineering for Teachers (SU) An introduction to engineering and technology concepts, as well as methods to conduct engineering and technology instruction. Intended for secondary school teachers during a summer workshop.

DEPARTMENT OF GEOSCIENCES

Thomas O. Graff
Department Chair
113 Ozark Hall
575-3355

DEGREES CONFERRED:
M.A. in Geography (GEOG)
M.S. in Geology (GEOL)

GEOGRAPHY (GEOG)

• Professors Cleaveland, Dixon, Hehr, Stahle • Adjunct Professor Limp • Associate Professors Davidson, Graff

Areas of Concentration: human geography, physical geography, GIS and cartography.

Prerequisites to Degree Program: Applicants must be admitted to the Graduate School and meet the following requirements: (1) satisfactory undergraduate preparation in geography, (2) three letters from persons competent to judge applicant's potential for graduate studies, and (3) a completed departmental application. Students who do not meet these requirements may be admitted conditionally. Students with course deficiencies may enroll concurrently in graduate courses.

Requirements for the Master of Arts Degree: A student may choose one of three options to satisfy the requirements for a Master of Arts degree in geography:

Geography M.A. with thesis. A minimum of 24 semester hours of course work including core courses specified by the department, six semester hours of thesis, and an oral examination conducted by the candidate's faculty committee.

Geography M.A. with internship. A minimum of 30 semester hours of course work including core courses specified by the department, six hours of internship, evidence of research ability, and an oral examination conducted by the candidate's faculty committee.

Geography M.A. without thesis. Thirty-six semester hours including core courses specified by the department and an oral examination conducted by the candidate's faculty committee.

A list of courses that meet the general distribution requirement is available from the departmental chair.

GEOLOGY (GEOL)

• Professors Brahana, Konig, Manger, Steele, Zachry • Adjunct Professor Wagner • Associate Professors Davis, Guccione • Assistant Professor Boss

The focus of instruction in geology at the graduate level is preparation of students to become practicing professional geologists in industry, or to pursue without deficiencies doctorates at established programs. Students intending to enter the industrial work force are encouraged to maintain a broad perspective with an emphasis in an area of geology that has a demonstrated record of past employment, such as petroleum geology or environmental geology. The greatest strength of the program in geology at the University of Arkansas is instruction in practical geologic interpretation, with emphasis on field relationships. This instructional strength includes all levels of teaching and supports an active research program that serves to strengthen the research and communication skills of the students through writing assignments, oral presentations, and participation in professional societies.

Prerequisites to Degree Program: Students admitted to graduate study should have completed an undergraduate geology program similar to that required for the B.S. degree at the University of Arkansas. Applicants lacking an appropriate background may satisfy deficiencies while enrolled in Graduate School. Prospective students should submit application forms, three letters of recommendation, and a statement of their graduate and professional goals before March 15 for the fall semester and October 15 for the spring semester to assure their consideration. These dates are also deadlines for receipt of application for financial assistance.

Requirements for the Master of Science Degree: The program in Geology requires 30 graduate course credit hours, six of which will be derived from a thesis reporting the results of an original laboratory or field research problem. All course work, a thesis topic, and the final thesis must be approved by the student's thesis committee. This committee is selected by the student and the student's thesis director and will consist of a minimum of three members. At least two of the committee members will be chosen from geology faculty whose areas of expertise coincide with the research interests of the student.

Each student will complete a core curriculum consisting of a minimum of 12 hours selected from the following courses: GEOL 4053 - Geomorphology; 4433 - Geophysics; 5063 - Geochemistry or 5263 - Hydrochemical Methods; 5123 - Stratigraphic Principles and Practice; 5223 - Sedimentary Petrology. Each student must complete a minimum of 18 credit hours in Geology courses,

including 1 credit hour of GEOL 5001 Graduate Seminar, in addition to the six credit hours for the thesis.

Students who have completed some or all of these core courses as part of their undergraduate program must substitute additional elective courses, as approved by their thesis committee, to fulfill the minimum required 24 credit hours of course work.

To complete the requirements for the degree, the candidate must complete all course work with a grade-point average of 3.00, submit an acceptable thesis, and pass a comprehensive examination based primarily on a defense of the student's thesis.

COURSES: GEOGRAPHY (GEOG)

GEOG4013 Latin America (IR) Geography of South America, Mexico, Central America, and the Caribbean Islands.

GEOG4033 Geography of the Middle East (IR) Natural setting, resources, human use, and current problems of the North African countries bordering the Mediterranean Sea, and of the lands of Southwest Asia west of Pakistan. Prerequisite: junior standing.

GEOG4063 Urban Geography (SP) Areal patterns of modern urban regions and the focus shaping these patterns. Emphasis is placed on American urban areas and their evolution and functional areas. Field work. Prerequisite: junior standing.

GEOG4093 Geography of Arkansas (FA) Natural resources of the state, its leading occupations, and its geographic regions. Prerequisite: junior standing.

GEOG4243 Political Geography (FA, Odd years) Contemporary world political problems in their geographic context. Development of the principles of political geography with emphasis upon the problems of Eastern Europe, Africa, and Southeast Asia. Prerequisite: junior standing.

GEOG430V Internship in Physical Geography (3-6) (FA, SP, SU) Supervised experience in municipal, county, state or private natural resource management agency, or any other such organization approved by instructor.

GEOG4353 Elements of Weather (FA) Examination of the atmospheric processes that result in multifarious weather systems. Offered as physical science. Prerequisite: junior standing.

GEOG4363 Climatology (SP) Fundamentals of topical climatology followed by a study of regional climatology. Offered as physical science. Prerequisite: GEOG 1003 and/or GEOG 4353.

GEOG4384 Principles of Landscape Evolution (FA) Examines the role of waves, rivers, wind, and tectonics in shaping and modifying the surface of the earth. Considers the way in which an understanding of landscape processes is essential to the effective solution of environmental problems. Lecture 3 hours, laboratory 2 hours per week.

GEOG440V Internship in GIS & Cartography (3-6) (FA, SP, SU) Supervised experience in GIS and/or cartographic applications with municipal, county, state, or private enterprises. May be repeated for 6 hours.

GEOG4523 Computer Mapping (SP) This course addresses advanced cartographic concepts especially as they relate to computer-assisted mapping. Students produce a variety of maps using Microstation CAD program and other computer mapping programs.

GEOG4543 Geographic Information Systems (FA) Computer assisted analysis and display of geographic resource data. Course develops the theory behind spatial data analysis techniques, and reinforces the theory with exercises that demonstrate its practical applications. (Same as ANTH 4543)

GEOG4553 Raster GIS (FA, SP, SU) Introduction to spatial analyses in the natural sciences and resource management fields using geographic information systems (GIS). Lectures focus on development of principles, paralleled by workstation-based laboratory exercises using raster-based software, relational data bases, and exploratory data analysis. (Same as ANTH 4553) Prerequisite: GEOG 3023 or GEOG 4543.

GEOG4563 Vector GIS (FA, SP, SU) Introduction to geographic information systems (GIS) applications in marketing, transportation, real estate, demographics, urban and regional planning, and related areas. Lectures focus on development of principles, paralleled by workstation-based laboratory exercises using Arc-node based software and relational data bases. (Same as ANTH 4563) Prerequisite: GEOG 3023 or GEOG 4543.

GEOG4573 Introduction to GRASS Applications in GIS (IR) An introduction to geographic information systems (GIS) problem solving using the Geographic Resource Analysis Support System (GRASS) software. (Same as ANTH 4573)

GEOG4593 Introduction to Global Positioning Systems (FA, SP, SU) Introduction to navigation, georeferencing, and digital data collection using GPS receivers, data loggers, and laser technology for natural science and resource management. Components of NavStar Global Positioning system are used in integration of digital information into various GIS platforms with emphasis on practical applications. (Same as ANTH 4593)

GEOG4723 Australia and the Pacific Islands (IR) Natural setting, resources, and human use of these areas and the significance of their world position. Prerequisite: junior standing.

GEOG4753 Geography of the United States and Canada (IR) The geographic regions of Anglo-America. Prerequisite: junior standing.

GEOG4783 Geography of Europe (IR) Geographic regions of the area with emphasis on their present development. Prerequisite: junior standing.

GEOG4793 Geographic Concepts for Global Studies (SU) Application of geographic concepts and perspectives for analyzing global relationships. Developing and developed nations as well as geographic themes of current importance will be examined. Prerequisite: junior standing.

GEOG4863 Quantitative Techniques in Geography (FA, SP, SU) An introduction to the application of standard quantitative and spatial statistical techniques to geographical analysis. Students will use both micro and large system computers in the course. (Same as ANTH 4863) Prerequisite: (STAT 4003 and STAT 4001L) or equivalent.

GEOG5003 Seminar in Geography (IR) Selected topics, the nature of which varies with the need. Prerequisite: graduate standing.

GEOG5011 Colloquium (SP) Weekly meetings of faculty, graduates, advanced students and guests to discuss research and trends in the field of geography. May be repeated for 2 hours.

GEOG5053 Quaternary Environments (FA) An interdisciplinary study of the Quaternary Period, including dating methods, deposits, soils, climates, tectonics, and human adaptation. Lecture 2 hours, laboratory 2 hours per week. (Same as ANTH 5053, ENDY 5053, GEOL 5053) Corequisite: GEOG 5050L. Prerequisite: graduate standing.

GEOG5093 History of Geography (SP, Even years) Chronological development of the science; leaders in the field of geography; and the evolution of the major concepts of geography. Prerequisite: graduate standing.

GEOG510V Special Problems in Physical Geography (1-6) (FA, SP, SU) Prerequisite: graduate standing.

GEOG5113 Global Change (FA) Examines central issues of global change including natural and human induced climate change, air pollution, deforestation, desertification, wetland loss urbanization, and the biodiversity crisis. The U.S. Global Change Research Program is also examined. (Same as ENDY 5113)

GEOG520V Special Problems in Human Geography (1-6) (FA, SP, SU) Prerequisite: graduate standing.

GEOG530V Special Problems in Regional Geography (1-6) (FA, SP, SU) Prerequisite: graduate standing.

GEOG5333 Research Methods and Materials in Geography (FA, Odd years) Geographical research and the preparation of research papers. Prerequisite: graduate standing.

GEOG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

COURSES: GEOLOGY (GEOL)

GEOL4033 Hydrogeology (SP) Occurrence, movement, and interaction of water with geologic and cultural features. Lecture 3 hours per week. Corequisite: GEOL 4030L. Prerequisite: MATH 2564 and GEOL 3513 and GEOL 3511L.

GEOL4030L Hydrogeology Laboratory (SP) Exercises and field trips illustrating principles of water movement through porous media and the methods by which this movement is monitored. Corequisite: GEOL 4033.

GEOL4043 Water Resource Issues (FA) Human impact on the quantity and quality of water resources including impact of agriculture, industrial, and municipal uses, and a comparative policies and water resource development, past and present. (Same as ENDY 4043)

GEOL4053 Geomorphology (SP) Mechanics of landform development. Lecture 2 hours, laboratory 3 hours per week. Several local field trips are required during the semester. Corequisite: GEOL 4050L. Prerequisite: GEOL 1004 and GEOL 1113 and GEOL 3002.

GEOL4050L Geomorphology Laboratory (SP) Corequisite: GEOL 4053.

GEOL4153 Karst Hydrogeology (IR) Assessment of ground water resources in carbonate rock terrains; relation of ground water and surface water hydrology to karst; quantification of extreme variability in karst environments; data collection rationale. Field trips required. Prerequisite: GEOL 4033.

GEOL4223 Stratigraphy and Sedimentation (SP) Introductory investigation of stratigraphic and sedimentologic factors important to the study of sedimentary rocks. Lecture 2 hours, laboratory 3 hours per week. A required weekend, two-day field trip will be conducted during the semester. Corequisite: GEOL 4220L. Prerequisite: GEOL 3413.

GEOL4220L Stratigraphy and Sedimentation Laboratory (SP) Corequisite: GEOL 4223.

GEOL4253 Petroleum Geology (FA) Distribution and origin of petroleum. Lecture 2 hours, laboratory 2 hours per week. Corequisite: GEOL 4250L. Prerequisite: geology major and senior standing.

GEOL4250L Petroleum Geology Laboratory (FA) Corequisite: GEOL 4253.

GEOL436V Geology Field Trip (1-2) (SP) Camping field trip to areas of geologic interest, usually conducted during Spring Break. May be repeated for 4 hours. Prerequisite: GEOL 3313.

GEOL4413 Principles of Remote Sensing (FA) Theoretical and practical consideration of radar imagery, aerial photography, and infrared imagery for understanding Earth resource problems related to agriculture, archeology, engineering, forestry, geography, and geology. Lecture 2 hours, laboratory 2 hours per week. (Same as GEOS 4413) Corequisite: GEOL 4410L. Prerequisite: GEOL 1004 and GEOL 1113 or GEOL 3002.

GEOL4410L Principles of Remote Sensing Laboratory (FA) (Same as GEOS 4410L) Corequisite: GEOL 4413.

GEOL4433 Geophysics (IR) Derivation from physical principles, of the geophysical methods for mapping the Earth. Computational methods of converting gravity, magnetic, radiometric, electrical, and seismic data into geologic information. Lecture 3 hours, laboratory 2 hours per week. Corequisite: GEOL 4430L. Prerequisite: MATH 2564 and PHYS 2033 and PHYS 2031L and GEOL 3513 and GEOL 3511L.

GEOL4430L Geophysics Laboratory (IR) Corequisite: GEOL 4443. (IR)

GEOL5053 Quarternary Environments (FA) An interdisciplinary study of the Quarternary Period, including dating methods, deposits, soils, climates, tectonics, and human adaptation. Lecture 2 hours, laboratory 2 hours per week. (Same as ANTH 5053, ENDY 5053, GEOG 5053, GEOS 5053) Prerequisite: graduate standing.

GEOL5063 Geochemistry (FA) Chemistry of geologic processes and the geochemical cycles of selected elements. Prerequisite: CHEM 1103 and CHEM 1101L and CHEM 1123 and CHEM 1121L.

GEOL5076 Advanced Field Methods of Applied Hydrogeology (SU) Applied field course emphasizing collection and interpretation of ground water data. Three hours may be applied toward an M.S. degree in geology. Prerequisite: GEOL 4033.

GEOL5123 Stratigraphic Principles and Practice (IR) Physical and biological characteristics of sedimentary environments and their correlation in time with emphasis on the local geologic section. Corequisite: GEOL 5120L. Prerequisite: GEOL 4223.

GEOL5120L Stratigraphic Principles and Practice Laboratory (IR) Corequisite: GEOL 5123.

GEOL5142 Conodont Biostratigraphy (IR) Laboratory study of the biology, taxonomy, and biostratigraphy of the conodonts. Pre- or Corequisite: GEOL 5123.

GEOL5153 Environmental Site Assessment (IR) Principles, problems, and methods related to conducting an environmental site assessment. An applied course covering field site assessment, regulatory documentation, and report preparation. (Same as ENDY 5153) Prerequisite: GEOL 4033.

GEOL5163 Hydrogeologic Modeling (IR) Topics include numerical simulation of ground water flow, solute transport, aqueous geochemistry, theoretical development of equations, hypothesis testing of conceptual models, limitations of specific methods, and error analysis. Emphasis on practical applications and problem solving. Prerequisite: GEOL 4033 and computer literacy.

GEOL5223 Sedimentary Petrology (FA) Sediments and sedimentary rocks. Lecture 2 hours, laboratory 2 hours per week. Corequisite: GEOL 5220L. Prerequisite: GEOL 4223.
GEOL5220L Sedimentary Petrology Laboratory (FA) Corequisite: GEOL 5223.
GEOL5263 Hydrochemical Methods (SP) Collection, analytical and interpretation techniques and methods for water, including quality control and quality assurance. Prerequisite: CHEM 1123 and CHEM 1121L.
GEOL5423 Remote Sensing of Natural Resources (SP, Odd years) Advanced course in remote sensing technology with special emphasis on interpretive techniques for resource management and research. Prerequisite: GEOL 4413.
GEOL5444 Advanced Petroleum Geology (SP, Even years) Advanced well logging techniques, quantitative analysis, and subsurface correlation. Lecture 3 hours, laboratory 2 hours per week. Corequisite: GEOL 5440L. Prerequisite: GEOL 4253.
GEOL5440L Advanced Petroleum Geology Laboratory (SP, Even years) Corequisite: GEOL 5444.
GEOL5533 Marine Geology (FA) Geological principles as applied to the study of the world's ocean basins. Course includes basic theories of ocean basin evolution, continental margin evolution, coastal geologic processes, and methods of study of deep sea records of global change and paleoceanography. (Same as ENDY 5533) Corequisite: GEOL 5530L.
GEOL5530L Marine Geology Laboratory (FA) Corequisite: GEOL 5533.
GEOL5543 Tectonics (FA) Development of ramifications of the plate tectonics theory. Analysis of the evolution of mountain belts. Lecture 3 hours per week. Prerequisite: GEOL 3513 and GEOL 3511L.
GEOL560V Graduate Special Problems (2-6) (FA, SP, SU) Library, laboratory, or field research in different phases of geology. May be repeated for 4 hours.
GEOL600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

GERMAN

(See Foreign Language, page 86)

HEALTH SCIENCE (HLSC)

(See also Health Science, Kinesiology, Recreation, and Dance)

Ro DiBrezzo
Department Head
306 HPER Building
575-2857

Dean Gorman
Coordinator of Graduate Studies
308W HPER Building
575-2890

Degrees Conferred: M.S., Ph.D. (HLSC)

Areas of Concentration: community health, patient education, corporate health promotion, health counseling, school health, and health care administration.

Prerequisites to Degree Program: For acceptance to the master's degree programs the program area requires, in addition to the general requirements for admission to the Graduate School, an undergraduate degree in Health Science or in a related field and the following admission standards: an overall undergraduate GPA of 3.00, or if the overall undergraduate GPA is between 2.70 and 2.99, the student must have a 3.00 GPA on the last 60 hours of undergraduate course work (excluding student teaching), or a GRE score of 1000 on the combined verbal and quantitative parts of the general test.

Requirements for the Master of Science Degree: Candidates for the Master of Science degree in health science must complete 27 semester hours of graduate work and a thesis or 33 semester hours without a thesis. The corporate health promotion and health care administration concentrations require 39 semester hours of graduate work and a thesis or 45 semester hours without a thesis. Students selecting the non-thesis option are required to complete three hours of HLSC 589V, Independent Research. In addition to the program requirements listed below, all degree candidates must successfully complete a written comprehensive examination.

Community Health Course Concentration: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics,
OR EDFD 6403, Elementary Statistics and Data Processing Applied to Education
HKRD 5353, Research in HKRD

Required Courses (15)
HLSC 5563, Public Health, OR HLSC 5633, Health Service Admin.
HLSC 5573, Principles of Health Education
HLSC 5613, Principles of Epidemiology
HLSC 5623, Health Planning
HLSC 6333, Health Behavior Research,
OR HLSC 5353, Health Counseling,
OR HLSC 699V (3), Seminar

Required Internship (3)
HLSC 574V, Internship

Required Project or Thesis (3-6)
HLSC 589V, Independent Research (master's degree project), OR
HLSC 600V, Master's Thesis

Approved Electives (3-6)

Patient Education Course Concentration: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics
OR EDFD 6403, Elementary Statistics and Data Processing Applied to Education
HKRD 5353, Research in HKRD

Required Courses (15)
HLSC 5353, Health Counseling
HLSC 5563, Public Health,
OR HLSC 5613, Principles of Epidemiology
HLSC 5573, Principles of Health Education
HLSC 5623, Health Planning,
OR HLSC 5633, Health Service Admin.
HLSC 6333, Health Behavior Research,
OR HLSC 699V (3), Seminar

Required Internship (3)
HLSC 574V, Internship

Required Project or Thesis (3-6)
HLSC 589V, Independent Research (master's degree project), OR
HLSC 600V, (Master's Thesis)

Approved Electives (3-6)

Corporate Health Promotion Course Concentration: (45 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics, OR EDFD 6403, Elementary Statistics and Data Processing Applied to Education
HKRD 5353, Research in HKRD

Required Courses (12)
HKRD 5983, Health Promotion in/Workplace
HLSC 5353, Health Counseling
HLSC 5573, Prin of Health Education
HLSC 5623, Health Planning

Business Administration/Communication Component (9)-Selected from the following with approval of adviser
RECR 5883, Recreation Services Promotion
MKTT 5433 Consumer and Market Research
HKRD 5893, Public and Private Finance in HKRD
RECR 6533, Legal and Political Aspects
HKRD 5873, Leadership in HKRD Services
COMM 5403, Organizational Communication Theory
JOUR 5063, Issues in Advertising and Public Relations

Behavioral Sciences Component (6)-Selected from the following with approval of adviser
EDFD 5393, Psychological Foundations of Teaching and Learning
PSYC 4133, Behavior Modification
PSYC 5163, Theories of Personality
PSYC 4073, Psychology of Learning
SOCI 5153, Sociological Perspectives on Social Psychology
SOCI 5163, Sociology of Health Care Systems

Required Project or Thesis (3-6)
HLSC 589V, Independent Research (master's degree project), OR
HLSC 600V, Master's Thesis

Approved Electives (6-9) Health Counseling Course Concentration: (52 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics OR EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Counseling Courses (28)
CNED 5203, Introduction to Counseling
CNED 5213, Lifestyle & Career Development
CNED 5303, Individual Appraisal
CNED 5323, Counseling Theory
CNED 5333, Basic Counseling Techniques
CNED 5343, Counseling Practicum
HLSC 5353, Health Counseling
CNED 5363, Dynamics of Group Counseling
CNED 5372, Ethical and Legal Issues in Counseling
CNED 599V, Seminar

Program Core Courses (3)
HLSC 5573, Principles of Health Education

Internship (6)
CNED 574V, Counseling Internship

Required Project or Thesis (3-8)
HLSC 589V, Independent Research (master's degree project), OR
HLSC 600V, Master's Thesis

Approved Electives (0-6)

Health Care Administration Concentration: (45 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics, OR EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Core Courses (15)
HLSC 5633, Health Services Administration
HLSC 5623, Health Planning
HLSC 5563, Public Health
HLSC 699V, Seminar: Law & Public Policy
Governing Health Care Delivery Systems
HLSC 699V Seminar: Total Quality Management & Evaluation For Health Delivery Services.

Business Administration Core (12)- Select 4 from the following 6 courses listed with approval of adviser
ACCT 5122, Introduction to Management Accounting
MKTT 5103, Marketing Concepts
MKTT 5433, Consumer and Market Research
MGMT 5203, Managerial Process/ Organizational Behavior
MGMT 5373, Management of Human Resources

Required Project or Thesis (3-6)
HLSC 589V, Independent Research (master's degree project), OR
HLSC 600V, Master's Thesis

Approved Electives (6-9)

School Health Course Concentration: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistics, OR EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Remaining Education Core (6)
CNED 5203, Introduction to Counseling
ETEC 5213, Introduction to Ed. Media
EDFD 5373, Psychological Foundations of Teaching and Learning
EDFD 5303, Historical Found. Of Modern Ed., OR
EDFD 5353, Philosophy of Education

Required Courses (9)
HLSC 5553, School Health Program
HLSC 5573, Prin of Health Education
HKRD 5373, Problems in HKRD

Required Project or Thesis (3-6)
HLSC 589V, Independent Research (master's degree project),OR
HLSC 600V, Master's Thesis

Approved Electives (6-9)

Prerequisites to the Ph.D. Degree Program: The applicant must have completed a master's degree or its equivalent in health science or a closely related field and meet general admission requirements of the Graduate School. An application should include identification of applicant's objectives, supportive background information including three letters of recommendation supporting the applicant's ability to successfully pursue a Ph.D. in health science; a GPA of at least 3.00 on all graduate course work; and an acceptable score on the Graduate Record Examinations (GRE). Additional prerequisites may be prescribed after review of application materials.

Requirements for the Doctor of Philosophy Degree: A minimum of 96 graduate hours beyond the bachelor's degree is required. A doctoral advisory committee will be established by the student in consultation with the Coordinator of Graduate Study during the first semester of enrollment subsequent to acceptance into the degree program. The student, in conjunction with the advisory committee, will define the program of study. The degree program requires successful completion of candidacy examinations, an acceptable dissertation, and an oral defense of the dissertation. These last requirements are described elsewhere in this catalog on pages 35 and 36. Further requirements of the Doctor of Philosophy degree in health science include:

Departmental Core Requirements
Required Prerequisites: (12)
HLSC 5573, Principles of Health Education
HLSC 5563, Public Health
HLSC 5613, Principles of Epidemiology I
HLSC 5623, Health Planning

Required Courses: (15)
HLSC 6333, Health Behavior Research
HLSC 6553, Environmental Health
HLSC 6733, Health and the Aging Process
HLSC 6833, Principles of Epidemiology II
HLSC 699V(3), Seminar

Research and Statistical Requirements
Required Prerequisites: (6)
HKRD 5353, Research in HKRD
EDFD 5393, Applied Educational Statistics, OR EDFD 6403, Elementary Statistics/Data Processing Applied to Education (or equivalent)

Required Courses: (6)
EDFD 6413, Experimental Design in Education
EDFD 6423, Multiple Regression Techniques for Education

Additional Courses (9)- Selected from the following with the approval of adviser
EDFD 6533, Qualitative Research
EDFD 6453, Applied Multivariate Statistics
EDFD 6623, Techniques of Research in Education
EDFD 6653, Measurement and Evaluation
EDFD 699V(3), Seminar
HKRD 699V(3), Seminar
*other adviser approved 5000 or 6000 level research and/or statistics courses

Field of Study (9)
Students, in consultation with their doctoral advisory committee, will identify further course work comprising a field of study in

health science, consistent with the goals and objectives of the students and institution. Course work may be selected from several related disciplines or a single discipline.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in the doctoral program in health science. See page 163 for additional information.

COURSES: HEALTH SCI (HLSC)

HLSC5353 Health Counseling (SP) A review of the role and function of the health counselor including a focus on problem solving approaches for coping with daily problems of living, decision making, and life style planning. (Same as CNED 5353)
HLSC5543 Contemporary Issues in Human Sexuality (FA) Indepth analysis of the social, biological, and behavioral factors associated with the development of one's sexuality.
HLSC5553 School Health Programs (FA) Study of program content, program organization, and administrative details in planning and conducting a school program which includes healthful school living, health services, and health instruction.
HLSC5563 Public Health (FA) Acquaints the student with the structure, functions, and major problems in public health and with the role of education in public health.
HLSC5573 Principles of Health Education (FA, SP, SU) Current trends, basic issues, controversial issues, and fundamental principles of health education.
HLSC5583 Voluntary Health Agencies (FA, SP, SU) Introduction to a variety of voluntary health agencies in the community. Opportunities to visit these agencies will be provided. Purpose, objectives, functions, and programs will be presented by representatives of selected agencies.
HLSC560V Workshop (1-6) (IR)
HLSC5613 Principles of Epidemiology (FA, SP, SU) Distribution and patterns of disease or physiological conditions within populations; an examination of the nature of epidemiological research.
HLSC5623 Health Planning (FA, SP, SU) Emphasis is on examination of health planning processes, principles, and concepts. Methods for health planning agencies, issues in comprehensive health planning, and analysis of decision making steps for program implementation will be addressed.
HLSC5633 Health Services Administration (FA, SP, SU) Emphasis is on an examination of administrative factors related to health services. Administrative and professional authority, boards, consumers, delivery of services, federal role, and cost containment will also be addressed.
HLSC574V Internship (1-6) (IR)
HLSC589V Independent Research (1-6) (FA, SP, SU) Development, implementation, and completion of graduate research project. Prerequisite: M.S. degree in health science and HPER 5353 and EDFD 5393.
HLSC599V Seminar (1-3) (IR) May be repeated for 18 hours.
HLSC600V Master's Thesis (1-6) (FA, SP, SU)
HLSC605V Independent Study (1-6) (FA, SP, SU) Provides students with an opportunity to pursue special study of education problems.
HLSC6333 Health Behavior Research (FA) A review of human behavior and its relationship to health and well being. Focuses on contemporary health behavior research and instrumentation.
HLSC6443 Health & Health Care in Cross-Cultural Settings (FA, SP, SU) The relationship of socio-political and cultural factors to primary health care and public health in developed and developing countries is emphasized. Epidemiological factors influencing health status in various countries are reviewed.
HLSC6553 Environmental Health (FA, SP, SU) An analysis and evaluation of the various environmental factors that influence our health. Causes of problem factors are identified and solutions proposed for improving environmental conditions.
HLSC6733 Health and the Aging Process (FA, SP, SU) An overview of the health-related issues facing elderly populations with indepth study of the biological and behavioral changes associated with aging.
HLSC674V Internship (1-3) (FA, SP, SU) Provide Ph.D. students with an individualized college teaching experience in collaboration with a faculty mentor. Enrollment concurrent with residency. Prerequisite: admission to the Ph.D. in Health Science degree program.
HLSC6833 Principles of Epidemiology II (FA, SP, SU) Provides students with knowledge and skills necessary to design, conduct, and interpret observational epidemiological concepts, sources of data, prospective cohort studies, retrospective cohort studies, case-control studies, cross-sectional studies, methods of sampling, estimating sample size, questionnaire design, and effects of measurement error. Prerequisite: EDFD 5393 or EDFD 6403.
HLSC699V Seminar (1-3) (FA, SP, SU) Discussion of selected topics and review of current literature in the health sciences. Prerequisite: advanced graduate standing.

DEPARTMENT OF HEALTH SCIENCE, KINESIOLOGY, RECREATION, AND DANCE (HKRD)

Ro DiBrezzo
Department Head
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575-2857

• University Professor Brown • Professors DiBrezzo, Fort, Gorman, Hunt, Riggs, Young • Adjunct Professors Gagliardi, Guyton • Associate Professors Jones, Langsner, Lirgg, Moiseichik • Assistant Professors Graening, McWhorter, Morgan, Turner • Clinical Assistant Professor Kern • Instructors Edmonston, Smith-Nix

COURSES: HEALTH SCIENCE, KINESIOLOGY, RECREATION AND DANCE (HKRD)

HKRD5353 Research in Health Science, Kinesiology, Recreation and Dance (FA, SP, SU) Methods and techniques of research in health education, physical education and recreation including an analysis of examples of their use and practice in their application to problems of interest to the student.
HKRD5373 Problems in Health Science, Kinesiology, Recreation, and Dance (SU) A study of current problems in the field of health education, kinesiology, and recreation.
HKRD560V Workshop (1-3) (FA, SP, SU)
HKRD5873 Leadership in HKRD Services (FA) Considers research, theory, and practical applications of leadership principles utilized in the provision of HKRD services. Focus is on motivation, attitude, communication, group dynamics, and problem solving.
HKRD5883 Sports Facilities Management (FA) Considers basic elements and procedures in the planning, design, construction, operation, and maintenance of sport facilities; management considerations in conducting various types of events.
HKRD5893 Public and Private Finance in HKRD (FA, SP, SU) Develops an understanding of both public and private finance management for students in public and private management positions. Provides an understanding of the budgeting processes and techniques used in obtaining and controlling funds, including private sector finance problems in areas of credit, pricing, indexing, and debt management.
HKRD5983 Health Promotion at the Workplace (FA, SP, SU) Examines specific for health promotion programming, organizational and administrative schemes for program delivery, and appraisal systems for determining health programming priorities in workplace settings.
HKRD599V Seminar (1-3) (FA, SP, SU)
HKRD6133 Issues in HKRD (SU) A review of the significant social, demographic, behavioral, developmental, and technological issues that influence health, kinesiology, and recreation programs. Pre- or Corequisite: for doctoral level students only.
HKRD6233 Management in HKRD (SP) Deals with principles, procedures, relationships, problems, and current practices in the supervision of health education and kinesiology. Includes management of facilities, programs, personnel, and processes.
HKRD6333 Measurement in HKRD (SP, SU) Competencies for analysis and application of evaluation and measurement in HKRD.
HKRD660V Workshop (1-3) (FA, SP, SU)
HKRD689V Directed Research (1-6) (FA, SP, SU) Laboratory investigations, in basic and applied research.
HKRD699V Seminar (1-3) (FA, SP, SU)
HKRD700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

HIGHER EDUCATION (HIED)

Christopher J. Lucas
Department Head of Educational Leadership, Counseling, and Foundations
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575-4207

John W. Murry, Jr.
Coordinator of Graduate Studies
251 Graduate Education Building
575-2207

• Professors Gearhart, Hammons, Lucas
• Associate Professors Gohn, Murry
• Adjunct Assistant Professors Conneely, Gordon, Stauffacher

Degrees Conferred:
M.Ed. (HIED)
Ed.S., Ed.D. (EDUC)

Areas of Specialization: The Higher Education program prepares students for professional competence, leadership, and service in two areas: administration (including student personnel work) and college teaching. A third program option combining elements of both administration and college teaching also may be selected. Within these areas of specialization, practicing professionals as well as persons entering the higher education field, may pursue programs emphasizing community colleges, four-year colleges and universities, or state, regional, or national agencies.

Prerequisites for Acceptance to the Program: In addition to meeting university requirements for admission to the Graduate School, all students seeking admission to the higher education program must complete departmental application procedures which include program application, three letters of reference, an autobiographical sketch, a sample of their writing ability, and for all educational specialist and doctoral applicants, a Miller Analogies or Graduate Record Examinations score, and a personal interview with members of the higher education faculty.

Requirements for the Master of Education Degree: The master's degree program in Higher Education provides academic preparation for persons who plan to seek entry level positions at the director or assistant director level in both two-year and four-year institutions for which a master's degree is appropriate preparation including community colleges and technical colleges, liberal arts colleges, and four-year colleges and universities. Depending upon prior experience, graduates may expect to find employment in a

wide variety of positions in residence life, financial aid, career planning and placement, student activities, student union management, alumni affairs, development, public information, continuing education, financial management, human resources, and institutional research, or as adviser to fraternities and sororities, or minority students.

In combination with course work outside of Higher Education, students may prepare for positions in development studies and in other beginning level positions in post-secondary institutions and educational agencies.

The 33 graduate-semester-hour program (or 27 hours and a thesis) includes a minimum of 21 graduate semester hours in Higher Education, a minimum of 6 semester hours of adviser- approved electives, and 3 semester hours in research or statistics, Additionally, students with no prior experience in post-secondary institutions will be expected to complete one or more internships.

Requirements for the Educational Specialist Degree: Two options are available: one in college teaching and one in college administration. While both programs are designed primarily for persons currently employed in post-secondary education, they can, under certain circumstances, be used as pre-service preparation for persons presenting two years of relevant experience. Each option contains a minimum of 30 graduate semester hours including 15 semester hours in higher education, 3 semester hours in research or statistics, a written project, and a minimum of 6 graduate semester hours of approved electives from outside Higher Education (previous graduate work may be counted toward this requirement). Students enrolled in either specialization with no prior full-time experience directly in keeping with their goals will be required to complete one or more internships. A basic requirement for majors in college teaching is the completion of a minimum of 30 graduate semester hours of course work in one or more intended teaching field(s) (including previous graduate work).

Requirements for the Doctor of Education Degree: Three program concentrations are offered: college teaching, administration, and a specialization combining elements of both. Each student's program of study includes 11 semester hours of Higher Education core courses, 9 semester hours of courses stipulated for an area of specialization, of 6 semester hours of electives in Higher Education, 9 semester hours from outside Higher Education; and 9-12 semester hours in research methods and statistics. Programs for students in the administration specialization must contain 9 graduate semester hours in courses outside Higher Education while those in the college teaching specialization must contain a minimum of 45 post-baccalaureate, graduate semester hours in a teaching field(s). Students without three years of relevant experience in their field(s) of intended endeavor will be required to complete one or more appropriate internships.

COURSES: HIGHER EDUC (HIED)

HIED5003 Overview-American Higher Education (FA) A basic course in the study of higher education open to all students seeking careers in colleges and universities. Serves as an introduction to the programs, problems, issues, and trends in higher education.

HIED5033 College Students and Student Personnel Services (FA) Study of origins, functions, and policies in student personnel services in contemporary 2- and 4-year colleges and universities with emphasis on the student and student development.

HIED504V Practicum in Higher Education (1-6) (FA, SP, SU) Students are assigned to a department or agency within or outside the university for professional experience under the joint supervision of on-site personnel and university faculty. Periodic meetings are scheduled for evaluation, discussion, and examination of techniques.

HIED5043 The Student in Higher Education (SP) Provides those who work or plan to work in post secondary educational institutions with an understanding of the student population in contemporary colleges and universities.

HIED5053 The Community-Junior College (FA) An overview of the community college. Topics include the history and philosophy of the community college movement, students, curriculum, state and local campus governance, teaching, student personnel work, finance and issues, problems, and trends.

HIED5083 History and Philosophy of Higher Education (SP) An examination of the history and development of higher education including the study of the philosophy, objectives, and functions of various types of institutions.

HIED560V Workshop (1-6) (IR) Practical and concentrated consideration of selected topics of current interest to practitioners.

HIED574V Internship (1-3) (FA, SP, SU) Supervised field experiences in student personnel services, college administration, academic advising, institutional research, development, or other areas of college and university work.

HIED600V Master's Thesis (1-6) (FA, SP, SU)

HIED6013 The Professoriate: Problems and Issues (SP) An examination of the vital issues and trends affecting college faculty personnel with emphasis upon institutional practices and policies.

HIED6022 Introduction to the Study of Higher Education (FA, SP) A requirement for all new doctoral and specialist students. Familiarization with writing requirements, library search procedures, library resources, and program requirements. Prerequisite: admission to Higher Education program (Ed.S. & Ed.D.)

HIED605V Independent Study (1-6) (FA, SP, SU) Provides students with an opportunity to pursue special study in higher education.

HIED6073 Management of Higher Education Institutions (SU) Principles and concepts of management and their application in college and university settings.

HIED6173 Individual and Group Management Skills (SP, Even years) Development of knowledge, skill, and confidence in personal management, interpersonal relations, and structured group facilitation in a higher education setting.

HIED6183 Organization Development and Change in Higher Education (SU) An examination of the theory and practice of organization development as it relates to planned change in colleges and universities.

HIED6323 Design and Evaluation of College Teaching (FA, SU) Theory and practice of effective college teaching. Emphasis is placed on preparation and evaluation of instruction.

HIED6333 Curriculum Design in Higher Education (FA, Odd years) Types of undergraduate curricula and their supporting philosophies; approaches to curricula planning and assessment; curricular reforms; and factors influencing curricular policy making.

HIED6343 Strategies for Effective College Teaching (SP, Even years) An examination of traditional and innovative instructional strategies for use in college teaching.

HIED6423 Trends, Issues and Problems in Higher Education (FA, Odd years) A study of the current problems and trends related to the field of higher education.

HIED6653 Legal Aspects of Higher Education (SP) An examination of the legal status of higher education in the United States; the rights and responsibilities of educators and students including fair employment; due process; torts liability and contracts; student rights landmark court decisions; federal and state legislation having an impact on education.

HIED6663 Finance and Fiscal Management (SP) Higher education finance and budgeting practices: problems, issues, trends, and policy issues in higher education.

HIED6683 Governance and Policy Making in Higher Education (FA, Odd years) An analysis of governance and policy making affecting the control of colleges and universities. Attention is given to policy generation, governing board supervision, and the impact of institutional, professional, and regional groups as well as community, state, and federal pressures.

HIED674V Internship (1-6) (FA, SP, SU) Supervised field experiences in student personnel services, college administration, college teaching, institutional research, development, or other areas of college and university work.

HIED680V Ed.S. Project (1-6) (FA, SP, SU)

HIED699V Seminar (1-6) (FA, SP, SU) A series of seminar for specialized study into areas of current significance in postsecondary education, such as leadership and planning; organization, development, and change; human resource development and appraisal; the student in higher education; etc.

HIED700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF HISTORY (HIST)

Jeannie M. Whayne
Department Chair
416 Old Main
575-3001

• Distinguished Professors Jones, West, Woods • Professors Bukey, Engels, Kennedy, Sutherland, Tsai • Associate Professors Chappell, Coon, Finlay, Gordon, Sloan, Sonn, Tucker, Whayne, Williams
• Assistant Professors McCann, Robinson

Degrees Conferred: M.A., Ph.D. (HIST)

Prerequisites to Degree Program: Graduate work in history at the master's level presupposes an undergraduate major in that subject of approximately 30 semester hours. In addition, students must have achieved a verbal/analytical score of 1100, or a verbal/analytical/history subject score of 1600, on the Graduate Record Examinations. Students who present a minimum of 30 hours may be admitted without deficiency. Students who present between 18 and 30 hours of history may be admitted with or without deficiency subject to the determination of the Department's Graduate Studies Committee. Students who present less than 18 hours of history may not be admitted without deficiency. The nature of the deficiency requirements will be determined by the Graduate Studies Committee.

Requirements for the Master of Arts Degree: Students seeking the Master of Arts degree must offer at least 30 hours of history at the 4000-level or above and HIST 5023 (Historical Methods). Included in the 30 hours must be nine in American history and

nine in European history. Students who write a thesis must complete six hours of HIST 600V (Master's Thesis) and a minimum of nine hours of seminar (reading or research) or historiography. Students who do not write a thesis must complete three hours of research seminar and an additional nine hours of seminar (reading or research) or historiography. Students not electing to write a thesis must also pass a written examination in three regional-national fields.

Requirements for the Doctor of Philosophy Degree: Applicants are generally required to have a master's degree in history (or the equivalent) with a 3.20 grade-point average in graduate history courses and a verbal/analytical score of 1100, or a verbal/analytical/history subject score of 1600, on the Graduate Record Examinations. Applicants without a master's degree in history (or its equivalent), but with exceptionally strong qualifications, may be admitted directly into the Ph.D. program at the discretion of the Graduate Studies Committee of the Department of History.

During the first semester of study all students will be assigned an advisory committee that will determine their particular programs. Students will select four fields of historical specialization, three from the major area and one from the minor area. Students will also be required to meet the departmental language procedure in establishing competency in two foreign languages. At the discretion of the advisory committee, competency in statistics or quantitative analysis may be substituted for one of the languages.

After completing the course of study prescribed by their advisory committees and satisfying the language requirements, students may apply to take the candidacy examinations. These consist of written examinations in each of the four specialized fields. When these examinations have been passed, students may apply for admission to candidacy.

All students must demonstrate a capacity for independent research by the writing of an original dissertation on a topic within their major area of study. Upon admission to candidacy, students will be assigned a dissertation committee with a major professor as chair to direct the research and writing. Under direction of the major professor, candidates will develop programs of reading in the general areas and research techniques pertinent to researching and writing their dissertations. To demonstrate competency in this preparation, students will be given oral examinations by their dissertation committees. Examinations should be taken no later than the end of the semester immediately following that in which the written qualifying examinations are passed.

The student's final examination will be oral and will be primarily a defense of the dissertation.

Although the Doctor of Philosophy degree is primarily a research degree, most successful candidates engage in teaching as a major feature of their careers. Therefore, each doctoral candidate in history is required to engage in teaching activities in the Department before completion of the program.

COURSES: HISTORY (HIST)

HIST4003 Greece and the Ancient Near East (FA, Odd years) An introduction to the origins of civilization in the ancient Near East and Greece. Emphasis placed upon the development of agriculture and cities, Hebrew religious ethics, and Greek culture, political institutions, and thought.

HIST4013 Alexander the Great and the Hellenistic World (SP, Even years) A survey of the achievements of Alexander and the culture of the new world he created. The personality and career of Alexander are examined as well as the rich diversity of the Hellenistic world: trade with India, religious syncretism, and the development of Hellenistic science and philosophy.

HIST4023 The Roman Republic and Empire (FA, Even years) An introduction to Rome's cultural development from its origins as a small city state in the 8th century B.C. to its rule over a vast empire extending from Scotland to Iraq. Emphasis is placed upon the causes of Roman expansion during the Republic, the urbanization and Romanization of Western Europe, and the persecution and spread of Christianity.

HIST4043 Late Antiquity and the Early Middle Ages (IR) This course examines the political, spiritual, intellectual, and social-economic developments of European history, c. 300-1000 CE. Special topics include the Christianization of the late Roman Empire and Byzantium, as well as the formation of Celtic and Germanic Kingdoms in the West.

HIST4053 Late Middle Ages (IR) This course examines the political, social-economic, intellectual, and spiritual developments of European history, c. 1000-1400 CE. Special topics include monasticism, sacral kingship, the crusades, and the medieval university.

HIST4073 Renaissance and Reformation, 1300-1600 (FA, Even years) Examines the history of Europe from the end of the Middle Ages through the Renaissance to the Reformation and Counter-Reformation. Special attention is paid to changes in popular piety, political thought, religious representation, and the discovery of the New World.

HIST4083 Early Modern Europe, 1600-1800 (SP, Odd years) Begins with the upheaval of the reformation, moves through the crisis of the 17th century and culminates with the democratic revolution of the 18th century. Examines the consolidation of the European state system, the propagation of modern science, discovery of overseas worlds, and the advent of the Industrial Revolution.

HIST4103 Europe in the 19th Century (IR) European history from the Congress of Vienna to the outbreak of World War I, with emphasis on political and diplomatic history.

HIST4113 Twentieth Century Europe, 1898-1939 (FA, Even years) Background and impact of World War I to the outbreak of World War II.

HIST4133 Society and Gender in Modern Europe (SP, Odd years) Changing values and attitudes toward childhood, family life, sexuality, and gender roles in Europe from the Renaissance to the present. The social impact of the Industrial Revolution, urbanization, demographic change, and the two world wars.

HIST4143 Intellectual History of Europe Since the Enlightenment (FA, Even years) A survey of the major developments in European thought and culture since the emergence of Romanticism. Topics include Romanticism, Darwinism, Marxism, and Modernism.

HIST4163 Tudor-Stuart England (FA, Even years) Examines the history of England from the Henrician Reformation of the early 16th century through the Glorious Revolution of 1688 to the early 18th century. The Elizabethan Renaissance, the rise of Puritanism, the Revolution of the 1640s and the creation of an overseas empire are given special consideration.

HIST4183 Great Britain, 1780-1914: Industry and Empire (SP, Even years) An inquiry into effects of industrialization, class consciousness and imperialism on British politics, culture and society during the Victorian Era.

HIST4193 Great Britain, 1901-1982: Empire to Welfare State (SP, Even years) Consideration of Imperial Britain from the Angle-Boer conflict to the Falkland Islands War, with emphasis on the effects of the Great Depression and the emergence of the modern welfare state.

HIST4213 The Era of the French Revolution (FA) France in Old Regime, the Enlightenment, and the French Revolution.

HIST4223 France Since 1815 (SP, Even years) Survey of French history from the overthrow of Napoleon to the 5th Republic, with emphasis on French politics, society, and culture.

HIST4243 Germany, 1789-1918 (FA, Even years) Survey of Germany from Age of Absolutism to collapse of the Hohenzollern monarchy with emphasis upon political, social, and economic developments.

HIST4253 History of Germany, 1918-1949 (FA) Survey of Germany from advent of the Weimar Republic to 1949 with emphasis upon the failure of democratic government in the 1920s, the National Socialist dictatorship, and the division of Germany into two separate states.

HIST4273 Russia to 1801 (FA, Odd years) Survey of the origins, emergence and extension of Russia.

HIST4283 Russia, 1762-1917 (FA, Even years) Study of the political, social and cultural development of Russia, with emphasis on the 19th century.

HIST4293 Russia Since 1905 (SP) Survey of political, cultural and intellectual trends in modern Russia with emphasis upon the Revolutions of 1917, the Soviet Union, and its successor states.

HIST4313 History of China to 1644 (FA, Odd years) A history of pre-modern China, including the study of Confucianism, Taoism and Buddhism.

HIST4323 Modern China (SP, Odd years) Survey of Chinese culture, society, government and diplomacy between 1644 and 1912.

HIST4343 Modern Japan (IR) Survey of Japanese history since 1859 to the downfall of Tokugawa shogunate through the two world wars to the rise of an economic superpower. Emphasis is placed on Japanese economic, social, and political questions, including their successes and costs.

HIST4353 Middle East, 600-1500 (FA, Even years) An examination of the origins of modern Middle Eastern societies-Arabic, Turkish, and Persian-with emphasis upon the development of the Islamic faith and culture.

HIST4373 Mongol & Mamiuk Middle East 1250-1520 (SP, Even years) An examination of Egypt, the Fertile Crescent, and Iran in the period of the Turco-Mongol military elites. Special attention given to the rise of slave and free governments and their roles in shaping Middle East political and social patterns.

HIST4383 The History of Sub-Saharan Africa (IR) A survey of the history of the major political, economic, and social institutions of Africa with the major emphasis on the civilizations of West Africa.

HIST4393 The Ottoman Empire and Iran 1300-1722 (SP, Odd years) An examination of Ottoman government and society in the {Classical Period{ as well as a survey of Iranian history from 1300 to 1722. Special attention given to the Ottoman ruling structure, religious-legal establishment, and Ottoman conquests in the Balkans and Arab world.

HIST4413 Women and Family in the Middle East Since 1800 (SP, Even years) An examination of Middle East women and families in historical and social context. Special attention given to both the links and tensions between family and women's history.

HIST4423 The Mediterranean World (FA, Even years) An introduction to the Mediterranean as a region, including both its northern and southern shores. Cultural, economic, and poltical themes are pursued regionally from the 16th century until present.

HIST4433 Social and Cultural History of the Modern Middle East (SP, Odd years) An analysis of Middle East history in the 17th-20th centuries which focuses on the social transformation of urban and rural life. Particular emphasis is given to the roles of economics, genealogy, art, and popular culture.

HIST4463 The American Frontier (SP) American westward expansion and its influence on national institutions and character. Emphasis on the pioneer family and the frontier's role in shaping American society, culture, economy, and politics. Topics include exploration, the fur trade, the cattle kingdom and the mining, farming, and military frontiers.

HIST4473 Environmental History (IR) Examines the interactions between human culture and the natural environments: Concepts of nature in the West and elsewhere, dynamics of the Physical Environment, case studies in Regional Environmental History and the Politics of Environmental movements.

HIST4483 Diplomatic History of U.S. 1890 to 1960 (FA, SP, SU) America's development as a world power from the Spanish-American War to Vietnam. Particular emphasis is placed on the Middle East, Europe, Latin America, and East Asia.

HIST4503 History of Political Parties in the United States, 1789-1896 (FA, Even years) Origin and development of the American party system from the implementation of the constitution to the election of McKinley.

HIST4513 History of Political Parties in the United States Since 1896 (SP, Odd years) Response of the party system to America's emergence as an industrial nation and world power from the election of 1896 to present.

HIST4533 American Social and Intellectual History to 1865 (FA) Survey of significant ideas and institutions from Colonial times through the Civil War with emphasis upon religious, educational, literary, and scientific developments.

HIST4543 American Social and Intellectual History Since 1865 (IR) Survey of thought and society since the Civil War with emphasis upon the nature of American life in the 20th century.

HIST4563 The Old South, 1607-1865 (FA, Odd years) Survey of the political, social, and economic development of the antebellum South.

HIST4573 The New South, 1860 to the Present (FA, Even years) Survey of the development of the Civil War and postwar South to the present.

HIST4613 Colonial America to 1763 (FA) Political, economic, and social history of colonial development from the time of contact to the Treaty of Paris, with primary, but not exclusive, emphasis upon Anglo-America.

HIST4623 Revolutionary America, 1763 to 1801 (SP) Political, economic, and social history of Revolutionary and post-Revolutionary America and the evolution of the new nation, with a particular emphasis upon the emergence on constitutional traditions.

HIST4643 The Jeffersonian Era, 1801-1828 (IR) Political, social, and economic development of the U.S. during the years of Republican supremacy from Jefferson's election to the election of Jackson.

HIST4653 The Age of Jackson, 1828-1850 (IR) Political, social, and economic history of the Unites States from 1828 to 1850, with particular emphasis upon the factors producing Jacksonian Democracy, Sectionalism, and Manifest Destiny.

HIST4663 Rebellion to Reconstruction, 1850-1877 (SP, Even years) A survey of political, social, and economic issues from the late antebellum period through Reconstruction. Emphasis is placed on the causes of the Civil War and the problems of postwar America. A brief examination of the Civil War is included.

HIST4673 The American Civil War (FA) An intensive study of the political, social, military, and economic aspects of the American Civil War period.

HIST4703 Emergence of Modern America, 1876-1917 (FA) A survey of the impact of the Industrial Revolution, Imperialism, and progressivism upon American life and institutions.

HIST4723 America Between the Wars, 1917-1941 (SP) The impact of World War I, the 1920s, and the Great Depression upon American society and culture.

HIST4733 Recent America, 1941 to the Present (SP) A general survey of American history since World War II with emphasis upon the presidency, reform movements, the Cold War, and cultural developments.

HIST4743 History of Brazil (SP, Even years) A survey of five centuries of a new world in the tropics, covering exploration and settlement, slavery and expert monoculture, industrialization, and popular culture. Prerequisite: HIST 3203 or HIST 3213.

HIST5023 Historical Methods (FA) Practical introduction to historical research and writing. Consists of lecture, library reading, and class criticism of research papers. Prerequisite: graduate standing.

HIST5043 Historiography (SP) Survey of the history of historical writing and a study of the important schools and historical interpretation. Prerequisite: graduate standing.

HIST5053 Reading Seminar in Asian History (FA, SP, SU) Concentrated reading in selected specialized areas of Asian history. Prerequisite: advanced graduate standing.

HIST506V Readings in European History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST507V Readings in American History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST508V Research Problems in European History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST509V Research Problems in American History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST5103 Reading Seminar in American History (FA, SP, SU) Historiographical and bibliographical study of special areas of U.S. history, such as the Age of Jackson, the Civil War, etc. Prerequisite: graduate standing.

HIST5123 Research Seminar in American History (FA, SP, SU) Research projects in selected fields of American history, such as the Civil War, the Age of Jackson, etc. Prerequisite: graduate standing.

HIST5133 Reading Seminar in European History (FA, SP, SU) Historiographical and bibliographical study of special periods in European history, such as the Roman Empire, the late Middle Ages, the French Revolution, etc. Prerequisite: graduate standing.

HIST5143 Research Seminar in European History (FA, SP, SU) Research projects in selected fields of European history, such as the French Revolution, humanism, etc. Prerequisite: graduate standing.

HIST5163 Research Seminar in British History (FA, SP, SU) Research projects in selected fields of British history.

HIST517V Readings in Asian History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST519V Readings in Near Eastern History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST520V Research Problems in Near Eastern History (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST5213 Reading Seminar in Middle Eastern History (FA, SP, SU) Historiographical and bibliographical study of special areas of Middle Eastern history. Prerequisite: graduate standing.

HIST5233 Research Seminar in Middle Eastern History (FA, SP, SU) Research projects in selected fields of Middle Eastern history. Prerequisite: graduate standing.

HIST560V Teaching Foreign Cultures in Social Studies Curriculum (1-6) (SU) Extensive examination of foreign cultures (West Europe, USSR, China, Latin America) and methods of teaching about them in secondary school social studies. Four week residential summer institute.

HIST600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HIST700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

DEPARTMENT OF HORTICULTURE (HORT)

John R. Clark
Interim Department Head
316 Plant Sciences Building
575-2603

• Professors Clark, Klingaman, Morelock, Murphy • Associate Professor Rom • Research Associate Professors Robbins, Striegler • Assistant Professors Andersen, Cole, Karcher, Lindstrom, Richardson

Degree Conferred: M.S. (HORT)

Areas of Concentration: genetics and plant breeding of fruit crops or vegetable crops; physiology and culture of fruit crops, vegetable crops, or ornamental crops; physiology and management of turfgrasses.

Prerequisites to Degree Program: A candidate must have a B.S. degree from an accredited institution with a background in physical and biological sciences, horticulture, and supporting agricultural disciplines. The student will be assigned a major adviser, who will arrange a committee to evaluate the student's background and plan a program of study with the student.

Requirements for the Master of Science Degree: A minimum of 24 semester hours of graduate level course work and 6 hours of thesis are required, in addition to any deficiency courses that may be specified. The student's advisory committee will also serve as the thesis and oral examination committee.

The Ph.D. program in plant science (page 115) is an interdepartmental program involving the Departments of Horticulture and Plant Pathology. The dissertation and most of the course work may be completed in horticulture.

COURSES: HORTICULTURE (HORT)

HORT400V Special Problems (1-6) (FA, SP, SU) Original investigations on assigned problems in horticulture. Prerequisite: junior standing.

HORT401V Special Topics in Horticulture, Turf or Landscape (1-6) (IR) topics relate to horticulture, turfgrass or landscape science or management not covered in other courses or a more intensive study of a specific topic. May be repeated.

HORT4033 Landscape Contracting and Management (SP, Odd years) Management of established residential, recreational, institutional, and commercial landscapes; development of cultural, pest management, irrigation, and landscape care; preparation of management specifications, bids, and contracts. Corequisite: HORT 4030L. Prerequisite: HORT 3123.

HORT4030L Landscape Contracting and Management Laboratory (SP, Odd years) Corequisite: HORT 4033.

HORT4103 Fruit Production Science and Technology (FA, Even years) The management technologies and cultural practices of fruit crops including (but not limited to) blueberries, blackberries, raspberries, strawberries, grapes, peaches, and apples will be presented. The underlying scientific principles of crop genetics, nutrition, and physiology will be presented as a basis for making management decisions in fruit crop productions. Corequisites: HORT 4100L. Prerequisites: HORT 2003.

HORT4100L Fruit Production Science and Technology Lab (FA, Even years) Corequisite: HORT 4103.

HORT4200L Small Fruit Production Laboratory (FA, Odd years) Corequisite: HORT 4203.

HORT4403 Plant Propagation (SP, Even years) Principles of plant propagation using seeds, cuttings, grafting, budding, layering, and tissue culture. The physiological basis of propagation is described. Knowledge of plant growth and physiology is needed. Lecture 2 hours, laboratory 2 hours per week. Corequisite: HORT 4400L.

HORT4400L Plant Propagation Laboratory (SP, Even years) Corequisite: HORT 4403.

HORT4413 Tissue Culture (FA, Even years) Principles and application of tissue culture techniques with emphasis on micropropagations and genetic manipulation for the improvement of horticultural and agronomic crops. Lecture topics cover aseptic techniques, medium preparation, regeneration through somatic embryogenesis and organogenesis, mutant selection, embryorescue, meristem culture, hapiold, somatic hybridization, and genetic transformation. Lecture 2 hours, laboratory 3 hours per week. Corequisite: HORT 4410L.

HORT4410L Tissue Culture Laboratory (FA, Even years) Corequisite: HORT 4413.

HORT4503 Nursery Management (FA, Odd years) Principles and practices in the production and handling of woody ornamental stock; management of the retail nursery and garden center. Lecture 2 hours, laboratory 2 hours per week. Corequisite: HORT 4500L. Prerequisite: HORT 2003.

HORT4500L Nursery Management Laboratory (FA, Odd years) Corequisite: HORT 4503.

HORT4603 Basic Home Landscape Design Studio (SP, Even years) Fundamental principles of landscape design with practical exercises in planning and preparing master planting plans and cost estimates for the home landscape. Laboratory 6 hours per week. Prerequisite: HORT 3103.

HORT4613 Advanced Home Landscape Design Studio (SP, Even years) Preparation of design installation detail drawing, specifications, cost estimates and competitive bid documents for planting and small scale construction in residential landscapes. Lecture 6 hours per week. Prerequisite: HORT 3103 and HORT 4603.

HORT464V Turf Management Internship (1-9) (FA, SP, SU) Practical experience in golf course management, sports turf management, residential and/or commercial turf management, turf production or related turf industries. May be repeated for 9 hours. Prerequisite: (60 hours

completed coursework or junior standing) and HORT 3901 and (HORT 2303 or HORT 3403 or HORT 4903).

HORT465V Horticulture Merchandising Internship (1-9) (FA, SP, SU) Practical work and study experience in companies in Horticultural business management. May be repeated for 9 hours. Prerequisite: (60 hours completed or junior standing) and HORT 3901.

HORT4703 Greenhouse Management (FA, Odd years) Greenhouse management and operation with special emphasis on construction, heating and cooling systems, energy conservation, daylength and temperature control and production cost management. Lecture 3 hours per week. Prerequisite: HORT 2003.

HORT4903 Golf and Sports Turf Management (FA, Odd years) Turf management techniques for golf courses, and athletic fields including species selection, root-zone construction and modification, fertilization, mowing, irrigation and pest control. Corequisite: HORT 4900L. Prerequisite: AGRN 2203 and AGRN 2201L and (HORT 2303 or HORT 3403).

HORT4900L Golf and Sports Turf Management Laboratory (FA, Odd years) Corequisite: HORT 4903.

HORT5001 Seminar (FA, SP) Review of scientific literature and oral reports on current research in horticulture. May be repeated for 4 hours.

HORT503V Special Problems Research (1-6) (FA, SP, SU) Original investigations on assigned problems in horticulture. Prerequisite: graduate standing.

HORT5043 Advanced Plant Breeding (FA, Odd years) Application of genetic principles to the improvement of crop plants. Presentation of conventional plant breeding methods and special techniques such as polyploidy, interspecific hybridization and induced mutation. Lecture 3 hours per week. Prerequisite: BIOL 3323 and BIOL 3321L (or ANSC 3123 and AGRN 4103).

HORT5343 Seed Physiology (SP, Even years) Physiological process and molecular regulation in the development, dormancy, germination, and early growth of seeds. A basic knowledge of plant physiology expected. (Same as PTSC 5343)

HORT600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

HORT602V Special Topics in Horticulture (1-3) (IR) Discussion and advanced studies on selected topics in genetics, plant breeding, physiology and culture of horticultural crops. May be repeated. Prerequisite: graduate standing.

HORT6033 Genetic Techniques in Plant Breeding (FA, Even years) Indepth study of genetic improvement and techniques. Covers both current and classical literature. Topics to be discussed: haploidy, genetic control of pairing, somaic instability, tissue culture and protoplast fusion, and male sterility. Lecture discussion 3 hours per week. Prerequisite: BIOL 3323 and BIOL 3321L (or ANSC 3123 and AGRN 4103 or equivalent).

HORT6044 Tissue Culture and Biochemical Methods in Plant Breeding (FA, Even years) Lecture, discussion and laboratory course, covering the latest biological, molecular genetics, biochemical genetics, and other techniques used in applied genetics and breeding of crop plants. Tissue culture, isoenzyme and protein analyses, and genetic engineering techniques are lab topics. Lecture and discussion stresses application of these methods to present and future crop improvement programs in agricultural and forest plants. Lecture-discussion 2 hours, laboratory 4 hours per week. Corequisite: HORT 6040L. Prerequisite: AGRN 4103 and BOTY 4304.

HORT6040L Tissue Culture and Biochemical Methods in Plant Breeding Laboratory (FA, Even years) Corequisite: HORT 6044.

COURSES: PLANT SCI (PTSC)

PTSC5343 Seed Physiology (SP) Physiological process and molecular regulation in the development, dormancy, germination, and early growth of seeds. A basic knowledge of plants physiology expected. (Same as HORT 5343)

The doctoral program in Plant Science is an interdepartmental program involving the departments of Plant Pathology and Horticulture. See page 115 for graduate courses in Plant Science.

SCHOOL OF HUMAN ENVIRONMENTAL SCIENCES (HESC)

Stephen Jorgensen
Director of the School
118 Home Economics Building
575-4305

• Professors Farmer, Jorgensen, Kenney, Martin, McCoy, Voth, Warnock, Whan • Associate Professors Bailey, Noble, Sizer, Turner • Assistant Professors Dennis, Fitch-Hilgenberg, Webb

Degree Conferred: M.S. (HESC)

Areas of Concentration: Human development and family sciences, apparel studies, food and human nutrition, general human environmental sciences, and rural sociology. (Rural Sociology M.A. is awarded in the Sociology Department.)

Prerequisites to Degree Program: In general, 12 semester hours in junior-senior courses in one or more given areas of human environmental sciences or related subject matter are considered minimum prerequisites to graduate study. Specific course minimums depend on the area of concentration chosen. Eligibility for admission to any of the program areas is determined by an admissions committee (appointed by the Director at the time an application for admission is received). The admissions committee specifies any deficiencies in admission requirements that must be met by students who are accepted. The Director recommends a major adviser to the Graduate Dean. The major adviser will, in consultation with the student, recommend faculty members to serve as the student's graduate advisory committee. Specific recommendations about the compositions of advisory committees appear in the Graduate Student Handbook for the School of Human Environmental Sciences.

Pre-requisites for the concentration in Rural Sociology are found in the description of the Sociology program.

Requirements for the Master of Science Degree: Students who specialize in apparel studies, food and human nutrition, or human development and family sciences are required to write a thesis based on their own research. Minimum degree requirements are 24 semester hours of course work and 6 semester hours of thesis research. Selection and execution of the research problem is directed by the major professor with the advice and approval of the advisory committee.

Students desiring education in human environmental sciences, rather than specialization in an area of subject matter, may pursue a course of study in general human environmental sciences. A thesis is optional. The course of study in general human environmental sciences (non-thesis option) requires a minimum of 33 semester hours of graduate-level work including 21 or more hours divided between at least two areas of human environmental sciences. The recommended split is at least 12 hours in one area and 9 hours in a second area. Credit requirements for students who elect to write a thesis are similar to those for students who specialize in an area of subject matter.

Requirements for the M.A. in Sociology with specialization in Rural Sociology:

SOCI 5013, Advanced Social Research, or
RSOC 5463, Research Methodology in Social Sciences.
SOCI 5083, Methods of Field Research
SOCI 5252, Classical Social Theory
SOCI 5262, Contemporary Social Theory
SOCI 5272, Theory Construction
SOCI 5313, Applied Data Analysis
SOCI 5311L, Applied Data Analysis Lab
RSOC 4623, Introduction to Community Development

In addition to these core courses, the student must take sufficient hours of electives to reach 31 semester hours total, and must complete a masters thesis. The student must also pass a comprehensive examination.

For all students, the total program of study, including work outside the Dale Bumpers College of Agricultural, Food and Life Sciences, will be outlined by the student's graduate advisory committee in terms of specific program requirements and individual students' needs. The School requires that at least 50 percent of the course requirements be earned from courses at the 5000 or 6000 level. All students must take at least one course each in statistics and in research methods. Specific degree requirements and other information pertinent to graduate study appear in the Graduate Student Handbook for the School of Human Environmental Sciences.

COURSES: HUMAN ENV SC (HESC)

HESC400V Special Problems (1-6) (FA, SP, SU)

HESC4023 Fashion Merchandising Methods (FA) Exploration of activities associated with the procurement of fashion apparel. A fashion analysis is directed toward apparel demands and the creation of a fashion statement by the use of specific quantitative skills. Course follows fashion item from the designer to the store rack. Lecture 3 hours per week. Prerequisite: HESC 3033.

HESC4033 Advanced Textile Study (FA) Practical consumer study of fabrics used for apparel and house furnishings including selection, use and care. Lecture 3 hours per week. Prerequisite: HESC 2053 and CHEM 1074 and CHEM 1071L.

HESC4043 History of Apparel (FA) The evolution of clothing from ancient times to the twentieth century with emphasis upon Western civilization. Cultural and economic factors affecting dress and customs associated with dress will be stressed. Lecture three hours per week. Prerequisite: ANTH 1023 or SOCI 2013.

HESC4053 Contemporary Apparel (SP) Fashion as a social force, the origin, scope, theory, and history of the fashion business, the materials of fashion, the fashion producers, auxiliary fashion enterprises, designers, fashion leaders, and leading market. Lecture three hours per week. Prerequisite: HESC 3033.

HESC4103 Experimental Foods (SP, Odd years) Application of experimental methods for investigations in cookery. Group and individual problems. Lecture 2 hours, laboratory 3 hours per week. Corequisite: HESC 4100L. Prerequisite: HESC 2113 and CHEM 1123 and CHEM 1121L (or HESC 2113 and CHEM 1074 and CHEM 1071L).

HESC4100L Experimental Foods Laboratory (SP, Odd years) Corequisite: HESC 4103.

HESC4123 Home Food Preservation (IR) Principles and techniques of food preservation in the home, by canning, freezing, drying, pickling, and preserving of jellied products. Lectures 2 hours, laboratory 3 hours per week. Corequisite: HESC 4120L. Prerequisite: CHEM 1074 and CHEM 1071L (or CHEM 1103 and CHEM 1101L) and HESC 2113.

HESC4120L Home Food Preservation Laboratory (IR) Corequisite: HESC 4123.

HESC4213 Advanced Nutrition (FA) Normal nutrition with emphasis on utilization of nutrients. Lecture and reports on current literature 3 hours per week. Pre- or Corequisite: CHEM 3813. Prerequisite: HESC 3204.

HESC4223 Nutrition During the Life Cycle (FA) Study of normal nutrition emphasizing quantitative needs for nutrients as functions of biologic processes that vary during stages of the life cycle. Nutritive needs during pregnancy and childhood are emphasized with some attention to nourishing aging and elderly adults. Factors that affect food choices and eating behavior are also considered. Lecture 3 hours per week. Prerequisite: HESC 1213 and either (ZOOL 2213 and ZOOL 2211L or ANSC 3032 or POSC 3032 and ANSC 3042 or POSC 3042) or (CHEM 1074 and CHEM 1071L and BIOL 1543 and BIOL 1541L).

HESC4243 Community Nutrition (SP, Odd years) Identifying, assessing, and developing solutions for nutritional problems encountered at the local, state, federal, and international levels. Lecture 3 hours per week. Pre- or Corequisite: HESC 3204.

HESC425V Food and Nutrition Seminar (1-2) (SP) Upperclassmen, graduate students and members of faculty meet weekly for presentation and discussion of selected topics. Two credits (2 semesters) required of all foods and nutrition graduate students. May be repeated for 2 hours.

HESC4260L Clinical Nutrition I Laboratory (FA, Odd years) Corequisite: HESC 4264.

HESC4273 Medical Nutrition Therapy II (SP, Even years) Principles of nutritional care with emphasis on pathophysiology, assessment, and treatment in critical illness. Lecture 3 hours per week. Prerequisite: HESC 4264.

HESC4433 Dynamic Family Interaction (SP) Examination of family interaction across the lifespan. Methods for enhancing marriage and family relations will be examined. Sources of marital conflict, intergenerational support and negotiations process will be analyzed. Lecture three hours per week. Prerequisite: HESC 1403 and HESC 2413 and junior standing.

HESC4443 Gerontology (SP) Physiological and psychological development of the aging individual, extended family relations, service networks for the elderly, and retirement activities. Some attention to housing and care needs of persons in advanced years. Lecture 3 hours per week. Seminar. Prerequisite: HESC 1403 (or HESC 2413 or PSYC 2003 or SCWK 2133) and junior standing.

HESC4453 Parenting and Family Dynamics (FA) Focus is on influence of parenting and family dynamics on individual development, especially factors in family life which contribute to normal psychological development. Topics include family values, the psychology of sex and pregnancy, the transition to parenthood, childbearing techniques, family influences on cognitive and social development, and changes in family relationships during the life cycle. Prerequisite: HESC 1403 or PSYC 2003.

HESC4463 Administration and Evaluation of Child Development Programs (SP) Information on planning, developing, operating, and evaluating child development programs. Topics include physical facilities, staff, curriculum, budgets, parent involvement, and education. Lecture and discussion 3 hours per week. Prerequisite: HESC 3403 and junior standing.

HESC4474 Child Development Practicum (SP) Planning, implementing, and evaluating directed experiences on campus and in the community with young children in group settings and with their parents. Lecture 2 hours, laboratory 6 hours per week. Corequisite: HESC 4470L. Prerequisite: HESC 2433 and HESC 3403.

HESC4470L Child Development Practicum Laboratory (SP) Corequisite: HESC 4474.

HESC4493 Public Policy Advocacy for Children and Families (FA) Public policy advocacy as related to children and family issues. Strategies for advocacy will be emphasized. Lecture three hours per week.

HESC455V Special Topics (1-6) (IR) Topics not covered in other courses, a focused study of specific topics in the students' areas of concentration.

HESC5003 Clothing and Textiles Studies (SP) Examination of theoretical base and published research in clothing and textiles. Review of social trends and their effects. Emphasis on understanding, interpreting and use of research in clothing and textiles, and related areas and the planning of scientific studies. Oral and written reports. Lecture 3 hours per week.

HESC5013 Recent Advances in Textiles and Clothing (FA) Recent advances and new developments in textile fabrics for clothing and home furnishings. Lecture 3 hours per week.

HESC502V Special Problems Research (1-6) (FA, SP, SU)

HESC5033 Principles of Textile Testing (SP) Study of textile testing machines and methods utilized to determine construction and performance characteristics of woven and knit fabrics. Lecture 1 hour, laboratory 4 hours per week.

HESC5030L Principles of Textile Testing Laboratory (SP)

HESC5203 Special Topics in Nutrition (SP) Critical review of current literature; reports and discussion of original nutrition research pertinent to the topic(s) identified for study. Lecture/seminar format 3 hours per week. May be repeated. Prerequisite: HESC 4213 (or ANSC 4143) and CHEM 3813.

HESC522V Readings in Nutrition (1-6) (FA, SP, SU) Seminar and individual study. Prerequisite: HESC 4213 or HESC 4223.

HESC5403 Advanced Family Relations (FA) Subtle elements in marriage, parent-child, and other relations among family members and between the family and the larger community. Recent cultural change as it affects the family. Recent research and literature. Prerequisite: graduate standing.

HESC5423 Theories of Human Development (FA) Classic and contemporary theories and theoretical issues concerning human development across the life span. Prerequisite: graduate standing.

HESC5433 Advanced Child Development (SP) Theory and research concerning normal behavior and development in childhood. Acquaintance with library resources, classic studies, and recent literature.

HESC5463 Research Methodology in Social Sciences (SP) Logical structure and the method of science. Basic elements of research design; observation, measurement, analytic method, interpretation, verification, presentation of results. Applications to research in economic or sociological problems of agriculture and human environmental sciences. (Same as AGEC 5013, AGED 5463, RSOC 5463) Prerequisite: Any upper division (3000 or higher) statistics course.

HESC555V Special Topics in Human Environmental Sciences (1-3) (IR) Topics not covered in other courses or a more intensive study of specific topics in the specializations of human environmental sciences. May be repeated.

HESC600V Master's Thesis (1-6) (FA, SP, SU)

HESC700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

COURSES: FOOD SCIENCE (FDSC)

The doctoral program in Food Science is an interdepartmental program involving the Departments of Food Science, Animal and Poultry Sciences, and Human Environmental Sciences. See page 84 for graduate courses in Food Science.

COURSES: RURAL SOCIGY (RSOC)

See Sociology on page 125 for specialization in rural sociology in sociology M.A. program.

RSOC4603 Environmental Sociology (SP) The course provides a social perspective on environmental issues. It examines the linkage between society, ecological systems and the physical environment. It provides conceptual framework(s) for analyzing environmental issues, considers the role of humans in environmental issues, and enhances understanding the complexity of the relationship between societal organization and environmental change. (Same as SOCI 4603)

RSOC4623 Introduction to Community Development (SP) Introduction to the field of community development; including approaches used in Cooperative Extension Service, vocational agriculture, local governments, and the private sector. Focus is on the community development process. Prerequisite: RSOC 2603 or SOCI 2013.

RSOC500V Special Problems (1-6) (FA, SP, SU) Gives experience in executing research and in analyzing a sociological problem of agriculture. Prerequisite: graduate standing.

RSOC5463 Research Methodology in the Social Sciences (SP, Odd years) Logical structure and the method of science. Basic elements of research design; observation, measurement, analytic method, interpretation, verification, presentation of results. Applications to research in economic or sociological problems of agriculture and Human Environmental Sciences. (Same as AGEC 5013, AGED 5463, HESC 5463) Prerequisite: graduate standing.

RSOC5623 Advanced Community Development (SP) Examination of the theories and applications of community development. Course is operated as a seminar, and covers a wide variety of community development applications. Prerequisite: RSOC 3613 or RSOC 4623 or equivalent.

RSOC600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

RSOC700V Doctoral Dissertation (FA, SP, SU)

DEPARTMENT OF INDUSTRIAL ENGINEERING (INEG)

John English
Interim Chair of the Department
4207 Engineering Center
575-3156

• University Professor Taha • Professors Asfahl, English, Johnson • Associate Professors, Fant • Assistant Professors Cole, Collins, Kutanoglu, Rossetti • Adjunct Assistant Professor Gattis

Degrees Conferred:
M.S.I.E. (INEG)
M.S. in Operations Management (OMGT)
(See Operations Management)
M.S.O.R. in Operations Research (ORES)
(See Operations Research)
M.S.E., Ph.D. in Engineering (ENGR)
(See Engineering)

Areas of Research Activity: A critical component of all graduate-level work is scholarly activity through the completion of substantive research. These activities take place through the completion of doctoral dissertations, master's theses, and master's research projects. The Department encourages the completion of master's theses, particularly for those students holding assistantship appointments.

Research areas of concentration at both the master's and doctoral levels include the following: artificial intelligence/expert systems, computer assisted processes, computer integrated manufacturing, cost engineering, engineering administration, engineering economics, facilities analysis/design, human factors/ergonomics, manufacturing automation/robotics, material handling, operations research, productivity measurement/analysis, production control/materials management, and quality control/reliability.

Prerequisites to the M.S.I.E. Degree Program:

1. There are no prerequisites for students with an undergraduate degree from an ABET-accredited industrial engineering program.
2. For students with an engineering degree other than industrial engineering or from a non-accredited engineering program, a number of prerequisite courses are required. These are presented in a departmental manual for graduate students which should be obtained by all students entering programs at the graduate level.

Requirements for the Master of Science in Industrial Engineering Degree: In addition to the requirements of the Graduate School, the following departmental requirements must be satisfied by candidates for the M.S.I.E. degree.

1. Candidates who present a thesis are required to complete a minimum of 24 graduate credit hours plus six hours of thesis.
2. Candidates who do not present a thesis (i.e., project report option) are required to complete a minimum of 30 graduate credit hours plus three hours of INEG 513V, Master's Research Project and Report.
3. Candidates must successfully complete a master's oral examination which is conducted by the candidate's committee.

Courses Taken for Graduate Credit: A limited number of 4000-level courses may be taken for graduate credit as specified by the Department's Handbook for Advanced Degrees. Some of these 4000-level courses are required in the Department's undergraduate program.

A Certificate of Achievement in Electronics Manufacturing is available for students seeking a graduate degree in an engineering discipline. (See page 77 in this catalog.)

COURSES INDUSTRIAL ENGR (INEG)

INEG4223 Occupational Safety and Health Standards (FA, SP, SU) Survey of existing and proposed standards by examining fundamental physical, economic, and legal bases. Performance vs. specific standards. Enforceability and data collection. National consensus and promulgation process. Includes a design project using the computer. (Same as OMGT 4223) Prerequisite: PHYS 2053 and CHEM 1123 and CHEM 1121L (or graduate standing).

INEG4233 Energy Conservation (FA, SP, SU) Elements of heat gain and heat loss in structures. Analysis and identification of energy loads in structures; heating load, lighting load, hot water load, distribution and equipment load, and cooling load. Identification and analysis of energy conservation measures. Economic analysis, life-cycle costing, payback period. Case studies and real structure analysis. Prerequisite: INEG 3413 and PHYS 2073.

INEG4243 Industrial Energy Management (FA, SP, SU) Analysis of energy use in the industrial environment. Characteristics, quality, quantity, and delivery systems of various industrial energy courses. Identification of major energy consuming items in industry. Energy conservation measures and economic analysis for industry. Prerequisite: INEG 3513 and INEG 3413.

INEG4323 Quality Engineering and Management (FA, SP, SU) Provides the student with complete coverage of the functional area of "Quality Assurance" ranging from the need for such a function, how it works, techniques utilized, and managerial approaches for insuring its effectiveness. Prerequisite: senior standing.

INEG4333 Industrial Statistics (FA, SP, SU) Application of statistical techniques to industrial problems; relationships between experimental measurements using regression and correlation theory and analysis of variance models; emphasis on inherent variability of production processes; control chart techniques and the use of exponential and Weibull models in reliability analysis; acceptance sampling procedures. Prerequisite: INEG 3313.

INEG4423 Intermediate Engineering Economy (FA, SP, SU) Preparation of feasibility studies, including capital cost estimation manufacturing and operating cost estimation and preparation of pro forma statements. Effects of taxes, inflation and financing costs on cash flows. Financial statement analysis. Prerequisite: INEG 3413.

INEG4433 Administrative Analysis (FA, SP, SU) Studies of cases in engineering administration emphasizing human relationships in a technical environment. Productivity/quality enhancement through an understanding of organizational design and behavior, motivation and reward systems, and participative management. Prerequisite: senior standing.

INEG4443 Engineering Management (FA, SP, SU) Analysis of the strategic level of engineering management including environment, planning, organization, and staffing. Professional creativity, motivation, leadership, and ethics are explored. At the tactical level, project selection, control and systems management are analyzed. Organizational behavior and models related to scientific and professional employees are examined. Prerequisite: senior standing.

INEG4453 Productivity Improvement (IR) Analysis of common productivity problems. Development of skills required to: diagnose problems; measure productivity; develop improvement strategies; and provide for the implementation and maintenance of productivity measurement and improvement systems. Prerequisite: senior standing.

INEG4513 Electronics Manufacturing Processes (FA, SP, SU) Introduction to manufacturing processes and concurrent engineering in the electronics industry. Survey of electronics components and products and the processes of fabrication and assembly. Principles of design, productivity, quality, and economics. Emphasis on manufacturability. Lecture 2 hours, laboratory 2 hours per week. (Same as ELEG 4273) Corequisite: INEG 4510L. Prerequisite: ELEG 3903 (or ELEG 2103) and INEG 3313 (or STAT 3013).

INEG4510L Electronics Manufacturing Processes Laboratory (FA, SP, SU) Corequisite: INEG 4513.

INEG4523 Automated Production (FA, SP, SU) Industrial robots and robot programming, industrial logic control systems, programmable controllers for the control of work stations, and conveyor systems. On-line computer control and microprocessors. Group technology, flexible manufacturing systems, and computer-integrated manufacturing. Laboratory required. Corequisite: INEG 4520L. Prerequisite: INEG 3513 or graduate standing.

INEG4520L Automated Production Laboratory (FA, SP, SU) Corequisite: INEG 4523.

INEG4533 Application of Machine Vision (FA, SP, SU) Automated machine vision applied to assembly and inspection tasks traditionally performed by human operators; development of application by acquiring image, processing image data, analyzing image and transmitting results; application analysis, selection and economics. Laboratory required. Corequisite: INEG 4530L. Prerequisite: senior standing.

INEG4530L Application of Machine Vision Laboratory (FA, SP, SU) Corequisite: INEG 4533.

INEG4553 Production Planning and Control (FA, SP, SU) Operational problems of production systems including a control of purchased materials inventory; scheduling a job shop, batch, and continuous production processes for single and multi-item product lines; planning of work force and inventory under seasonal and stochastic demand.

INEG4563 Application of Robotics (FA, SP, SU) Industrial robotics, programming and applications; tooling and interfacing with peripheral equipment, sensor technology, machine vision; application analysis, selection, and justification; research, economics, human interface. Laboratory required. Corequisite: INEG 4560L. Prerequisite: senior standing.

INEG4560L Application of Robotics Laboratory (FA, SP, SU) Corequisite: INEG 4563.

INEG4623 Introduction to Simulation (FA, SP, SU) Elementary queuing models derivations and applications. Discrete simulation techniques. The SIMNET simulation language. Applications of simulation to the design of industrial and service installations. Simulation project. Prerequisite: INEG 3313.

INEG4723 Ergonomics (FA, SP, SU) The capabilities and limitations of humans are addressed in the context of the person's interaction with machines and the environment. Topics of discussion include anthropometric considerations in equipment design, human sensory and physiological capabilities in the work environment, selection and training of workers, and the design of controls and displays. Corequisite: INEG 4720L. Prerequisite: INEG 3713 and INEG 3313.

INEG4720L Ergonomics Laboratory (FA, SP, SU) Corequisite: INEG 4723.

INEG4733 Industrial Ergonomics (FA, SP, SU) Gives background and experience in measurement and evaluation of human performance as it pertains to the working environment. The physical, physiological and psychological capabilities of the tasks they are to perform. Laboratory projects required. Prerequisite: INEG 4723 and INEG 4333.

INEG5111 Industrial Engineering Graduate Seminar (FA, SP, SU) Papers presented by candidates for graduate degree in industrial engineering, graduate faculty, and guest lectures on design problems or new developments in the field of industrial engineering.

INEG5123 Industrial Engineering in the Service Sector (FA, SP, SU) Review of the development of industrial engineering into the service sector, e.g., health care systems, banking, municipal services, utilities, and postal service. Emphasizes those principles and methodologies applicable to the solutions of problems within the service industries. (Same as OMGT 5133) Prerequisite: graduate standing.

INEG513V Master's Research Project and Report (1-6) (FA, SP, SU) Required course for students electing the report option.

INEG514V Research and Special Topics (1-6) (FA, SP, SU) Fundamental and applied research. Prerequisite: graduate standing.

INEG5223 Safety and Health Standards Research (FA, SP, SU) For graduate students who seek Certified Professional or Certified Industrial Hygienist status, or both. Includes review and development of computer databases for standards, interpretations, court decisions, and field memoranda. Test equipment and procedures for determining indoor industrial aid containment PEL concentrations and industrial environment noise levels are examined. (Same as OMGT 5223) Prerequisite: INEG 4223 or OMGT 4303.

INEG5313 Engineering Applications of Probability Theory and Stochastic Processes (FA, SP, SU) Basic probability theory; random variables and stochastic processes; distribution of sums, products, and quotients of random variables, with application to engineering; normal and Poisson processes; engineering applications of Markov chains, ergodic theorem, and applications. Prerequisite: INEG 4333.

INEG5323 Reliability (FA, SP, SU) Reliability and maintenance techniques including probability modeling, statistical analysis, testing and improvement. Emphasis on engineering applications and computer analysis methods. Prerequisite: INEG 3313 or equivalent.

INEG5333 Design of Industrial Experiments (FA, SP, SU) Statistical analysis as applied to problems and experiments in engineering and industrial research; experiment design and analysis; probability; response surface analysis. Prerequisite: INEG 4333 or equivalent.

INEG5343 Advanced Quality Control Methods (FA, SP, SU) Acceptance sampling by attributes; single, double, sequential, and multiple sampling plans, sampling plans, sampling plans of Department of Defense; acceptance sampling by variables; Bayesian acceptance sampling; (rectifying inspection for lot-by-lot sampling); control charts; special devices and procedures. Prerequisite: INEG 3313.

INEG5353 Topical Readings in Quality Control (FA, SP, SU) Objectives of course: extend the student's quality background into some of the state-of-the-art process control techniques and related current and classical research topics in the area of quality control; vastly increase the student's knowledge of the industrial quality function; identify potential M.S., Ph.D, funded, and publishable research topics. Prerequisite: INEG 5343.

INEG5423 Engineering in Global Competition (FA, SP, SU) Studies of principles and cases in engineering administration in global competition. Emphasis on high-technology manufacturing such as the electronics industry. Survey of markets, technologies, multinational corporations, cultures, and customs. Discussions of ethics, professionalism, difference valuing, human relations skills, and other topics relevant to global engineering practice.

INEG5433 Cost Estimation Models (FA, SP, SU)

An examination of the methodologies for estimating and forecasting manufacturing costs. Types of cost recovery systems, work progress functions, product improvement curves, determination of hourly rates, parametric estimating systems, and the development of software for computer-assisted estimating systems. (Same as OMGT 5433) Prerequisite: INEG 3513 and INEG 3833.

INEG5443 Statistical Decision Theory (FA, SP, SU) Bayes strategies for industrial and management decisions; review of generating and characteristics functions; sums of random variables; sufficient and maximum likelihood estimators; Cramer-Rao inequality; Bayesian and fiducial methods; risk function; decision under certainty; mathematical model construction. Prerequisite: CSEG 1913 and INEG 3313.

INEG5513 Advanced Materials Handling (FA, SP, SU) Computerized offline planning and on-line control of materials handling systems. Specific topics include programmable controls, graphic simulations, and information systems. Emphasis on projects. Prerequisite: INEG 4543 or graduate standing.

INEG5523 Topics in Automated Systems (FA, SP, SU) Current developments in applications of automation to industrial processes. Robots, expert systems, artificial intelligence, natural language interfaces, computer interfaces, vision systems. Prerequisite: INEG 4523.

INEG5613 Optimization Theory I (FA, SP, SU) Basic solutions and bases in linear equations, matrix version of simplex tableau, duality and primal dual relationships, complementary slackness, revised simplex, bounded variables, decomposition algorithm parametric linear programming, special linear program, generalized network models. Nonlinear programs solved by LP algorithm. Prerequisite: graduate standing.

INEG5623 Analysis of Inventory Systems (FA, SP, SU) Elements of production and inventory control, economic lot size models, price breaks models using Lagrangian method, deterministic dynamic inventory model, probabilistic one-period and multi-period models, zero and positive lead time models, continuous review models. Prerequisite: INEG 5313.

INEG5633 Integer Programming and Combinatorial Analysis (FA, SP, SU) Gomory's cutting plane algorithms for mixed and pure integer linear problems, Glover-Young primal-feasible algorithms, convergence proofs, branch and bound algorithms, Land-Doig algorithm, Dakin's algorithm, implicit enumeration, Balas zero-one algorithm, binary representation of integer problems, zero-one polynomial programming, the traveling salesman problem, quadratic assignment problem, applications of integer programming. Prerequisite: INEG 5613 and MATH 3404.

INEG5643 Optimization Theory II (FA, SP, SU) Classical optimization theory, Lagrangian and Jacobian methods, Kuhn-Tucker theory and constraint qualification, duality in nonlinear problems; separable programming, quadratic programming, geometric programming, stochastic programming, steepest ascent method, convex combinations method, SUMT, Fibonacci search, golden section method. Prerequisite: INEG 5613.

INEG5653 Dynamic Programming (FA, SP, SU) Theory of multistage decision processes based on Bellman's principle of optimality. Deterministic dynamic programming; network analysis, recursive equations, forward and backward computations. Large optimization problems involving inventory, resource allocation, and equipment replacement. Probabilistic dynamic programming; Markovian decision processes. Prerequisite: INEG 5613.

INEG5663 Analysis of Queuing Systems (FA, SP, SU) Poisson axioms, pure birth and death model, queue disciplines (M/M/1) and (M/M/c) models, machine servicing model, Pollazek-Khintchine formula, priority queues, queues in series. Markovian analysis of (Gl/M/K) (M/G/1) models, bulk queues. Reneging, balking, and jockeying phenomena. Transient behavior. Prerequisite: INEG 3313.

INEG5673 Graphs and Network Theory (FA, SP, SU) Directed, undirected and bipartite graphs; incidence matrices; shortest route problems; maximal flow and minimal cut theorems, planar graphs; and duality theorem. Applications of networks and graphs to transportation, transshipment, assignment, plant layout, routing, scheduling, and tree problems. Prerequisite: INEG 3613 or INEG 5613.

INEG5713 Advanced Topics in Human Factors Engineering (FA, SP, SU) Advanced work in special research topics in man-machine systems. Prerequisite: INEG 4723.

INEG5723 Advanced Man/Machine System Design (FA, SP, SU) Continuation of INEG 5713. Prerequisite: INEG 5713.

INEG5823 Systems Simulation (FA, SP, SU) Monte Carlo technique, construction of digital simulation models, timekeeping in simulations, design of simulation experiment, statistical verification of results. Includes the use of SIMNET simulation language with introductions to other simulation languages. Prerequisite: CSEG 1913 and INEG 3313 (or equivalent).

INEG5843 Scheduling and Sequencing (FA, SP, SU) An introduction to constructive algorithms and various operations research approaches for solving, sequencing, and scheduling problems in flow shops and job shops. The NP-completeness of most scheduling problems leads to a discussion of computational complexity, the use of heuristic solution methods, and the development of worst case bounds. Prerequisite: INEG 3613 and INEG 4623.

INEG600V Master's Thesis (1-9) (FA, SP, SU)

INEG6613 Operations Research Applications (FA, SP, SU) Investigation of literature case studies; use of mathematical models to solve practical problems; data collection and solution implementation. Students work in teams on actual problems observed in industry and government. Prerequisite: INEG 3613 or INEG 5613.

INEG6823 Systems Simulation II (FA, SP, SU) Simulation of linear and nonlinear systems; systems with time varying coefficients; frequency analysis of closed loop control systems. SIMSCRIPT and CSMP simulation languages will be used. Prerequisite: INEG 5823.

INEG700V Doctoral Dissertation (1-18) (FA, SP, SU)

INFORMATION SYSTEMS

(See the Graduate School of Business, page 34)

WALTER J. LEMKE DEPARTMENT OF JOURNALISM (JOUR)

Patsy G. Watkins
Department Chairperson
116 Kimpel Hall
575-3601

• Professor Purvis • Associate Professors Carey, Foley, Jordan, Miller, Montgomery, Watkins, Wicks

Degree Conferred: M.A. (JOUR)

Areas of Concentration: Advanced journalism studies, combined with graduate-level requirements in an additional academic discipline.

The purposes of the interdisciplinary program are to refine the skills of graduate journalism students through advanced writing courses in journalism and English; to offer comprehensive, media-related courses in government, public affairs, and law; and to provide journalists expertise in an additional academic discipline.

Prerequisites to Degree Program: A student with fewer than three years of professional journalism experience must possess an undergraduate degree, including a minimum of 21 undergraduate course hours in journalism and other courses specified by the Journalism Graduate Faculty Committee; a minimum undergraduate grade-point average of 3.00; and a minimum score of 1,000 on the verbal and quantitative parts of the Graduate Record Examinations (including a minimum score of 500 on the verbal part). A student with three or more years of professional journalism experience must possess an undergraduate degree and a minimum score of 1,000 on the verbal and quantitative parts of the Graduate Record Examinations (including a minimum score of 500 on the verbal part), or an undergraduate degree and a record of superior professional achievement.

Requirements for the Master of Arts Degree: In addition to the requirements of the Graduate School (page 23), the Master of Arts degree in journalism requires a minimum of 30 semester hours with a cumulative grade-point average of 3.00. Students must complete:

1. 12 hours of graduate credit in journalism,
2. 12 hours of graduate credit in a single department other than journalism chosen by the student and approved by the Journalism Graduate Faculty Committee, and
3. a master's thesis (6 semester hours)

COURSES: JOURNALISM (JOUR)

JOUR4063 Computer-Assisted Publishing (FA, SP, SU) Indepth, hands-on exploration of computer hardware and software in the design and production of media messages. Examination of developing media technologies and the computer's influence on design and conceptualization. Prerequisite: JOUR 3002.

JOUR4883 Advanced Television News Production (FA, SP) Continuation of JOUR 4873. Students prepare and present television newscasts for air. Laboratory component arranged. Corequisite: JOUR 4880L. Prerequisite: JOUR 4873.

JOUR5003 Advanced Reporting (FA, SP, SU) Stresses public affairs coverage, interpretive, investigative, and analytic journalism, involving research, work with documents, public records, and budgets and specialized reporting.

JOUR5033 Critical and Opinion Writing and Commentary (FA, SP, SU) Experience in writing and analyzing columns, editorials, criticism, and other forms of opinion and commentary in the media and in examining the media's role as a forum for opinion and commentary and its impact and influence.

JOUR5043 Research Methods in Journalism (FA, SP, SU) Research methods of utility in journalism. Emphasis on survey research, electronic data base searching, and traditional library research. Prerequisite: graduate standing or honors program standing.

JOUR5063 Issues in Advertising and Public Relations (FA, SP, SU) Seminar course involving the critical examination of the major cultural, social, political, economic, ethical, and persuasion theories and/or issues relevant to advertising and public relations affecting individuals, organizations, societies.

JOUR5073 Propaganda and Public Opinion (FA, SP, SU) Examines and analyzes the means of influencing and measuring public opinion, with an emphasis on survey research and polling.

JOUR5183 International Mass Communications (FA, SP, SU) Examination of national media systems, issues in international communications, the role of the media in coverage of international affairs, and the impact of new technologies on mass communications.

JOUR5193 Professional Journalism Seminar (IR) Examination of complex problems encountered by professional journalists with focus on research and analysis of the role of journalism in major social, economic, and political developments. Content will vary.

JOUR5233 Media and Public Policy (FA, SP, SU) Focuses on the interaction between media, politics, government, and public policy, particularly on the impact and influence of the media on the public policy agenda.

JOUR5313 Literature of Journalism (FA, SP, SU) A study of superior works of non-fiction journalism, past and present. Includes authors from Daniel Defoe to John McPhee.

JOUR600V Master's Thesis (1-6) (FA, SP, SU) Required of all M.A. journalism students.

KINESIOLOGY (KINS)

(See also Health Science, Kinesiology, Recreation, and Dance; Health Science; Physical Education; and Recreation)

Ro Di Brezzo
Department Head of Health Science, Kinesiology, Recreation, and Dance
306 HPER Building
575-2857

Dean Gorman
Coordinator of Graduate Studies
308W HPER Building
575-2890

Degrees Conferred: M.S., Ph.D. (KINS)

Areas of Concentration for the Master of Science Degree: Adapted movement science, and exercise science.

Prerequisites to Degree Program: For acceptance to the master's degree programs the program area requires, in addition to the general requirements for admission to the Graduate School, an undergraduate degree in kinesiology or in a related field and the following admission standards: an overall undergraduate GPA of 3.00 or if the overall undergraduate GPA is between 2.70 and 2.99, the student must have a 3.00 GPA on the last 60 hours of undergraduate course work (excluding student teaching), or a GRE score of 1000 on the verbal and quantitative parts of the general test.

Requirements for the Master of Science Degree: Candidates for the M.S. degree in kinesiology must complete 27 semester hours of graduate work and a thesis or 33 semester hours without a thesis. In addition to the program requirements listed below, all degree candidates must successfully complete a written comprehensive examination.

Adapted Movement Science Course Concentration: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Ed Statistics or
EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Courses (15)
PHED 5413, Adapted Physical Education
KINS 5423, Assessment and Prescriptive Programming in Adapted KINS
KINS 5443, Perceptual Motor Development and Clinical Application
KINS 5513, Physiology Exercise I
CIED 5723 Nature and Needs of Persons with Mild Disabilities

Required Project or Thesis (3-6)
KINS 589V, Independent Research (master's degree project) or
KINS 600V, Master's Thesis

Approved Electives (6-9)

Exercise Science Course Concentration: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Ed Statistics or
EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Courses (9)
KINS 5513, Physiology Exercise I
KINS 5323, Biomechanics I
KINS 5593, Practicum in Lab Instrumentation

Required Project or Thesis (3-6)
KINS 589V, Independent Research (master's degree project) or
KINS 600V, Master's Thesis

Approved Electives (12-15)

Areas of Concentration for the Doctor of Philosophy Degree: Pedagogy and exercise science.

Prerequisites to Ph.D. Degree Program: The applicant must have completed a master's degree or its equivalent in kinesiology or a closely related field of the biological or physical sciences and meet general admission requirements of the UA Graduate School. An application identifying applicant objectives and supportive background information, including three letters of recommendation supporting the applicant's ability to successfully pursue a Ph.D. in kinesiology, a GPA of at least 3.00 on all graduate course work, and an acceptable score on the Graduate Record Examinations (GRE) is required. Additional prerequisites may be prescribed after review of application materials.

Requirements for the Doctor of Philosophy Degree: A minimum of 96 graduate credit hours beyond the baccalaureate is required for the degree. A doctoral advisory committee will be established by the student in consultation with the Coordinator of Graduate Study during the first semester of enrollment subsequent to acceptance into the degree program. If competency cannot be determined, successful completion of a preliminary examination may be required of the student prior to the completion of 48 hours of graduate course work beyond the bachelor's degree or as soon after admission to the doctoral degree program as possible. The degree program also requires successful completion of candidacy examinations, an acceptable doctoral dissertation, and oral defense of the dissertation. These last requirements are described elsewhere in this catalog. Further requirements for the Doctor of Philosophy degree in kinesiology include:

Exercise Science Concentration:

Departmental Core Requirements
Required Prerequisites: (12)
HKRD 5353, Research in HKRD
KINS 5323, Biomechanics I
KINS 5513, Physiology of Exercise I
KINS 5593, Practicum in Laboratory Instrumentation

Required Courses: (6)
KINS 6323, Biomechanics II
KINS 6343, Physiology of Exercise II

Research and Statistical Requirements: (18)
(A minimum of 18 hours approved by the doctoral advisory committee)

Field of Study: (18)

The student, in consultation with the doctoral advisory committee, will identify further course work comprising a field of study in kinesiology and consistent with the goals and objectives of the student and institution. Course work may be selected from several related disciplines or a single discipline.

Dissertation: (18)

Pedagogy Concentration:

Departmental Core Requirements
Required Prerequisites: (6)
PHED 5233, Research in Teaching Physical Education
HKRD 5353, Research in HKRD

Required Courses: (12)
PHED 6353, Systematic Observation Research in Physical Education
PHED 6363, Supervision in Physical Education
KINS 674V, Internship: College Teaching
HKRD 689V, Independent Research

Research and Statistical Requirements: (18)
(A minimum of 18 hours approved by the doctoral advisory committee)

Cognate: (6)
(A minimum of 6 hours approved by the doctoral advisory committee)

Field of Study: (12)
The student, in consultation with the doctoral advisory committee, will identify further course work comprising a field of study in kinesiology and consistent with the goals and objectives of the student and institution. Course work may be selected from several related disciplines or a single discipline.

Dissertation: (18)

Through an agreement with the Academic common market, residents of certain southern states may qualify for graduate enrollment in the masters or doctoral program in kinesiology.

COURSES: KINESIOLOGY (KINS)

KINS5323 Biomechanics I (FA, SP, SU) Intended to serve as in introduction to biomechanics and focuses on scientific principles involved in understanding and analyzing human motion.
KINS5333 Instrumentation in Biomechanics (FA, SP, SU) The application of knowledge and skills necessary for data collection for sports analysis. Provides valuable information on instrumentation used specifically in biomechanics. Prerequisite: KINS 5323.
KINS5423 Assessment and Prescriptive Programming in Adapted KINS (FA, SU) Instruction in the assessment, prescription, and use of instruction methods, materials, and equipment relevant to specific handicapping conditions in the adapted physical education setting.
KINS5443 Perceptual-Motor Development and Clinical Application (FA, SP, SU) Indepth examination relevant to specific handicapping conditions in the adapted physical education setting.
KINS5493 Practicum in Adapted Physical Education (SP, SU) Deals with the application of skills, knowledge and concepts necessary for planning, organizing and conducting adapted physical education programs through supervised field experiences.
KINS5513 Physiology Exercise I (FA, SP, SU) A study of the foundation literature in exercise physiology. Emphasis is placed on the muscular, cardiovascular, and respiratory systems.
KINS5523 Muscle Metabolism in Exercise (SP) A study of the metabolic changes that occur in muscle as a result of exercise, exercise training, and other stressors. Prerequisite: KINS 5513 or equivalent.
KINS5533 Cardiac Rehabilitation Program (FA, SP, SU) An examination of the concepts, design, and implementation of cardiac rehabilitation programs. Emphasis on exercise programs but reference to nutrition, psychology, and other lifestyle interventions.
KINS5543 Cardiovascular Function in Exercise (FA, SP, SU) Study of the effects of exercise training and other stressors on the cardiovascular system. Detailed study of the components of the cardiovascular system and the responses and adaptations of those components to selected stimuli. Prerequisite: KINS 5513 or equivalent.
KINS5593 Practicum in Laboratory Instrumentation (FA, SP, SU) Practical experience in testing physical fitness utilizing laboratory equipment. Objective is to quantify physiological parameters, leading to the individualized exercise prescription.
KINS560V Workshop (1-3) (IR)
KINS5643 Motor Learning (FA) Concepts of motor learning and control are presented. Attention is given to an analysis of the literature in movement control, motor behavior, and motor learning.
KINS574V Internship (1-6) (SP)
KINS5753 Research in Sport Psychology (SU) Investigation of historical and contemporary research in sport psychology. Prerequisite: HKRD 5353.
KINS5773 Performance and Drugs (SU) The pharmachological and physiological effects of ergogenic aids upon the athlete and performance coupled with the ethical and moralistic viewpoints of drug taking. Practical laboratory experiences are provided with pertinent statistical surveys of athletes; their drug taking habits and relevant psychological impact on performance. Prerequisite: ZOOL 2213 and ZOOL 2211L or equivalent.
KINS589V Independent Research (1-3) (FA, SP, SU) Development, implementation, and completion of basic or applied research project. Prerequisite: M.S. degree program in exercise and movement sciences and HKRD 5353 and EDFD 5393.
KINS599V Seminar (1-3) (IR)
KINS600V Master's Thesis (1-6) (FA, SP, SU)
KINS605V Independent Study (1-3) (FA, SP, SU) Provides students with an opportunity to pursue special study of educational problems.
KINS6323 Biomechanics II (FA, SU) Analysis of human movement with emphasis on sports skills by application of principles of anatomy, kinesiology, and cinematographical analysis. Prerequisite: KINS 5323.
KINS6343 Physiology of Exercise II (SP) Detailed study of the body systems affected by exercise, the functions of these systems during exercise, the effects of age, sex, body type, and nutrition on capacity for exercise, the techniques of assessing work capacity, and a critical analysis of research literature in this area.
KINS660V Workshop (1-3) (IR)
KINS674V Internship (1-3) (IR)
KINS699V Seminar (1-3) (IR)

DEPARTMENT OF MANAGEMENT (MGMT)

(See Graduate School of Business, page 39)

DEPARTMENT OF MARKETING AND TRANSPORTATION (MKTT)

(See Graduate School of Business, page 40)

DEPARTMENT OF MATHEMATICAL SCIENCES (MASC)

William A. Feldman
Department Chair
301 Science Engineering Center
575-3351

Mark Arnold
Coordinator of Graduate Studies

• Distinguished Professor Schein • University Professor Dunn • Professors Akeroyd, Brewer, Cochran, Duncan, Feldman, Khavinson, Luecking, Madison, Tabachnikov, Tubbs • Associate Professors Arnold, Goodman-Strauss, Meaux, Meek, Monroe, Ryan • Assistant Professors Capogna, Johnson, Lanzani, Petris, Woodland

Degrees Conferred:
M.S., Ph.D. in Mathematics (MATH)
M.A. in Secondary Mathematics (SMTH)
M.S. in Statistics (STAT)

(See Statistics)

Prerequisites to Degree Program: Prospective candidates for the Master of Science degree in mathematics are expected to have completed a program equivalent to that required by the Department for a B.S. degree, as set forth in the current catalog of the Fulbright College of Arts and Sciences. Deficiencies may be removed either by taking the appropriate undergraduate courses or by examination.

The degree of Master of Science is intended for collegiate teachers of mathematics, non-teaching professional mathematicians, and those who desire to continue advanced study.

Requirements for the Master of Science Degree: This degree is offered under two separate options, a general option and a computational mathematics option. The general option is intended for students who plan to be collegiate teachers of mathematics, continue advanced study in mathematics, or obtain a broad background for preparation as a non-teaching professional mathematician. The computational mathematics option is intended for students who intend to specialize in computational and applied mathematics in preparation for professional employment in an inter-disciplinary or computationally intensive environment.

The program of a candidate will be determined in conference with the candidate's graduate adviser. A comprehensive examination must be passed by each candidate for the Master of Science degree. It should be taken near the end of the last semester of residence. Normally this examination will be given during the thirteenth week of each semester. At least four weeks prior to the scheduled date students must notify the Department of their intention to take the examination. No student may take the comprehensive examination more than three times. MATH 4513, 5013, 5033 and 504V are not applicable to the Master of Science degree in mathematics. The program will include at least two semesters of one hour credit in Mathematics Seminar, MATH 510V.

The candidate for the general option must complete a minimum of 32 semester hours of approved graduate work. Students may include up to nine semester hours of graduate work in courses outside the Department. All selected courses are subject to the approval of the Graduate Committee. The comprehensive examination for the general option will include material covered in six semester hours of graduate courses in each of: (1) abstract algebra, (2) topology, (3) real or complex analysis, and (4) an area chosen by the candidate and approved by the Graduate Committee. When there is a choice in the above list of topics, students shall make their choice not less than four weeks before the date of the examination.

The candidate for the computational mathematics option must complete a minimum of 32 semester hours of approved graduate work. Students must include at least six but not more than twelve semester hours of graduate work in courses outside of mathematics. All selected courses are subject to the approval of the Graduate Committee. The comprehensive examination for the computational mathematics option will include material covered in six semester hours of graduate courses in each of: (1) numerical analysis, (2) applied mathematics, (3) analysis or algebra, and (4) an area other than mathematics chosen by the student and approved by the Graduate Committee. Every candidate who does not elect to write a thesis must take MATH 4153.

Requirements for the Master of Arts Degree with a Major in Secondary Mathematics: This program is designed for secondary school teachers of mathematics. It requires 32 semester hours of graduate work. All requirements for certification must be fulfilled before the degree will be awarded. Prospective candidates for the Master of Arts degree in secondary mathematics are expected to have earned credit in courses equivalent to MATH 2574, 3083, 3113, and 3773. Deficiencies may be removed either by taking the appropriate courses or by examination.

The candidate's program must include MATH 4513, 4783, 5123, two semesters of one hour credit in MATH 510V, and one of the following courses: MATH 5133, 5303, 5313, 5503, 5523 or 5703. Not more than 12 semester hours of credit toward this degree will be allowed from the following categories: (1) "Institute type" mathematics courses and (2) graduate courses in education. All courses selected to apply on this degree must be approved by the student's adviser in accordance with the above requirements. Recommended courses include MATH 4103, 4253, 4353, 4363, 4523, and either STAT 3013 or 5103.

Each person receiving the Master of Arts degree in secondary mathematics must pass a written examination covering: (1) algebra, MATH 5123, (2) advanced calculus, MATH 4513, (3) geometry, MATH 4783, and one other area of mathematics to be approved by the candidate's adviser. The examination schedule is the same as for the Master of Science degree. No student will be allowed to take the examination more than three times.

Requirements for the Doctor of Philosophy Degree: Candidates for the degree of Doctor of Philosophy with a major in mathematics will be required to earn not less than 60 semester hours of course credit beyond the bachelor's degree in mathematics and closely related fields. The number of hours and the courses for each student will be determined by the advisory committee. The candidate must fulfill the course requirements for the Master of Science degree in mathematics.

The basic requirement for the Ph.D. degree is the preparation of an acceptable dissertation. This dissertation must demonstrate the candidate's ability to do independent, original, and significant work in mathematics. It is required that this dissertation possess the degree of excellence of research papers ordinarily published in the leading mathematical journals.

A comprehensive examination is given each year during the weeks preceding the beginning of the fall and spring semesters. This examination is taken by all students in the graduate program who have completed the requirements for the M.S. degree, and who have not been admitted to candidacy for the Ph.D. degree. The examination serves as both a qualifying and candidacy examination. The prospective candidate for the Ph.D. will be allowed to take the examination at most three times. Two failures to qualify eliminates the student from the graduate program in mathematics.

Each candidate will be required to pass proficiency examinations in one of the languages French, German, and Russian, which are given by the Department of Foreign Languages.

In addition to extending knowledge by personal reading and research, a doctoral graduate in mathematics will normally communicate knowledge to others. Therefore each student in the Ph.D. program is required to acquire the equivalent of one semester of full-time experience in teaching; this requirement may be fulfilled by part-time experience over several semesters. Typically, teaching assistantship appointments will satisfy this requirement, but other similar experience may qualify as approved by the Department.

COURSES: MATHEMATICS (MATH)

MATH4103 Finite Dimensional Vector Spaces (IR) Linear functionals, matrix representation of linear transformations, scalar product, spectral representation of linear transformations. Prerequisite: MATH 3083.

MATH4113 Introduction to Abstract Algebra II (FA) Topics in abstract algebra including finite abelian groups, linear groups, factorization in cummutative rings, quadratic field extensions, Gaussian integers, Wedderburn's theorem, and multilinear algebra. Prerequisite: MATH 3113.

MATH4203 Linear Programming and Game Theory (IR) Solution sets, duality, and pivoting in linear programming. Feasible solutions and the simplex method. The transportation problem. Matrix games. Prerequisite: MATH 3083 and proficiency in a high-level computer language.

MATH4253 Symbolic Logic I (FA) Rigorous analyses of the concepts of proof, consistency, equivalence, validity, implication, and truth. Full coverage of truth-functional logic and quantification theory (predicate calculus). Discussion of the nature and limits of mechanical procedures (algorithms) for proving theorems in logic and mathematics. Informal accounts of the basic facts about infinite sets. (Same as PHIL 4253)

MATH4263 Symbolic Logic II (SP) Topics include: soundness and completeness of propositional logic, soundness and completeness of quantification theory, the elements of model theory and recursion theory, G]odel's incompleteness theorems, and the limitative theorems of Tarski and Church. (Same as PHIL 4263) Prerequisite: MATH 4253 or PHIL 4253.

MATH4353 Numerical Linear Algebra (SP) Numerical methods for problems of linear algebra, including the solution of very large systems, eigenvalues, and eigenvectors. Prerequisite: MATH 3083 and programming experience.

MATH4363 Numerical Analysis (FA) General iterative techniques, error analysis, root finding, interpolation, approximation, numerical integration, numerical solution of differential equations. Prerequisite: MATH 4513 and programming experience.

MATH4503 Differential Geometry and Vector Calculus (IR) Topics include: Vector differential and integral calculus, Stokes' Theorem in 3-space, classical differential geometry in 3-space (curves, surfaces), differential forms, general Stokes' Theorem, applications to hydrodynamics, and electromagnetism. Prerequisite: MATH 3083 and MATH 4513.

MATH4513 Advanced Calculus I (FA) The real and complex number systems, basic set theory and topology, sequences and series, continuity, differentiation, Taylor's theorem. Emphasis is placed on careful mathematical reasoning. Prerequisite: MATH 2574 and MATH 3083.

MATH4523 Advanced Calculus II (SP) The Riemann-Stieltjes integral, uniform convergence of functions, Fourier series, implicit function theorem, Jacobians, and derivatives of higher order. Prerequisite: MATH 4513.

MATH5013 Topics in Algebra for Teachers (IR) Topics from abstract and linear algebra of current interest to teachers. May be repeated. Prerequisite: graduate standing.

MATH5033 Topics in Analysis for Teachers (IR) Topics related to calculus of current interest to secondary school teachers. May be repeated. Prerequisite: graduate standing.

MATH504V Special Topics for Teachers (1-6) (IR) Current topics in mathematics of interest to secondary school teachers. May be repeated. Prerequisite: graduate standing.

MATH510V Mathematical Seminar (1-3) (FA) Members of the faculty and advanced students meet for presentation and discussion of topics. Prerequisite: graduate standing.

MATH5123 Algebra I (SP) What the beginning graduate student should know about algebra: groups, rings, fields, modules, algebras, categories, homological algebra, Galois Theory. Prerequisite: MATH 3113.

MATH5133 Algebra II (FA) Continuation of 5123. Prerequisite: MATH 5123.

MATH5303 Ordinary Differential Equations (FA) Existence, uniqueness, stability, qualitative behavior, and numerical solutions. Prerequisite: MATH 3404 and MATH 4513 and programming experience.

MATH5313 Partial Differential Equations (SP) Classification, boundary value problems, applications, numerical solutions. Prerequisite: MATH 3423 and MATH 4513.

MATH5503 Theory of Functions of a Real Variable I (FA) Real number system, Lebesque measure, Lebesque integral, convergence theorems, differentiation of monotone functions, absolute continuity and the fundamental theorem of calculus L^P spaces, Holder and Minkowski inequalities, bounded linear functionals on the L^P spaces. Prerequisite: MATH 4523.

MATH5513 Theory of Functions of a Real Variable II (SP) Measure and integration on abstract measure spaces, signed measures, Hahn decomposition, Radon-Nikdoym theorem, Lebesque decomposition, measures on algebras and their extensions, product measures, Fubini's theorem. Prerequisite: MATH 5503.

MATH5523 Theory of Functions of a Complex Variable I (FA) Complex numbers, analytic functions, power series, complex integration, Cauchy's Theorem and integral formula, maximum principle, singularities, Laurent series, Mibius maps. Prerequisite: MATH 4513.

MATH5533 Theory of Functions of a Complex Variable II (SP) Riemann Mapping Theorem, analytic continuation, harmonic functions, entire functions. Prerequisite: MATH 5523.

MATH5703 Foundations of Topology (FA) Metric and general topological spaces, separation axioms, Urysohn's lemma, Tietze extension theorem, connectedness, compactness, and the Tychonoff theorem. Prerequisite: MATH 4513.

MATH5713 Algebraic Topology (FA) Homotopy, singular and relative homology, excision theorem, the Mayer-Vietoris sequence, Beti numbers, and the Euler characteristic. Prerequisite: MATH 5703.

MATH600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

MATH610V Directed Readings (1-6) (IR)

MATH619V Topics in Algebra (1-6) (FA, SP, SU) Current research interests in algebra. May be repeated.

MATH659V Topics in Analysis (1-6) (FA, SP, SU) Current research interests in analysis. May be repeated.

MATH679V Topics in Topology (1-6) (FA, SP, SU) Current research interest in topology. May be repeated.

MATH700V Doctoral Dissertation (1-6) (FA, SP, SU)

DEPARTMENT OF MECHANICAL ENGINEERING (MEEG)

William F. Schmidt
Department Head
204 Mechanical Engineering Building
575-3153

• Professors Cole, Jong, Schmidt, West • Associate Professors Couvillion, Gordon, Malshe, Nutter, Roe, Springer • Research Associate Professor Singh • Assistant Professors Batzer, Reynolds, Stewart, Tung

Degrees Conferred:
M.S.M.E. (MEEG)
M.S.E., Ph.D. in Engineering (ENGR)

(See Engineering)

Areas of Concentration: thermal systems, mechanical design, materials science, engineering mechanics, and nuclear engineering.

Requirements for the Master of Science Degree: In addition to the requirements of the Graduate School and the graduate engineering faculty, the following departmental requirements must be satisfied by candidates for the M.S.M.E. degree.

1. Candidates who present a thesis are required to complete a minimum of 24 semester hours of course work and six semester hours of thesis.
2. Candidates who do not present a thesis are required to complete a minimum of 33 semester hours of course work, which is to include at least three hours of credit for Research or Special Problems (including a formal engineering report), completed under direction of the candidate's major adviser.
3. All students must present a grade-point average of 3.00 or better on all courses included in their plan of study, with no more than 6 hours of "C."

Requirements for the Doctor of Philosophy Degree (Engineering): Students desiring to pursue a doctoral degree in engineering under the direction of a professor in the Department of Mechanical Engineering must obtain a set of guidelines from the Department Head.

A Certificate of Achievement in Electronics Manufacturing is available for students seeking a graduate degree in an engineering discipline. (See page 77 in this catalog.)

COURSES: MECHNCL ENGR (MEEG)

MEEG4003 Intermediate Dynamics (IR) Principles and application of dynamics from a more advanced point of view than in MEEG 2013. Topics include use of rotating reference frames, kinematics, and kinetics of rigid bodies in 3 dimensions, and oscillations. Prerequisite: MEEG 2013.

MEEG4013 Mechanical Vibrations (IR) Equations of motion applied to systems with free and forced vibrations, viscous and Coulomb damping, multitude degree of freedom. Rayleigh's method. Isolation and absorption of vibrations with applications to engines and rotating machinery. Prerequisite: MEEG 2013 and MEEG 3013.

MEEG4023 Basic Engineering Acoustics (IR) A study of the fundamental principles underlying the generation, transmission, and reception of acoustic waves with emphasis on noise pollution and noise abatement techniques. Prerequisite: MATH 3404.

MEEG4033 Continuum Mechanics (IR) Cartesian tensor and index notation; Legrangian and Eulerian description; analyses of stress and strain, coordinate transformations, invariants, principal values and principal directions, stress and strain quadrics, equations of equilibrium, and compatibility equations; Reynolds transport theorem, balance of momenta, continuity equation, 1st and 2nd laws of thermodynamics, application to solids and fluids. Prerequisite: MEEG 3013 and MEEG 3503 and MATH 3423.

MEEG4123 Finite Element Methods in Mechanical Engineering (SP) Introduction to the use of the finite element method in mechanical engineering analysis and design. Applications to machine design, aerospace design, machine vibrations, heat transfer, and fluid flow. Prerequisite: MEEG 3123.

MEEG4213 Control Systems (IR) Mathematical models of control root-locus, and frequency-response design techniques. Performance criteria and stability. Special topics. Credit may be earned for only 1 of CSEG 4403, ELEG 4403, OR MEEG 4213. (Same as CENG 4403, CSEG 4403, ELEG 4403) Prerequisite: ELEG 3123.

MEEG4223 System and Signal Analysis (IR) Discrete and continuous time dynamic systems, convolution, Fourier and z-transforms, FFT, stability, frequency response, filtering, state variable models, and analysis. Digital system simulation. Masons Rule. Credit cannot be earned for both MEEG 4233 and ELEG 3123. (Same as ELEG 3123) Prerequisite: (ELEG 2113 or ELEG 3903) and MATH 3404.

MEEG4233 Microprocessors in Mechanical Engineering I: Electromechanical Systems (IR) Microcomputer architectural, programming, and interfacing. Smart product design (microprocessor-based design). Control of DC and stepper motors and interfacing to sensors. Applications to robotics and real-time control. Mobile robot project. Digital and analog electronics are reviewed where required. Prerequisite: ELEG 3913 or equivalent.

MEEG4243 Robot Manipulator Control (IR) Lectures and experiments developing fundamentals and design principles for digital computer control of robot manipulators. Homogeneous transformations, kinematic equations, motion trajectories, and control. BASIC programming and computer software. Prerequisite: CSEG 1913 and MATH 3404 and MEEG 2013.

MEEG4303 Materials Laboratory (SP) A study of properties, uses, testing, and heat treatment of basic engineering materials. Lecture 1 hour, laboratory 4 hours per week. Corequisite: MEEG 4300L. Prerequisite: MEEG 2303 and MEEG 3013.

MEEG4413 Heat Transfer (FA, SU) Basic thermal energy transport processes; conduction, convection, and radiation; and the mathematical analysis of systems involving these processes in both steady and time-dependent cases. Prerequisite: MEEG 3503.

MEEG4423 Steam Power Plants (FA, Odd years) Detailed study of steam power plants and equipment; fuels and combustion calculations; fuel handling and storage; furnaces, boilers, and draft apparatus; types of prime movers; condensers and their auxiliaries. Prerequisite: MEEG 3403.

MEEG4433 Propulsion (FA, Even years) Principles, operation, and characteristics of reciprocating engines, gas turbines, turbojets, and rockets. Brief study of novel propulsion systems. Prerequisite: MEEG 3403 and MEEG 3503.

MEEG4443 Thermal and Vibration Analysis and Testing of Electronics (IR) Packaging, manufacture, and failure mechanisms of boards and assemblies. Analysis of overheating, thermal stress, and vibration. Laboratory testing and environmental stress screening. Corequisite: MEEG 4440L. Prerequisite: INEG 4513 or ELEG 4273.

MEEG4440L Thermal and Vibration Analysis and Testing of Electronics Laboratory (IR) Laboratory 1 hour per week in support of MEEG 4443. Corequisite: MEEG 4443.

MEEG4453 Industrial Waste and Energy Management (SP) Applications of thermodynamics, heat transfer, fluid mechanics, and electric machinery to the analysis of waste streams and energy consumption for industrial facilities. Current techniques and technologies for waste minimization and energy conservation including energy-consuming systems and processes, utility rate analysis, economic analysis and auditing are taught. Prerequisite: MEEG 3403 and MEEG 3503 and MEEG 4413.

MEEG4463 Refrigeration Engineering (IR) Fundamental thermodynamics of refrigeration; properties of commercial refrigerants; study of compression, absorption, and vacuum systems; use of solid refrigerants. A consideration of equipment. The application of these principles to ice plants, cold storage industries, and air conditioning. Prerequisite: MEEG 3403.

MEEG4473 Indoor Environmental Control (FA) Gives student a thorough understanding of the fundamental theory of air conditioning. About one-half of the course time will be devoted to a study of the types and selection of equipment used in the performance of air conditioning. Prerequisite: MEEG 3403.

MEEG4483 Thermal Systems Analysis and Design (SP, SU) Analysis design and optimization of thermal systems and components with examples from such areas as power generation, refrigeration, and propulsion, Availability loss characteristics of energy systems and availability conservation methods. Prerequisite: MEEG 3403 and MEEG 4413.

MEEG4523 Theory of Aeronautics (IR) Properties of air, airfoil characteristics, streamline flow, modern high-speed airfoil theory, drag estimation, airplane stability and control. Prerequisite: MEEG 3403 or MEEG 3503.

MEEG4603 Basic Nuclear Engineering (SP) Principles of atomic and nuclear physics, including: fusion and fission reactions, radioactive decay, and neutron interactions. Introduction to nuclear reactor theory, types, components, and behavior. Prerequisite: PHYS 2073 and MATH 2574.

MEEG4623 Radiation Protection and Shielding (IR) Aspects of personnel radiation protection and shielding design as applied to the operating nuclear power plant, research laboratory, or other nuclear facility. Prerequisite: PHYS 2073 and MATH 2574.

MEEG4633 Nuclear Power Generation (FA) Thermal energy analysis and design of nuclear power reactors and power plants including thermodynamical analysis of components and cycle, thermal hydraulic aspects, core energy distribution, and fluid transients. Emphasis is on pressurized water reactors and boiling water reactors. Prerequisite: MEEG 3503 and MATH 3404 and MEEG 2403.

MEEG4703 Mathematical Methods in Engineering (FA) Determinants, matrices, simultaneous equations, eigenvalues, eigenvectors, and coordinate transformations of matrices; vector algebra and calculus, integral theorems, curvilinear coordinates, covariant and contravariant tensors. Applications of tensor algebra and calculus to mechanics. Prerequisite: MATH 2574.

MEEG4733 Numerical Methods II (SP) Numerical methods for the solution of ordinary and partial differential equations, initial and boundary value problems; one-step and multi-step methods; finite differences and finite element techniques; computer applications. Prerequisite: (MEEG 3703 or MATH 3353) and CSEG 1913.

MEEG4813 Air Pollution Abatement (SP) Design of air pollution abatement systems and equipment including cyclones, bag filters, and scrubbers. Other topics discussed are air pollution regulations: permitting, dispersion modeling, and national air quality standards.

MEEG4843 Environmentally Conscious Design and Manufacturing The course will provide an introduction to the environmental aspects of production design and illustrate the consequences and costs of waste generation and pollution abatement. The course will also define pollution prevention and waste minimization techniques and will introduce the student to the design for the environment (DfE) concept, life cycle analysis, and total quality environmental management techniques.

MEEG491V Special Projects (1-6) (FA, SP, SU)

MEEG5013 Advanced Mechanical Vibrations (IR) Continuation of MEEG 4013 with a more analytic approach. Included are techniques for modeling and understanding the vibratory behavior of multi-degree of freedom discrete systems, continuous systems, nonlinear systems, and random variables. Prerequisite: MEEG 4013.

MEEG5033 Advanced Mechanics of Materials I (IR) Combined stress, theories of failure, thick-walled cylinders, bending of unsymmetrical sections, torsion in noncircular section, plate stresses, and strain energy analysis. Prerequisite: MEEG 2013 and MEEG 3013.

MEEG5093 Engineering Mechanics Topics (IR) Detailed study of selected engineering mechanics topics; specific topics for study will vary, but may include vibration, wave propagation, stability, elasticity, plasticity, composites, etc. Prerequisite: graduate standing.

MEEG5103 Structural Dynamics (FA) The forced and random vibration response of complex structural systems are studied through the use of the finite element method. Computational aspects of these problems are discussed and digital computer applications undertaken. Prerequisite: MEEG 4103 and graduate standing.

MEEG5113 Modal Analysis Methods (SP) Fundamental concepts of both analytical and experimental modal analysis methods are examined and applied to the study of complex structural systems. Computational aspects of these problems are discussed, and digital computer applications undertaken with experimental verification. Prerequisite: MEEG 5103 and graduate standing.

MEEG5123 Computer Aided Mechanical Design (FA) Design of mechanical systems using optimization techniques, digital simulation, application programs, and interactive graphics with the goal being to demonstrate how these various techniques can be used together to enhance the resulting design. Prerequisite: (MEEG 4103 or MEEG 4413) and graduate standing.

MEEG5143 Advanced Machine Design (SU) Application of advanced topics such as probability theory, fracture mechanics, and computer methods to the design and analysis of complex mechanical systems. Prerequisite: MEEG 4103 and graduate standing.

MEEG5193 Mechanical Design Topics (IR) Detailed study of selected mechanical design topics; topics will vary, but may include advanced numerical analysis methods for finite and boundary element applications, vibration analysis using advanced parameter extraction methods, advanced mechanism analysis methods with possible application to robotics, use of composite materials in mechanical systems, computer graphics in mechanical design, etc. Prerequisite: graduate standing.

MEEG5213 Microprocessors in Mechanical Engineering II Real-time Control (IR) Feedback control system theory and design. C programming. Microcontroller interfacing. Real-time control of electro-mechanical systems in laboratory projects using a single-board computer as the controller. Prerequisite: MEEG 4233.

MEEG5273 Electronic Packaging (FA) An introductory treatment of electronic packaging from single chip to multichip including materials, electrical design, thermal design, mechanical design, package modeling and simulation, processing considerations, reliability, and testing. Credit

cannot be earned for both MEEG 5273 and ELEG 5273. (Same as ELEG 5273) Prerequisite: (ELEG 3213 or ELEG 3913) and MATH 3404.

MEEG5293 Digital Control Topics (IR) Applications of digital control to mechanical engineering problems. Topics will vary, but may include digital control theory, robotics, CAD/CAM systems, and mechatronics. Prerequisite: graduate standing.

MEEG5303 Physical Metallurgy (IR) Physical and chemical properties of solids and the application of materials in commerce. Lecture 4 hours per week. Prerequisite: MATH 3404.

MEEG5313 Materials and Design (IR) Analysis, design, and testing of high strength and modulus materials, brittle materials, composites, and anisotropic materials. Effect of environment on design with particular emphasis on nuclear application. Prerequisite: MATH 3404 and graduate standing.

MEEG5393 Engineering Materials Topics (IR) Detailed study of selected materials engineering topics; topics will vary, buy may include diffusion processes in solids, thermodynamics of solids, fracture of materials, failure analysis, advanced techniques in electron microscopy, analytical methods in materials science, advanced corrosion and engineering, etc. Prerequisite: graduate standing.

MEEG5403 Advanced Thermodynamics (FA) An in-depth review of classical thermodynamics, including availability analysis, combustion, and equilibrium, with an introduction to quantum mechanics and statistical thermodynamics. Prerequisite: (MEEG 3403 and MATH 3404) or equivalent.

MEEG5423 Statistical Thermodynamics (SP, Odd years) Concepts and techniques for describing high temperature and chemically reactive gases from a molecular point of view. introductory kinetic theory, chemical thermodynamics, and statistical mechanics applied. Prerequisite: MEEG 3403 and MATH 2574.

MEEG5433 Combustion (SP, Even years) Introduction to combustion of solid, liquid, and gaseous fuels. Equilibrium and kinetics of hydrocarbon oxidation, laminar and turbulent flames, premixed and non-premixed combustion processes, ignition, quenching, stability, emissions, diagnostics. Prerequisite: (MEEG 3403 and MATH 3404) or equivalent.

MEEG5453 Advanced Heat Transfer (SP) More in-depth study of topics covered in MEEG 4413, Heat Transfer, and coverage of some additional topics. Prerequisite: MEEG 4413 or CHEG 3143 or equivalent.

MEEG5463 Conduction and Convection Heat Transfer (SU, Odd years) Deeper, broader coverage of topics studied in MEEG 4413 and 5453. Steady and transient, one and multidimensional conduction with emphasis on solution methods, analytical and numerical. Forced and free convection in laminar and turbulent, internal and external flow. Porous media heat and mass transfer and/or mass diffusion. Prerequisite: MEEG 5453 or equivalent.

MEEG5473 Radiation Heat Transfer (SU, Even years) Spectral analysis, radiant exchange in gray and non-gray enclosures, gas radiation, and multi-mode heat transfer. Prerequisite: MEEG 5453 or equivalent.

MEEG5493 Thermal Science Topics (IR) Detailed study of selected thermal science topics; topics will vary, but may include electronics cooling, porous media heat/mass transfer, combustion, gas turbines, laser velocimetry, etc. Prerequisite: graduate standing.

MEEG5503 Advanced Fluid Dynamics I (FA) A basic survey of the characteristics of fluid flow under a variety of conditions with examples. Begins with a derivation of the Navier-Stokes equations and an evaluation of the dimensionless groups found from these equations. Topics to be covered include viscous laminar and turbulent boundary layers, jets and wakes, Stokes flow, inviscid flows with and without free surfaces and turbulence. Prerequisite: MEEG 3503 and MATH 3404.

MEEG5513 Gas Dynamics (SP, Even years) Basic concepts of gas dynamics and gas properties applied to compressible flows including quasi one-dimensional isentropic flow in variable area ducts, normal shock waves, flow in ducts with friction, heating and cooling, oblique shock and expansion waves and shock tube flow. Prerequisite: MEEG 3503 and MEEG 3403 and MATH 2574.

MEEG5523 Advanced Fluid Dynamics Topics (SP, Odd years) This course is a continuation of 5503. A series of advanced topics in fluid dynamics in some depth. These topics will change depending on the instructor. The course will cover applications, derivation of equations, and analytical and approximate solution techniques. Potential subjects may include (but are not limited to) aerosol and hydrosol motion, groundwater, and tribology (lubrication). Prerequisite: MEEG 5503 and MATH 3404.

MEEG5603 Nuclear Power Plants I (IR) Methods of converting the heat generated into useful work in power plant systems, from different types of reactors. Recitation 3 hours per week. Prerequisite: MEEG 4603.

MEEG5613 Nuclear Power Plants II (IR) Continuation of the study of power reactors considered in MEEG 5603, with emphasis on reactor control and operation in power plant systems. Prerequisite: MEEG 5603.

MEEG5623 Reactor Physics (IR) Physical principles underlying the operation of a nuclear reactor, including: neutron interactions, criticality for single and multiregion reactors, reactor kinetics, operational reactivity effects, and an introduction to perturbation theory. Prerequisite: MATH 3404 and (MEEG 4603 or PHYS 4603).

MEEG5633 Nuclear Materials (IR) Radiation damage mechanisms in reactor structural and fuel materials, comprehensive study of the nuclear fuel cycle from uranium mining to high level radioactive waste management, and other materials science aspects of material behavior in nuclear energy systems. Prerequisite: MEEG 2303 and MEEG 4603 and MEEG 5603.

MEEG5643 Nuclear Heat Transport (IR) Heat generation and removal in nuclear power reactors, including water, gas, and liquid-metal cooled designs; boiling and 2-phase flow considerations. Prerequisite: MEEG 4603 and MEEG 4413 and MEEG 3503.

MEEG5683 Nuclear Engineering Topics (IR) Detailed study of one specialized nuclear engineering topic; topic varies from year to year, but may include radiation transport theory, nuclear fuel cycles, reactor safety analysis, dosimetry, radiological assessment, advanced reactors, etc. Prerequisite: graduate standing.

MEEG590V Research (1-6) (FA, SP, SU) Fundamental or applied research. Prerequisite: graduate standing.

MEEG591V Special Problems (1-6) (FA, SP, SU) Prerequisite: graduate standing.

MEEG600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

MEEG6273 Advanced Electronic Packaging (SP) An advanced treatment of electronic packaging concentrating on multichip modules. Topics covered include electrical design, thermal design, mechanical design, package modeling and simulation, computer-aided engineering and design, processing limitations on MCM performance, reliability, testing, and economic considerations. (Same as ELEG 6273) Prerequisite: ELEG 5273.

MEEG6800 Graduate Seminar (FA, SP) A periodic seminar devoted to mechanical engineering research topics. Appropriate grade to be "S."

MEEG700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

MICROELECTRONICS – PHOTONICS (MEPH)

Ken Vickers
Program Chair
239 Physics
575-2875

Faculty:

Business Administration:
• Professor J. Todd
Chemical Engineering:
• Professor R. Ulrich
Chemistry:
• Associate Professors I. Fritsch, X. Ping
Electrical Engineering:
• University Professor B. Brown • Professor and Department Chair A. Elshabini
• Professors S. Ang, H. Naseem, L. Schaper
• Research Professor F. Barlow • Associate Professor K. Olejniczak
Mechanical Engineering:
• Professor And Department Chair W. Schmidt • Associate Professor M. Gordon
• Assistant Professors A. Malshe, C. Tung
Physics:
• University Professor G. Salamo • Professor M. Xiao • Research Professor K. Vickers
• Associate Professors L. Oliver, Y. Ding
• Assistant Professors L. Bellaiche, M. Filipkowski, M. Henry, P. Thibado

Degrees Conferred: M.S. in Microelectronics-Photonics (MEPH)

This multidisciplinary program prepares students for pursuing careers in the development and manufacturing of high tech materials, devices, and systems in such industries as photonics, telecommunications, microelectronics, and MEMs. It is expected that typical students in this program will be full time students residing on campus, but provisions may be made to support remotely located part-time students already engaged in professional careers.

Prerequisites to Degree Program: Applicants to the program must satisfy the requirements of the Graduate School as described in the *Graduate School Catalog* and have the approval of the Graduate Studies Committee of the Microelectronics-Photonics program (GSCMEP).

Candidates must have completed a Bachelor of Science degree in either engineering or science, and candidates' academic backgrounds will be evaluated by the GSCMEP for suitability to the graduate program. To be admitted to graduate study in Microelectronics-Photonics without deficiency, candidates are required to have completed a math course sequence through differential equations, a calculus-based physics course sequence through introduction to quantum mechanics, and a junior level introduction to electricity and magnetism. Other undergraduate deficiencies may be identified during the evaluation process, and full admission to the graduate program will be contingent on successful completion of these identified deficiencies.

Prospective students from foreign countries in which English is not the native language must submit nationally recognized standardized testing results on written English proficiency for consideration by the GSCMEP. Students may be given conditional admittance pending demonstration of English language skills in appropriate courses at the University of Arkansas. Students wishing to apply for Teaching Assistantships (TA) in a department must meet that department's English Language proficiency test requirements for TA positions.

Requirements for the Master of Science Degree: Students choosing this degree program will work with the GSCMEP to define their advisory committee by the end of the sixth week of their first semester in the program.The advisory committee will be made up of at least three faculty members, with at least one faculty member from both physics and engineering. The advisory committee will elect a temporary chair until the student's research/project emphasis is picked. At that point, the research/project adviser will be added to the advisory committee and become the permanent chair.

Students in this degree program can choose either a research path or an independent project path. The minimum course hour requirements for both paths are as follows:

	Research Course Hours	Independent Project Course Hours
Physics	6	6
Engineering	9	12
Business	3	3
Technical elective	9	15
Research thesis	6	0
Independent project	0	3
Total hours	33	39

Physics courses are typically chosen from such courses as:

PHYS 5734 Laser Physics,
PHYS 5754 Applied Nonlinear Optics,
PHYS 5713 Solid State Physics,
PHYS 5774 Introduction to Optical Properties of Matter
PHYS 5794 Lightwave Communications
PHYS 588V Selected Topics in Experimental Physics.

Engineering courses will include INEG 4513/ELEG 4273 Electronics Manufacturing Processes and at least two other courses to be chosen from the following list:

ELEG 5213 Integrated Circuit Fabrication Technology Or
CHEG 5613 Microelectronics Fabrication and Materials,

ELEG/MEEG 5273 Electronic Packaging,
ELEG 5293L Integrated Circuits Fabrication Laboratory,
ELEG/MEEG 6273 Advanced Electronic Packaging,
INEG 4533 Application of Machine Vision,
INEG 4563 Application of Robotics,
INEG 5423 Engineering in Global Competition, or MEEG 4443 Thermal and Vibration Analysis and Testing of Electronics

Business course hours may be chosen from the following list:

MGMT 5363 Strategic Innovation Or
MGMT 5383 Intra/ Entrepreneurship of Technology.

While the courses listed above are designed to meet the interdisciplinary needs of highly technical industry, substitutions may be allowed to the courses listed above with approval by the student's advisory committee and the Graduate Studies Committee of the Microelectronics-Photonics program.

Technical elective courses can be additional courses from the course blocks above, or are expected to be senior level or above science/engineering courses such as

MEEG 4303 Materials Laboratory,
CHEM 4213 Instrumental Analysis
ELEG 4203 Semiconductor Devices.

Other similar technical courses can be applied to a student's individual curriculum plan with the consent of the student's advisory committee.

Research thesis hours will be chosen from the department of the students research adviser (PHYS 600V, ELEG 600V, etc) and will require a written thesis successfully defended in a comprehensive oral exam given by the advisory committee. Independent project hours will be under MEPH 588V, Special Problems in Microelectronics-Photonics, and will require a written project report successfully defended in a comprehensive oral exam given by the advisory committee.

Students in the program must demonstrate proficiency in commercial office software products to meet their documentation requirements as defined in the program's student handbook. These products will include word processing, spreadsheet, electronic communications, presentation, and project management software. In addition, students must be able to create documents using commercial software at the rate of forty words per minute or higher.

Students in this program who meet the requirements as listed on page 77 of the 2000-2001 *Graduate School Catalog* will be awarded a Certificate of Achievement in Electronics Manufacturing from the College of Engineering upon graduation.

COURSES: MICROEL PHOTO (MEPH)

MEPH5801 Graduate Seminar (FA, SP, SU) Papers presented by candidates for the Master of Science degree in Microelectronics-Photonics on leading edge topics in the field. Prerequisite: graduate standing.

MEPH5811 Operations Seminar (FA, SP, SU) Weekly seminar of Microelectronics-Photonics candidates for the Master of Science degree to identify and react to operational issues impacting the student's progress toward degree completion. Prerequisite: graduate standing.

MEPH587V Special Topics in Microelectronics-Photonics (1-3) (FA, SP, SU) Consideration of current microelectronic-photonic topics not covered in other courses. May be repeated for 9 hours.

MEPH588V Special Problems in Microelectronics-Photonics (1-3) (FA, SP, SU) Opportunity for individual study of advanced subjects related to a graduate degree in Microelectronics-Photonics to suit individual requirements. May be repeated for 6 hours.

MEPH6801 Graduate Seminar (FA, SP, SU) Papers presented by candidates for the Doctor of Philosophy degree in Microelectronics-Photonics on current research in the field of microelectronics-phonotics. Prerequisite: graduate standing.

MEPH6811 Operations Seminar (FA, SP, SU) Weekly seminar of Microelectronics-Photonics candidates for the Doctor of Philosophy degree to identify and react to operational issues impacting the students' progress toward degree completion. Prerequisite: graduate standing.

MIDDLE-LEVEL EDUCATION (MLED)

Priscilla L. Griffith
Department Head of Curriculum and Instruction
201 Graduate Education Building
575-4209

• Professor Totten • Associate Professors Johnson, Wavering • Assistant Professors Beller, Hardy, Morrow

Note: The M.A.T. Program in Middle Level Education will be available Fall 2001. For information about the program and other aspects of middle level education, students should contact a program adviser in Peabody Hall, 208A, 575-7244.

DEPARTMENT OF MUSIC (MUSC)

Stephen Gates
Department Chair
201 Music Building
575-4701

• Distinguished Professor Caldwell • Professors Cencel, Detels, Gates, Greeson, Ragsdale, Sloan, Umiker, Wolpert • Research Professor Markham • Associate Professors Jones, Mains, McNeela, Millen, Mueller, Ramey, Thompson, Warren, Yoes • Assistant Professors Hickson, Margulis • Adjuct Assistant Professor Lennerte

Degree Conferred: M.M. (MUSC)

Areas of Concentration: Applied music, accompanying, composition, theory, instrumental and vocal conducting, music history, and music education.

Prerequisites to Degree Program: To enter one of these programs, students should apply to the Director of Graduate Studies in Music for the specific degree program in which they are interested. Students wishing to change from one degree program or major applied area to another must also apply to the Director of Graduate Studies in Music. The Department Chair and the Director of Graduate Studies in Music, in consultation with the faculty of the specific area, determine acceptance, provisional acceptance contingent on the making up of specific deficiencies, or rejection of the student for admission to the degree program in the specific area of concentration.

Requirements for the Master of Music Degree: In addition to the general requirements of the Graduate School the following must be met:

1. All students seeking admission to the program for the degree of Master of Music must show evidence of satisfactory proficiency in aural and written theory, and in music history and literature. This shall be done by means of an aural and written theory and history diagnostic examination administered by the department. Any student who has not demonstrated satisfactory proficiency in these areas prior to entrance will be registered in remedial or refresher courses in the first semester of residence.
2. Applicants in applied music will present a repertoire (instrumental or vocal) corresponding to that required for the degree of Bachelor of Music at the University of Arkansas. Applicants from other schools will submit an audition recital; this may be done by recording.
3. Applicants in theory and composition will submit scores on the Graduate Record Exam in Music.
4. Applicants in composition will submit scores of at least three of their compositions.

In addition to the general requirements, the following must be met:

1. Applicants must pass a keyboard proficiency examination upon entrance or register in appropriate keyboard courses until this requirement is met. This exam tests the student's ability to use the keyboard as a tool within the framework of professional activities; thus the requirements vary in emphasis according to the area of major study and degree plan. The test may be taken at the end of any semester, but students must take it before they enter the last semester of study in which they expect to graduate. Keyboard proficiency in figured bass will be required of music history majors in early music performance practice emphasis.
2. Applicants in music history will pass a reading examination in French, German, or Italian and will demonstrate knowledge of common music terms in all three languages before admission to candidacy.
3. In addition to completing the specified requirements, the candidate will take comprehensive written examinations which must be passed before taking the oral examination.
4. The applicant will pass an oral examination.

All candidates for the degree of Master of Music, except those in composition (D.), music theory (E.), and music history (unless pursuing the early music performance option) (F.), must participate in at least one ensemble per semester throughout their residence.

The programs of study are listed below. All course selections to be subject to approval of the major adviser (i.e., applied teacher or thesis director).

HOURS

A. Master of Music in Performance, Instrumental: 36

I. APPLIED MUSIC 16
Requirements include:
1) MUAP 510V for four semesters, total 14 hours, to include:
a) Preparation of one complete concerto
b) Transposition and sight-reading proficiency examination
2) MUAP 5201 (solo recital)
3) MUAP 5211 (chamber recital)

II. MUSIC HISTORY AND MUSIC THEORY.....12
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) One music history course to be selected from MUHS 5753, 5773, 5783, 5793
3) One music theory course to be selected from MUTH 477V(3), 5623, 5343, 5643
4) Electives totaling 3 hours in either music history and/or music theory to be selected from (2) or (3) above of MUHS 4253 or 4963H

III. ELECTIVES.....8
To be selected from music courses at the 4000-6000 level with the consent of the adviser and to include not more than 4 hours of ensemble. Note: Study of the appropriate literature is required if not adequately covered in the undergraduate degree presented for admission, but will count toward the degree as an elective.

B. Master of Music in Performance, Keyboard:.....36

I. APPLIED MUSIC 16
1) MUAP 510V for four semesters, total 14 hours, to include preparation of one complete concerto
2) MUAP 5201 (solo recital)
3) MUAP 5211 (chamber recital)

II. MUSIC HISTORY AND MUSIC THEORY.....12
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) One music history course to be selected from MUHS 5753, 5773, 5783, 5793
3) One music theory course to be selected from MUTH 477V(3), 5623, 5343, 5643
4) Electives totaling 3 hours in either music history and/or music theory to be selected from (2) or (3) above of MUHS 4253 or 4963H

III. ELECTIVES.....8
To be selected from music courses at the 4000-6000 level with the consent of the adviser and to include not more than 4 hours of ensemble. Note: Study of keyboard literature is required if not adequately covered in the undergraduate degree presented for admission, but will count toward the degree as an elective.

C. Master of Music in Performance, Voice 36

I. APPLIED MUSIC 16
Requirements include:
1) MUAP 510V for four semesters, total 14 hours, to include:
a) Preparation of one complete operatic or oratorio role
b) Demonstration of language proficiency in English and three foreign languages
2) MUAP 5201 (solo recital)
3) MUAP 5211 (chamber or solo recital)

II. MUSIC HISTORY AND MUSIC THEORY.....12
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) One music history course to be selected from MUHS 5753, 5773, 5783, 5793
3) One music theory course to be selected from MUTH 477V(3), 5623, 5343, 5643
4) Electives totaling 3 hours in either music history and/or music theory to be selected from (2) or (3) above of MUHS 4253 or 4963H

III. ELECTIVES.....8
To be selected from music courses at the 4000-6000 level with the consent of the adviser and to include not more than 4 hours of ensemble. Note: Study of vocal literature is required if not adequately covered in the undergraduate degree presented for admission, but will count toward the degree as an elective.

D. Master of Music in Composition 36

I. MUSIC THEORY AND COMPOSITION.....21
1) MUTH 5643, Analysis of 20th Century Music
2) MUTH 568V, Composition (6)
3) MUTH 600V, Master's Thesis (6)
4) Six hours electives in music theory

II. MUSIC HISTORY AND LITERATURE.....6
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) At least one course from the 5000-level music history and musicology seminars (MUHS 5753, 5773, 5783, 5793, 5903)

III. ELECTIVES 9
Graduate-level courses to be selected from MUAP, MUEN (4 credit maximum), MUHS, MUTH, or MUPD areas or other disciplines with consent of the major adviser.

E. Master of Music in Music Theory 36

I. MUSIC THEORY AND COMPOSITION.....21
1) MUTH 5623, Pedagogy of Theory
2) MUTH 5643, Analysis of 20th Century Music
3) MUTH 600V, Master's Thesis(6)
4) Courses to be selected from MUTH courses at the 4000- or 5000-level (9 hours minimum).

II. MUSIC HISTORY AND LITERATURE.....6
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) At least one course from the 5000-level music history and musicology seminars (MUHS 5753, 5773, 5783, 5793, 5903)

III. ELECTIVES 9
Graduate-level courses to be selected from MUAP, MUEN (4 credit maximum), MUHS, MUTH, or MUPD areas or other disciplines with consent of the major adviser.

F. Master of Music in Music History: ..36
(music history, early music performance practice)

I. MUSIC HISTORY AND LITERATURE.....20
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) At least three courses from the 5000-level music history and musicology seminars (MUHS 5753, 5773, 5783, 5793, 5903)
3) At least one course in the area of music literature, to be selected from MUHS 5722, 5732, 5952, 5943, or 4253, with the approval of the major adviser.
4) MUHS 600V, Master's Thesis (6) -or- MUHS 601V, Lecture-Recital (Early Music Performance Practice)

II. APPLIED MUSIC 4-8
4 hours minimum for music history emphasis -or-
8 hour minimum for early music performance practice emphasis, at least six of which are on early instruments

III. MUSIC THEORY AND COMPOSITION.....4-8
Courses to be selected with the approval of the major adviser

IV. ELECTIVES
Courses either within the Music Department or in related fields, subject to the approval of the major adviser.

G. Master of Music in Instrumental Conducting 36

I. MUSIC THEORY AND COMPOSITION 8
1) MUTH 4703, Form and Analysis
2) MUTH 4612 or 5672, Orchestration
3) MUTH 5322, Score Reading

II. MUSIC HISTORY AND LITERATURE 12
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) At least one course from the 5000-level music history and musicology seminars (MUHS 5753, 5773, 5783, 5793, 5903)
3) At least one course in the area of music literature, to be selected from MUHS 4793, 5943, 5952, 5962, or 4253 with the approval of the major adviser.

III. APPLIED MUSIC 4
1) MUAP 510V, Applied Voice/ Instrumental

IV. MUSIC PEDAGOGY 6
1) MUPD 582V, Conducting IV
2) MUAP 5201, 5211, Recitals (2 recitals as conductor)

V. ELECTIVES 6

H. Master of Music in Vocal Conducting 36

I. MUSIC THEORY AND COMPOSITION 8
1) MUTH 4703, Form and Analysis
2) MUTH 4612 or 5672, Orchestration
3) MUTH 5322, Score Reading

II. MUSIC HISTORY AND LITERATURE 12
1) MUHS 5973, Seminar in Bibliography and Methods of Research
2) At least one course from the 5000-level music history and musicology seminars (MUHS 5753, 5773, 5783, 5793, 5903)
3) MUHS 5952, 5962
4) Other courses to be selected from 5000-level MUHS offerings

III. APPLIED MUSIC 4
1) MUAP 510V, Applied Voice/Instrument

IV. MUSIC PEDAGOGY 6
1) MUPD 582V, Conducting IV
2) MUAP 5211, Recitals (2 recitals as conductor)

V. ELECTIVES 6

I. Master of Music in Accompanying ..36

I. APPLIED MUSIC.....9
1) MUAP 510V, piano (8 hours)
Course requirements include:
a) Accompanying two vocal recitals
b) Accompanying one instrumental recital excluding piano-strings literature
c) One chamber recital with emphasis on piano-strings literature
d) Study of solo piano literature at the graduate level
e) MUAP 510V, harpsichord (1)

II. ACCOMPANYING STUDIES 9
1) MUPD 5362, 5372, Accompanying Techniques 4
2) MUPD 5111, Vocal Diction for Accompanists (one credit each in Italian, German, and French) 3
3) MUPD 5391, Opera Accompanying Techniques (two semesters, one credit each semester) 2

III. MUSIC THEORY AND COMPOSITION.....3-6
MUTH 4703, Form and Analysis

IV. MUSIC HISTORY AND LITERATURE.....9
1) MUHS 5722, 5732, Directed Studies (Vocal Literature)
2) MUHS 5933, Seminar in Chamber Music
3) MUHS 5973, Seminar in Bibliography and Methods of Research

V. ELECTIVES 3-6
A minimum of six hours to be taken in music courses, of which not more than two hours in ensemble may count toward the degree. Courses to be selected from the following areas:
1) Music Theory
2) Music History and Literature (MUHS 5943, Seminar in Opera, for emphasis in opera)
3) Other related courses

J. Master of Music in Music Education 36

I. Music Core 13
1) MUHS 5973 Seminar in Bibliography and Methods of Research
2) One Music Theory course to be selected from MUTH 477V (3 hours), 5343, 5623, 5643
3) One Music History course to be selected from MUHS 5753, 5773, 5783, 5793
4) MUAP 5001/510V Applied Music; 2 semesters; 2 hours minimum
5) Ensemble: 2 hours

II. MUSIC EDUCATION CORE 7

1) MUED 5513 Seminar: Resources in Music Education
2) MUED 5811 Curriculum Design in Music
3) MUED 5653 Seminar: Issues in Music Education

III. EDUCATION CORE.....3

EDFD 5373 Psychological Foundations of Teaching and Learning

IV. Thesis 6

A research thesis in the field of music education. The thesis at the master's level may be preparatory or exploratory for a dissertation to be developed later in connection with work toward a doctorate.

OR

V. Project (One of the following).....3-6

1) One (or more) original compositions
2) An arrangement of an existing large musical work for band, orchestra, chorus, or other ensemble.
3) Lecture-Recital
4) Development of an instructional method or innovative curriculum design.
5) A project involving educational planning, e.g., an administrative problem or a teaching or resource unit

VI. ELECTIVES.....7-10

Courses to be chosen with the consent of the advisory committee, to include some work in one of the following areas of specialization: Elementary, Secondary Choral, or Secondary Instrumental. Ensembles may not count as elective hours.

Courses: Applied Music: Private Instruction (MUAP)

Piano, Organ, Voice, Viola, Violin, Violoncello, String Bass, Clarinet, Bassoon, Flute, Oboe, Alto Saxophone, French Horn, Trombone, Baritone, Tuba, Cornet, Trumpet, Percussion, Harpsichord, Historic String, Historic Wind.

MAJOR LEVEL

MUAP510V Applied Voice/Instrument (1-5) (FA, SP, SU) Private study at the graduate level. May be repeated. Prerequisite: MUAP 310 or equivalent.

MUAP5201 Graduate Recital I (FA, SP, SU) Preparation and performance of a public recital of a minimum of 50 minutes of music. May be repeated.

MUAP5211 Graduate Recital II (FA, SP, SU) Preparation and performance of a public recital of a minimum of 50 minutes of music. May be repeated.

SECONDARY LEVEL

MUAP5001 Applied Voice/Instrument-Secondary Level (FA, SP, SU) Private study at the graduate secondary level. May be repeated.

COURSES: MUSIC ENSMBL (MUEN)

MUEN5341 Collegium Musicum (FA, SP) Performance of early music for various combinations of instruments and/or voices. Rehearsal 2 hours per week. May be repeated.

MUEN5401 Opera Theatre (FA, SP) Study of opera through performances of scenes, chamber and major operatic production. Admission with director's approval. May be repeated.

MUEN5411 Concert Choir (FA, SP, SU) Rehearsal 3 hours per week with extra rehearsals at the director's discretion. Admission with director's approval. No audition required prior to registration. May be repeated.

MUEN5421 Inspirational Singers (FA, SP) Performance of African-American literature with particular emphasis on Negro Spirituals and traditional/contemporary gospel music. No audition required to registration. Rehearsal 3 hours per week. May be repeated.

MUEN5431 Symphony Orchestra (FA, SP, SU) Rehearsal 3 hours per week with extra rehearsals at director's discretion. Admission with director's approval. May be repeated.

MUEN5441 Marching Band (FA) Rehearsal 8 hours per week. Admission with director's approval. May be repeated.

MUEN5451 Schola Cantorum (FA, SP) Vocal ensemble limited to the more experienced singers. Rehearsal 5 hours per week. Admission with director's approval. May be repeated. Prerequisite: one year of MUEN 3411.

MUEN5461 Wind Symphony (FA, SP) Rehearsal 3 to 5 hours per week. Admission by audition and approval of the conductor. May be repeated. Corequisite: MUEN 5460L.

MUEN5460L Wind Symphony Laboratory (FA, SP) May be repeated. Corequisite: MUEN 5461.

MUEN5471 Jazz Performance Laboratory (FA, SP) Training in the various styles of jazz and popular music. Rehearsal 3 hours per week. Admission by audition. May be repeated.

MUEN5481 Concert Band (SP) Rehearsal 3 hours per week. Admission by audition and approval of the conductor. May be repeated.

MUEN5501 Chamber Music (FA, SP, SU) Performance of small ensemble music for any combination of instruments and/or voice. Rehearsal 3 hours per week. May be repeated.

MUEN5511 Symphonic Band (SP) Rehearsal 3 hours per week. Admission by audition and approval of the conductor. May be repeated.

MUEN5521 Woodwind Quintet (FA, SP) Study and performance of music for woodwind quintet. Weekly coaching will emphasize intonation, blend, stylistic awareness, and ensemble precision. Repertorie ranges from the 18th to the 20th centuries. 3 hours of rehearsals weekly. May be repeated.

MUEN5541 Accompanying (FA, SP) Piano accompanying of vocal and instrumental soloists. Rehearsal 2 hours per week. May be repeated. Prerequisite: MUAP 110.

MUEN5551 Percussion Ensemble (SP, SU) Study and performance of ensemble music for multiple percussion instruments. Rehearsal 2 hours per week. May be repeated.

MUEN5591 Chamber Orchestra (FA, SP, SU) Performance of orchestral music for a small group of instruments as opposed to large symphonic works. Rehearsal 3 hours per week. May be repeated. Prerequisite: concurrent enrollment in MUEN 3431 and MUEN 5431.

MUEN5711 Flute Ensemble (FA, SP) Study and performance of music for multiple clarinets, including trios, quartets, quintets, and clarinet choir. Rehearsal 2 hours per week. May be repeated.

MUEN5721 Clarinet Ensemble (FA, SP) Study and performance of music for multiple clarinets, including trios, quartets, quintets, and clarinet choir. Rehearsal 2 hours per week. May be repeated.

MUEN5741 Double Reed Ensemble (FA, SP) Study and performance of music for multiple double reed instruments, including trios, quartets, quintets, and double reed choir. Rehearsal 2 hours per week. May be repeated.

MUEN5771 Trombone Ensemble (FA, SP) Study and performance of music for multiple trombones, including trios, quartets, quintets, and trombone choir. Rehearsal 2 hours per week. May be repeated.

MUEN5781 Tuba Ensemble (FA, SP) Study and performance of music for multiple combinations of tuba and euphonium, including trios, quartets, quintets, and low brass choir. Rehearsal 2 hours per week. May be repeated.

MUEN5791 University Bassoon Ensemble (FA, SP) Study and performance of music for multiple bassoons and contrabassoon, including trios, quartets, quintets, and bassoon choir. One hour of rehearsal weekly. May be repeated.

COURSES: MUSIC THEORY (MUTH)

MUTH4612 Orchestration (FA) A continuation of study of the capabilities of the various orchestral and band instruments and their use in arrangement for ensembles, band, and orchestra. Scoring for orchestra. Prerequisite: MUTH 2613.

MUTH4633 MIDI Applications in Music I (FA, SP) MIDI Application music techniques and equipment, including their application in the composition of electronic computer music. Lecture 2 hours, laboratory 2 hours per week. Prerequisite: MUTH 2613.

MUTH4703 Form and Analysis (SP) Beginning with phrase and period structure, a complete evaluation of musical form through large forms such as sonata, rondo, and theme and variation; with emphasis on characteristics of the classic and romantic schools, and analyses of select sonata movements. Prerequisite: MUTH 2613.

MUTH477V Special Topics in Music Theory (1-4) (IR) Subject matter not covered in other courses. May be repeated for 4 hours.

MUTH5322 Score Reading (IR) A conductor's approach to the technique of score reading and analysis of orchestra, band, and choral scores for the purpose of preparing composition for rehearsal and performance.

MUTH5343 Analytical Techniques (FA, Odd years) An intensive study of selected works from music literature. Schenkerian analysis, rhythmic analysis, and set theory analytical techniques will be studied and employed in addition to traditional harmonic and formal analysis. Prerequisite: MUTH 2613 or equivalent.

MUTH5623 Pedagogy of Theory (FA, Even years) Detailed study of methods of teaching undergraduates courses in music theory and aural perception.

MUTH5631 Music Theory Teaching Practicum (IR) Supervised teaching of an undergraduate course in music theory or aural perception, including lesson plan and examination preparation and in-class observation.

MUTH5643 Analysis of 20th Century Music (FA, Even years) Study of 20th century music and analytic techniques including pitch class set theory and serial techniques. Prerequisite: graduate standing.

MUTH5662 Instrumental Arranging (SU) A practical course in arranging for the various small ensembles including keyboard. Review of instrumental ranges and capabilities. Study of current trends in instrumental ranges and arranging.

MUTH5672 Advanced Orchestration (IR) A study of advanced principles of orchestral writing through individual projects in scoring and analysis. Prerequisite: MUTH 4612 or equivalent.

MUTH568V Composition (1-4) (FA, SP, SU) Private lessons of one-half hour, and one hour of composition laboratory session each week. Development of skills in creative musical expression specifically for composition-theory majors - others admitted by consent. Private instruction fee for one-half hour charged as for applied music private instruction. Prerequisite: graduate standing.

MUTH600V Master's Thesis (1-6) (FA, SP, SU)

COURSES: MUSIC HIST (MUHS)

MUHS4253 Special Topics in Music History (FA, SP) Topics not covered in MUHS 3703 or 3713, including history of American music, world music, music of Russia, and others. Satisfactory completion of the term paper in this class will fulfill the Fulbright College writing requirement. May be repeated. Prerequisite: MUHS 3703 and MUHS 3713.

MUHS4763 Survey of Vocal Literature I (FA, SP, Odd years) A survey of concert literature for the solo voice.

MUHS4773 Survey of Vocal Literature II (FA, SP, Odd years) A survey of concert literature for the solo voice. Prerequisite: MUHS 4763.

MUHS4793 Band Literature (SP, SU, Even years) A study of literature written for performance by concert band, symphonic band, and wind ensemble, representative of the following five periods in Music History: Renaissance (1420-1600), Baroque (1600-1750), Classical (1750-1820), Romantic (1820-1900), and Contemporary (1900-present).

MUHS4803 Survey of Keyboard Literature I (FA, SP, Odd years) A survey of the piano works of outstanding composers. Prerequisite: MUAP 110.

MUHS4813 Survey of Keyboard Literature II (FA, SP, Odd years) A survey of the piano works of outstanding composers. Prerequisite: MUHS 4803.

MUHS4823 Survey of Organ Literature I (IR) A survey of the organ works of outstanding composers. Prerequisite: MUAP 110.

MUHS4833 Survey of Organ Literature II (IR) A survey of the organ works of outstanding composers. Prerequisite: MUHS 4823.

MUHS489V Seminar in Music History (1-4) (IR) Subject matter not covered in other sources. With, permission, may be repeated for credit if topics are different. May be repeated.

MUHS4963H Honors Seminar in Performing Practice (IR) Study of problems of performing in their historical context including media of performance: relation of notation to performance: rhythm: tempo: ornamentation: realization of improvised parts: dynamics and expression: and changing styles in music performance. Open to graduate students and to undergraduates in honors or consent of the instructor.

MUHS5722 Directed Studies in Music Literature I (FA, SP, SU) Research in music literature in the performance field of the individual student.

MUHS5732 Directed Studies in Music Literature II (FA, SP, SU) Research in music literature in the performance field of the individual student. Prerequisite: MUHS 5722.

MUHS5753 Seminar in Medieval & Early Renaissance (IR) Intensive studies in music of Western Europe from early Christian times through the 15th century.

MUHS5773 Seminar in Music of the 18th Century (FA, SP, SU, Odd years) Intensive studies of late Baroque and Classical music.

MUHS5783 Seminar in Music of the 19th Century (FA, SP, SU, Odd years) Intensive studies in music of the 19th century.

MUHS5793 Seminar in Music of the 20th Century (FA, Even years) Intensive studies in20th century music.

MUHS5903 Seminar in Musicology (FA, SP, SU) Current problems, techniques, and approaches to the practice of musicology, including notation and editing problems. May be repeated.

MUHS5943 Seminar in Opera (FA, SP, SU) Intensive studies in operatic literature.

MUHS5952 Choral History and Literature I (FA, Odd years) Detailed study of choral history and literature from Gregorian chant to J.S. Bach.

MUHS5962 Choral History and Literature II (SP, Even years) Detailed study of choral history and literature from J.S. Bach to the present.

MUHS5973 Seminar in Bibliography and Methods of Research (FA, SP, SU) A survey of the methods and materials of musical research, including bibliography, methods of analysis, and style in the presentation of research results. Open to graduate students and to juniors in Honors.

MUHS600V Master's Thesis (1-6) (FA, SP, SU)

MUHS601V Lecture-Recital (1-6) (IR) The production and presentation, under the direction of the teacher(s) of historic instruments involved and other members of a graduate committee, of a performance (45 minutes minimum playing time) displaying historic practices of performance, with lecture. The candidate will be responsible for making archival tape of the performance available to the library, with 2 copies of a transcript of the lecture in thesis form to be retained by the University library.

COURSES: MUSIC PEDAGOGY (MUPD)

MUPD477V Special Topics in Pedagogy (1-4) (IR) Subject matter not covered in other sources. With permission, may be repeated for credit if topics are different. May be repeated.

MUPD4781L Harpsichord Laboratory (IR) The tuning, care and repair of the harpsichord.

MUPD5202 Voice Pedagogy I (FA, SP, SU) Graduate-level study of the techniques and materials of teaching voice.

MUPD582V Conducting (1-2) (FA, SP, SU) Private lessons of 1/2 hour and 1 hour conducting laboratory each week. Development of skills in conducting symphony, choral, opera, oratorio, ballet, and band repertoire.

MUPD584V Opera Workshop Techniques (1-2) (FA, SP, SU) A basic course in every phase of opera production, including staging, set design, music coaching, voice casting, and translation.

MUPD585V String Techniques (1-2) (FA, SP, SU) A continuation of the undergraduate courses in techniques and materials for elementary and secondary school music teaching.

MUPD586V Woodwind Techniques (1-2) (FA, SP, SU) A continuation of the undergraduate courses in techniques and materials for elementary and secondary school music teaching. Prerequisite: one year of similar class instruction in the field on the undergraduate level.

MUPD587V Brass Techniques (1-2) (SU) A continuation of the undergraduate class brass instrument course. Emphasis is placed on teaching methods, techniques, concepts, and materials. Prerequisite: one year of similar class instruction in the field on the undergraduate level.

MUPD591V Percussion Techniques (1-2) (FA, SP, SU) A continuation of the undergraduate class brass instrument course. Emphasis is placed on teaching methods, techniques, concepts, and materials. Prerequisite: one year of similar class instruction in the field on the undergraduate level.

MUPD599V Special Workshop in Music (1-6) (FA, SP, SU) Presented by visiting master artist-teacher in various fields of music performance, teaching and composition. Prerequisite: graduate standing.

COURSES: MUSIC EDUC (MUED)

MUED477V Special Topics in Music Education (1-4) (IR) Subject matter not covered in other sources. With permission, may be repeated for credit if topics are different. May be repeated.

MUED5513 Seminar: Resources in Music Education (FA, SP, SU) Study of the analytical and writing skills necessary for academic research in music education. Each student identifies one problem specific to music education, finds and reviews related literature and sources, develops a comprehensive bibliography, and writes a paper which synthesizes the research. Open to graduate students and undergraduates in honors in music education.

MUED5653 Seminar: Issues in Music Education (FA, SP, SU) A seminar exploring the relationships between the profession of teaching music and selected views about learning theories, teaching methods, philosophy, psychology, and other selected topics relevant to contemporary music education.

MUED5733 Music Education in the Elementary School (FA, SP, SU) Concepts of elementary music education; methods, materials, curriculum design, and supervision in the elementary school music.

MUED5811 Curriculum Design in Music (FA, SP, SU) Goals and objectives in music education. Student will develop a curriculum for an actual or hypothetical music education program. (1-18) (SU)

MUED583V Workshop: Music in the Elementary School (1-3) (FA, SP, SU) An in-service training workshop for elementary music teachers.

MUED5862 Marching Band Techniques (SU) Includes the place of the marching band in the school program, types of formations used, and selecting, arranging or writing the musical score.

MUED588V The Choral Program: Changing Materials and Techniques (1-3) (FA, SP, SU) Treatment of specific problems and issues-survey of choral literature; materials and contemporary methods appropriate to the development of a comprehensive choral experience.

MUED599V Seminar (1-6) (SU)

MUED600V Master's Thesis (1-6) (IR) Preparation of a master's thesis as partial fulfillment of the requirement for the master's degree.

MUED605V Independent Study (1-6) (FA, SP, SU) Provides students with an opportunity to pursue special study of problems in music education.

OPERATIONS MANAGEMENT (OMGT) Offered through Graduate Resident Centers

C. Ray Asfahl
Program Director and Chair of Studies
4207 Bell Engineering Center
575-7426

Professor Asfahl • Adjunct Professor English • Adjunct Associate Professors Fant, Gattis • Visiting Assistant Professors Belcher, Belovicz, Berthelot, Bonanno, Carmichael, Davis, Doddridge, Dyer, Esrael, Findley, Garner, George, Hipple, Jones, Mahan, Maksi, Martin, Moorhead, Nethercutt, Noland, Orr, Pike, Ton, Westfall, Whitehouse, Wilke, Yeager, Yoder

Degree Conferred: M.S. (OMGT)

The Master of Science in operations management program is directed toward the acquisition of practical knowledge in the areas of project planning, quality assurance, safety management, inventory techniques, and human factors analysis.

The operations management program is operated at Graduate Residence Centers in Arkansas, Tennessee, and Florida. Courses are offered in eight-week terms, five terms an academic year.

The operations management curriculum is aimed at the needs of both military and civilian working managers of technical and logistics operations, regardless of the major they selected as an undergraduate student. The subject matter is patterned after the industrial engineering curriculum, but is less technical and does not require a calculus mathematics background.

Before students complete more than 12 hours of course work toward the operations management degree, they must successfully complete the following courses (or equivalent courses or demonstrate knowledge of subject areas):

OMGT 4313, Law and Ethics
OMGT 4323, Industrial Cost Analysis
OMGT 4333, Applied Statistics
OMGT 4853, Data Processing Systems

These courses are offered at the undergraduate level and cannot be applied toward the requirements for a Master of Science degree.

To fulfill requirements for the M.S. degree, a student must earn a total of 30 semester hours credit in the program.

COURSES: OPER MGMT (OMGT)

OMGT4223 Occupational Safety and Health Standards (SP) Survey of existing and proposed standards by examining fundamental physical, economic, and legal bases. Performance vs. specific standards. Enforceability and data collection. National consensus and promulgation process. Includes a design project using a computer. (Same as INEG 4223) Prerequisite: freshman physics and chemistry.

OMGT4303 Industrial Safety Administration (FA, SP, SU) Principles of accident and industrial disease prevention; organization and operation of industrial safety and hygiene programs; conformance with federal occupational safety and health regulations. For operations management students an alternative course is INEG 4223. Either course, but not both, can be used for credit toward the operations management degree.

OMGT4373 Quality Engineering and Management (IR) Provides the student with complete coverage of the functional area of "Quality Assurance"; ranging from the need for such a function, how it works, techniques utilized, and managerial approaches for insuring its effectiveness. Prerequisite: INEG 3313.

OMGT4433 Administrative Analysis (FA) Studies of cases in engineering administration emphasizing human relationships in a technical environment. Productivity/quality enhancement through an understanding of organizational design and behavior, motivation and reward systems, and participative management.

OMGT4523 Automated Production (FA) Industrial robots and robot programming, industrial logic control systems, programmable controllers for the control of work stations, and conveyor systems. On-line computer and microprocessors. Group technology, flexible manufacturing systems, and computer-integrated manufacturing laboratory required. Prerequisite: INEG 3513 or equivalent experience.

OMGT4520L Automated Production Laboratory (FA)

OMGT4553 Production Planning and Control (SP) Operational problems of production systems including control of purchased materials inventory; scheduling of a job shop, batch, and continuous production process for single and multi-item product lines; planning of work force and inventory under seasonal and stochastic demand.

OMGT4583 Operations Productivity and Automation (FA, SP, SU) An examination of methods to improve industrial productivity including quality circles, robots, machine vision, programmable controllers, computer numerical control, and computer-assisted manufacturing. For operations management students an alternative course is INEG 4523. Either course, but not both, can be used for credit toward the operations management degree.

OMGT4613 Production and Inventory Control (FA, SP, SU) Operational problems of production systems including control of purchased materials; scheduling of job shop, batch, and continuous production processes; planning of work force and production under seasonal demand. Inventory models and strategies are compared. For operations management students an alternative course is INEG 4553. Either course, but not both, can be used for credit toward the operations management degree.

OMGT4623 Operations Analysis (FA, SP, SU) Case studies covering the spectrum of administrative problems facing typical organizations. Designed to provide analysis and synthesis experience to apply principles of operations management. For operations management students an alternative course is INEG 4433. Either course, but not both, can be used for credit toward the operations management degree.

OMGT4783 Project Analysis and Control (FA, SP, SU) Introduction to the Critical Path Method and Program Evaluation and Review Technique. Project planning and control methods; activity sequencing; time-cost trade-offs; allocation of manpower and equipment resources; scheduling activities; computer systems for PERT/CPM.

OMGT4873 Principles of Operations Research (FA, SP, SU) Surveys the mathematical models used to design and analyze operational systems. Contents include linear programming models, waiting line models, and management science. Applications of operations research are emphasized.

OMGT5003 Introduction to Operations Management (FA, SP, SU) An overview of the curriculum leading to the M.S. Degree with a major in Operations Management. Each class will consist of a capsule of the topics covered in other courses in depth. Guest lectures. Required course for all majors in Operations Management.

OMGT5013 Operational Systems Design (FA, SP, SU) Fundamental tools for design and analysis of operational systems. Facilities location and design, materials handling, transportation, maintenance, standards, and control.

OMGT5113 Public Personnel Administration (FA, SP, SU) Personnel policies and practices are compared for military, government, and private operations including legal foundations, classification and compensation plans, recruitment and selection processes, training, employment policies and morale, compensation, employee relations, and organization.

OMGT5123 Public Financial Administration (FA, SP, SU) Financial planning in military and civilian operations; the application of budgets and controls for operational systems.

OMGT5133 Industrial Engineering in the Service Sector (FA, SP, SU) Review of the development of industrial engineering into the service sector, e.g., health care systems, banking, municipal services, utilities, and postal service. Emphasizes those principles and methodologies applicable to the solutions of problems within the service industries. (Same as INEG 5123) Prerequisite: graduate standing.

OMGT5143 Contemporary Issues in Human Resource Management (IR) Emerging issues affecting employee well-being and workforce productivity. Impact of such issues as diversity, job evaluation, compensation, incentive pay, retention, and the aging workforce. Legal aspects of FMLA, EAP, and ADA are included. Students will develop a wage survey and an action plan to implement into an organization.

OMGT5223 Safety and Health Standards Research (FA, SP, SU) For graduate students who seek Certified Professional or Certified Industrial Hygienist status, or both. Includes review and development of computer databases for standards, interpretations, court decisions, and field memoranda. Test equipment and procedures for determining indoor industrial aid containment PEL concentrations and industrial environment noise levels are examined. (Same as INEG 5223) Prerequisite: INEG 4223 or OMGT 4303.

OMGT5303 Health Care Policies and Issues (IR) Health care management and policy development. Health insurance, Medicare and managed care. Health benefits for employees. The role of government and business in policy formulation. Financing of health care. Legal and ethical considerations in health care. Hospital and outpatient management issues.

OMGT5373 Total Quality Management (FA, SP, SU) Implementation of modern participative quality management techniques in military and civilian operations. Includes quality control methods and control charts. Acceptance sampling plans with emphasis upon Department of Defense procurement standards. For operations management students in alternative course is INEG 4323. Either course, but not both, can be used for credit toward the operations management degree.

OMGT5423 Engineering & Global Competition (SP) Studies of principles and cases in engineering administration in global competition. Emphasis on high-technology manufacturing such as the electronics industry. Survey of markets, technologies, multi-national corporations, cultures, and customs. Discussion of ethics, professionalism, difference valuing, human relations skills, and other topics relevant to global engineering practice. Prerequisite: INEG 4433.

OMGT5433 Cost Estimation Models (FA, SP, SU) An examination of the methodologies for estimating and forecasting manufacturing costs. Types of cost recovery systems, work progress functions, product improvement curves, determination of hourly rates, parametric estimating systems, and the development of software for computer-assisted estimating systems. (Same as INEG 5433) Prerequisite: INEG 3513 and INEG 3833.

OMGT5463 Economic Decision Making (FA, SP, SU) Principles of engineering economic analysis with emphasis upon discounted cash flow criteria for decision making. Comparison of criteria such as rate of return, annual cost, and present worth for the evaluation of project alternatives.

OMGT5733 Human Factors Analysis (FA, SP, SU) Psychological and physiological factors to be considered by the operations manager. Human perceptual and work capacities are examined in relation to various task situations, with emphasis on controlling and monitoring tasks. Fundamental design factors are also considered. Human behavioral aspects of management decisions are considered.

OMGT577V Special Problems (1-3) (FA, SP, SU) Application of previous course work knowledge to problems encountered in military base and civilian operations. Problems are proposed by students according to individual interests and needs.

OMGT5823 Computer Applications (FA, SP, SU) Computer systems for analysis and control of operations management problems. Coding of operations models and currently available software systems. Microcomputers, minicomputers, and time-sharing systems. Networking and navigating the Internet as a resource for solving operations management problems.

OMGT5873 Organization and Control (FA, SP, SU) Examination of organizational decision making authority, structures, and controls. Functions of management-planning, organizing, staffing, directing, and controlling. Comparison of military and civilian environments for the implementation of management principles.

OPERATIONS RESEARCH (ORES)

John English
Interim Chair of Studies
4207 Engineering Center
575-3156

• University Professor Taha • Professors Asfahl, Johnson • Associate Professors English, Fant • Assistant Professors Cole, Collins, Kutanoglu, Rossetti • Adjunct Assistant Professor Gattis

Degree Conferred: M.S.O.R. (ORES)

The Department of Industrial Engineering offers a graduate program leading to the Master of Science in Operations Research (M.S.O.R.) for engineering, science, and other non-engineering graduates. Candidates for the degree must possess or obtain mathematical training through differential equations, knowledge of probability theory, and proficiency in computer programming. Minors in the areas of mathematics, computer science, and statistics are also available under the program.

In addition to the requirements of the Graduate School and the College of Engineering, the following program requirements must be satisfied. A number of undergraduate prerequisites exist which are specified in the Department's Handbook for Advanced Degrees. Candidates for the Master of Science in Operations Research degree (M.S.O.R.) who present a thesis are required to complete a minimum of 24 semester hours of course work and six semester hours of thesis. Candidates for the degree who do not present a thesis are required to complete 30 semester hours of course work and three hours credit for INEG 513V, Master's Research Project and Report. All candidates must successfully complete a master's oral examination which is conducted by the candidate's faculty committee. Course listings and descriptions may be found under Industrial Engineering.

DEPARTMENT OF PHILOSOPHY (PHIL)

Thomas Senor
Department Chairperson
318 Old Main
575-3551

• Professors Hill, Nissen, Spellman • Associate Professors Adler, Lee, Minar, Senor • Assistant Professor Scott

Degrees Conferred: M.A., Ph.D. (PHIL)

Areas of Concentration: history of philosophy (including ancient, medieval, modern and contemporary), metaphysics, epistemology, ethics, social and political philosophy, philosophy of language, philosophy of mind, philosophy of religion, and philosophy of science.

Prerequisites to Degree Program: Admission to the program is subject to the approval of the graduate committee of the Department of Philosophy. For the M.A., the normal expectation is 18 hours in philosophy, including logic. Students with fewer hours in philosophy may be admitted with deficiencies. In addition to the materials required by the Graduate School, at least two letters of recommendation, a sample of written work, and GRE aptitude scores (if available) should

be submitted to the Department chair. For the Ph.D., completion of an M.A. degree in philosophy is required.

Requirements for the Master of Arts Degree

1. 27 total hours of course work with a cumulative GPA of 3.00 or better, These hours must include:
   a. Satisfaction of the course distribution requirement, which is as follows: one course each in ancient Greek philosophy, modern philosophy, one history of philosophy course in an area other than ancient Greek and modern philosophy, value theory, and metaphysics/epistemology; only courses in which the student earns a grade of "B" or better will count towards fulfilling the course distribution requirement. A student may petition the graduate committee to take an exam in one or more of the above areas which, if passed, would satisfy the distribution requirement for the area(s) in question.
   b. Symbolic Logic I or II with a grade of "C" or better, or equivalent, or exam in symbolic logic.
   c. Six hours of course work in graduate seminars.
2. An acceptable thesis and a successful oral comprehensive examination before the thesis committee. With the approval of the graduate committee, the comprehensive exam may be taken a second time.

Requirements for the Doctor of Philosophy Degree

1. 24 hours of course work beyond completion of the M.A. in philosophy (with the approval of the graduate committee, up to six hours may be taken in another discipline). Course work beyond the M.A. must satisfy the following conditions:
   a. The cumulative GPA must be 3.00 or better.
   b. Only courses in which a "B" or better is earned count toward completion of the 24 hours of course work required for the Ph.D.
   c. Symbolic Logic I or II, or equivalent, or exam in symbolic logic. (This requirement is waived for candidates who have completed the above M.A. program.)
   d. At least nine hours of graduate seminar work in philosophy.
2. Reading knowledge of one scholarly language in addition to English. Languages other than French, German, Latin, and classical Greek must be approved by the graduate committee of the Department of Philosophy.
3. Four comprehensive exams must be taken and passed: one in ancient Greek philosophy, one in modern philosophy, one in ethics, and one in another area of philosophy. With the approval of the graduate committee, exams may be taken a second time.
4. An acceptable dissertation, successfully defended before the dissertation committee.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in the doctoral program in philosophy as in-state students for fee purposes. See page 163 for details.

COURSES: PHILOSOPHY (PHIL)

PHIL4003 Ancient Greek Philosophy (FA) Pre-Socratics, Socrates, Plato, and Aristotle. Prerequisite: 3 hours of philosophy.

PHIL4013 Platonism & Origin of Christian Theology (SP) The study of Plato, gnosticism, Middle and Neoplatonism, including Philo, Plotinus, and Procius, and the influence of Platonism on the Greek church fathers of the 2nd-5th centuries, principally Irenaeus, Origen, Athanasius, and Gregory of Nyssa, as well as Psuedo-Dionysius. Prerequisite: 3 hours of philosophy.

PHIL4023 Medieval Philosophy (FA) Includes Augustine, Bonventure, Aquinas, Scotus, and Ockham.

PHIL4033 Modern Philosophy-17th and 18th Centuries (SP) British and Continental philosophy, including Bacon, Descartes, Spinoza, Liebniz, Hobbes, Locke, Berkeley, Hume, and Kant.

PHIL4043 Nineteenth Century Continental Philosophy (FA) Study of major Continental European philosophers of the 19th century including Hegel, Marx, Kierkegaard, Schopenhauer, Nietzsche. Emphasis on the nature of persons, the question of freedom, and the importance of self-expression, as well as views on knowledge, reality, and the nature of philosophy.

PHIL4063 Twentieth Century Continental Philosophy (SP) Study of major figures (e.g. Husserl, Heidegger, Sartre, Foucault, Derrida) and trends (phenomenology, existentialism, hermeneutics, critical theory, deconstruction) in 20th century French and German thought. Topics include human beings and their place in the world, the role of history and culture, and the possibility of critical reflection.

PHIL4073 History of Analytic Philosophy (SP) From Frege to recent figures, including Russell, Moore, Wittgenstein, Schlick, Carnep, Ayer, Ryle, Strawson, Quine, including a representative sample of works on the logical analysis of language, logical positivism, and ordinary language analysis. Prerequisite: 3 hours of philosophy.

PHIL4083 Existentialism (SP) Readings in major figures associated with "Existentialism" (e.g. Kierkegaard, Nietzsche, Heidegger, Sartre, Merleau-Ponty). Emphasis on connections between the metaphysical views of these thinkers, their views of freedom, their conceptions of modernity, and their responses to it.

PHIL4113 Social and Political Philosophy (SP) Selected philosophical theories of society, the state, social justice, and their connections with individuals.

PHIL4123 Classical Ethical Theory (FA) Study of classical texts in the history of philosophical ethics from Plato to Nietzsche. Philosophers covered may include Plato, Aristotle, Butler, Hume, Kant, and Mill. Prerequisite: 3 hours of philosophy.

PHIL4133 Contemporary Ethical Theory (FA) A study of contemporary texts in philosophical ethics from G.E. Moore to the present. Philosophers covered may include Moore, Stevenson, Hare, Foot, and Rawls. Prerequisite: 3 hours of philosophy.

PHIL4143 Philosophy of Law (SP) A philosophical consideration of the nature of law, theory of adjudication, concepts of legal responsibility, liberty and the limits of law, and selected moral-legal issues (abortion, affirmative action, punishment, etc.).

PHIL4203 Theory of Knowledge (FA) An examination of skepticism, the nature and structures of knowledge and epistemic justification, human rationality, and the justification of religious belief. Prerequisite: 3 hours of philosophy.

PHIL4213 Philosophy of Science (FA) Examination of issues related to scientific explanation, empirical foundations of science, observation and objectivity, nature of laws and theories, realism and instrumentalism, induction and confirmation, models, causation, and simplicity, beginning with historical survey set in the context of the history of science but emphasizing works from the 1930s to the current period, often including issues in recent physics.

PHIL4233 Philosophy of Language (SP) A survey of mainstream philosophical theories of meaning, reference, truth, and logical form. Attention given to the views of such figures as Frege, Russell, Tarski, Searie, Dumett, and the advocates of possible worlds semantics.

PHIL4253 Symbolic Logic I (FA) Rigorous analyses of the concepts of proof, consistency, equivalence, validity, implication, and truth. Full coverage of truth-functional logic and quantification theory (predicate calculus). Discussion of the nature and limits of mechanical procedures (algorithms) for proving theorems in logic and mathematics. Informal accounts of the basic facts about infinite sets. (Same as MATH 4253)

PHIL4263 Symbolic Logic II (SP) Topics include: soundness and completeness of propositional logic, soundness and completeness of quantification theory, the elements of model theory and recursion theory, G]odel's incompleteness theorems, and the limitative theorems of Tarski and Church. (Same as MATH 4263) Prerequisite: PHIL 4253 or MATH 4253.

PHIL4303 Philosophy of Religion (SP) Types of religious belief and critical examination of their possible validity, including traditional arguments and contemporary questions of meaning.

PHIL4403 Philosophy of Art (SP) Varieties of truth and value in the arts and aesthetic experience, focusing on the creative process in the art and in other human activities.

PHIL4423 Philosophy of Mind (SP) An examination of such topics such as the relationship between mind and body, the mentality of machines, knowledge of other minds, the nature of psychological explanation, the relationships between psychology and the other sciences, mental representation, the nature of the self, and free will and determinism.

PHIL4603 Metaphysics (IR) Theory and critical analysis of such basic metaphysical problems as mind and body, universals and particulars, space and time, determinism and free will, self-identity and individualism, with emphasis on contemporary perspectives. Prerequisite: 3 hours of philosophy.

PHIL5763 Seminar: Aquinas (IR)

PHIL5843 Seminar: Hume (IR)

PHIL5883 Seminar: Wittgenstein (IR)

PHIL5893 Seminar: Heidegger (IR)

PHIL5903 Seminar: Social & Political Philosophy (IR)

PHIL5913 Seminar: Ethical Theory (IR)

PHIL5933 Seminar: Philosophical Theology (IR)

PHIL5953 Seminar: Philosophy of Language (IR)

PHIL5963 Seminar: Philosophy of Mind (IR)

PHIL5973 Seminar: Metaphysics (IR)

PHIL5983 Philosophical Seminar (IR) Various topics and issues in historical and contemporary philosophy.

PHIL600V Master's Thesis (1-6) (FA, SP, SU)

PHIL690V Graduate Readings (1-6) (FA, SP, SU) Supervised individual readings in historical and contemporary philosophy.

PHIL700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

PHYSICAL EDUCATION (PHED)

(See also Health Science, Kinesiology, Recreation, and Dance; Health Science; Kinesiology; and Recreation)

Ro DiBrezzo
Department Head of Health Science, Kinesiology, Recreation, and Dance
306 HPER Building
575-2857

Dean Gorman
Coordinator of Graduate Studies
308W HPER Building
575-2890

Degrees Conferred: M.A.T., M.Ed. (PHED)

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree program offered in consecutive fall and spring semesters. Initial enrollment will be only in the fall semester. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Areas of Concentration for the M.A.T.: agricultural education, childhood education, middle-level education, physical education, secondary education, special education, and vocational education.

Prerequisites to M.A.T. Degree Program: Students will be selected up to the maximum number designated for each cohort area of emphasis. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all previous courses
3. Admission to the Graduate School
4. Admission to Teacher Education Program
5. Completion of the pre-education core with a minimum of "C" in all courses
6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Requirements for the Master of Arts in Teaching Degree in Physical Education
Required M.A.T. Core: 10 hours
CIED 5012, Measurement/Research/ Statistical Concepts for Teachers
CIED 5032, Curriculum Design Concepts for Teachers
CIED 5042, Reading and Writing Across the Curriculum
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Remaining Required for Concentration in Physical Education: (23 hours)
PHED 5011L, Measurement/Research/ Statistics Lab
PHED 5023, Class Management
PHED 5031L, Curriculum Design Lab
PHED 5233, Research on Teaching In Physical Education
PHED 5273, Critical Analysis of Professional Issues
KINS 5643, Motor Learning
PHED 5793, Effective Teaching in Physical Education
PHED 507V, Cohort Teaching Internship (6 hours)

Areas of Concentration for the M.Ed.: teaching physical education, teaching adapted physical education.

Prerequisites to M.Ed. Degree Program: For acceptance to the master's degree program in physical education, the program area stipulates, in addition to the general requirements to the Graduate School, an undergraduate degree in physical education or in a related field. Additional prerequisites may be prescribed by the program area.

Requirements for the Master of Education Degree: Candidates for the master's degree in physical education must complete 27-30 semester hours of graduate work and a thesis or 33-36 semester hours without a thesis. Candidates for a master's degree in sport management must complete 30 semester hours of graduate work and a thesis or 36 semester hours without a thesis. In addition to the program requirements listed below, all candidates must successfully complete a written comprehensive examination.

Teaching Physical Education: (33 hours)

Required Research Component (6):
EDFD 5393, Applied Educational Statistics , OR EDFD 6403, Educational Statistics and Data Processing Applied to Education
HKRD 5353, Research in HKRD

Education Core
Learning/Development Domain (3)
EDFD 5373, Psychological Foundations of Teaching and Learning
EDFD 5473, Adolescent Psychology in Education
EDFD 5573, Life-Span and Human Development
History/Philosophy Domain (3)
EDFD 5303, History Foundation of Modern Education
EDFD 5323, Global Education
EDFD 5353, Philosophy of Education

Program Core Courses (12)
PHED 5213, Philosophical Foundations
PHED 5233, Research on Teaching in PE
HKRD 5373, Problems in HKRD
PHED 5253, The PE Program

Approved Electives (9)

Teaching Adapted Physical Education: (33 hours)

Required Research Component (6)
EDFD 5393, Applied Educational Statistic, OR EDFD 6403, Educational Statistics and Data Processing Applied to Education
HKRD 5353, Research in HKRD

Education Core
Learning/Development Domain (3)
EDFD 5373, Psychological Foundations of Teaching and Learning
EDFD 5473, Adolescent Psychology in Education
EDFD 5573, Life-span and Human Development

History/Philosophy Domain (3)
EDFD 5303, History Foundation of Modern Education
EDFD 5323, Global Education
EDFD 5353, Philosophy of Education

Required Courses (12)
HKRD 5373, Problems in HKRD
PHED 5413, Adapted Physical Education
KINS 5423, Assessment and Prescriptive Programming in Adapted Kinesiology
KINS 5493, Practicum in Adapted PE

Approved Electives (9)

COURSES: PHYS EDUC (PHED)

PHED5011L Measurement/Research/Statistics Laboratory (FA, SP, SU) Cohort 5th year course. Application of content, principles, and concepts needed to become an effective evaluator/ researcher in kinesiology.

PHED5023 Class Management (FA, SP, SU) Cohort 5th year course that emphasizes class management; includes professional ethics and school policies related to students, faculty and programs. A major part of course time will be field based.

PHED5031L Curriculum Design Laboratory (FA, SP, SU) This cohort 5th year course reviews curriculum models unique to physical education program; application of general principles of curriculum design and specific models as used in selected public school settings. Corequisite: CIED 5032.

PHED507V Cohort Teaching Internship (1-6) (FA, SP, SU) May be repeated for 6 hours.

PHED5213 Philosophical Foundation (FA, SP, SU) Presentation of philosophical approaches to the student of physical education and human movement phenomena. Special attention is given the development of qualitative approaches enabling students to examine problematic issues and practices in physical education, sport, and other movement forms.

PHED5233 Research on Teaching in Physical Education (FA, SP, SU) A review of contemporary research literature informing effective teaching practices in physical education settings. Students gain experience in critically reviewing literature in physical education as well as related behavioral science, education, and humanities disciplines; emphasis is placed in incorporating research finding into personal teaching strategies.

PHED5253 The Physical Education Program (SU) Principles, problems, procedures, and the influence of educational philosophy on programs in physical education and their application in the construction of a course of study for a specific situation.

PHED5263 Movement Education in the Elementary School Program (SP) Movement concepts applied to the elementary school physical education program. Considers movement exploration techniques, locomotor, nonlocomotor, and manipulative skills.

PHED5273 Critical Analysis of Professional Issues (SP) A review of contemporary research literature

informing effective teaching practices in physical education settings. Students gain experience in critically reviewing literature and discussing current issues. Corequisite: M.A.T cohort.

PHED5383 Movement Experiences for Elementary School Children (FA, SP, SU) This cohort 5th year course includes taxonomies of physical education, descriptive techniques of teaching effectiveness and of student behavior, evaluation of elementary level programs and students, and field trips to selected public schools.

PHED5413 Adapted Physical Education (FA, SU) Methods, techniques and special groups of physical education for the atypical child.

PHED560V Workshop (1-3) (FA, SP, SU)

PHED5693 Practicum in Teaching (FA, SP, SU) Scheduled practical field experience applying knowledge gained in PHED 5011 (Meas/Research/Stat Lab), PHED 5031 (Curr. Lab), and KINS 5643 (Motor Learning).

PHED574V Internship (1-6) (SP)

PHED5793 Effective Teaching in Physical Education (FA) This cohort fifth-year course focuses on the skills necessary to develop and maintain an effective physical education learning environment. Special attention is given to the development of effective units of instruction throughout the K-12 curriculum. Corequisite: M.A.T. cohort.

PHED6353 Systematic observation Research in Physical Education (FA, SP, SU) This course will help students understand systematic observation as a tool for studying teaching, coaching, learning; to develop skills in systematic observation techniques; and to collect data on behaviors in physical education and sport.

PHED6363 Supervision in Physical Education (FA, SP, SU) The focus of this course is instructional supervision as a set of complex processes in which the supervisor works within accepted guidelines and functions to effectively supervise a teacher's pedagogical development. The Physical Education Instructional Supervision (PEIS) Model will be used to help facilitate this process.

PHYSICAL SCIENCE (PHSC)

Lothar Schäfer
Chair of Studies
218 Chemistry Building
575-4601

COURSES: PHYSICAL SCI (PHSC)

PHSC5003 Higher Order Thinking in Science (FA, SP, SU) Laboratory approach to teaching science as integrated, constructive processes involving experimentation, investigation, communication, reasoning, and problem solving. Subject foundation show connections and applications in life, earth, and physical systems. Training to improve content learning, learning environments, and the use of manipulatives, calculators, and science equipment. UNIVERSITY CORE COURSE

DEPARTMENT OF PHYSICS (PHYS)

Surendra Singh
Department Chair
226 Physics Building
575-2506

• University Professor Salamo • Professors Gea-Banacloche, Gupta, Harter, Lacy, Lieber, Pederson, Singh, Xiao • Research Professor Vickers • Associate Professors Ding, Oliver, Stewart, Vyas • Research Associate Professor Schultz • Research Assistant Professor La Bella • Assistant Professors Bellaiche, Filipkowski, Henry, Thibado

Degrees Conferred:
M.S. In Applied Physics (APHY)
M.A., M.S., Ph.D. (PHYS)

Areas of Concentration: Atomic and molecular, condensed matter, laser, quantum optical physics, surface physics, theoretical physics, and physics education.

Prerequisites to Degree Program: Prospective students must satisfy the requirements of the Graduate School as described in the *Graduate School Catalog* and have the approval of the Graduate Admissions Committee of the Department of Physics. In addition, to be admitted to graduate study in physics without deficiency, candidates should have an undergraduate degree with the equivalent of a 30-hour major in physics including intermediate-level courses in mechanics, electricity and magnetism, quantum physics and thermal physics, and mathematics through differential equations. Students who present less than the above may be admitted with deficiency dependent on degree track subject to the approval of the department's Graduate Admissions Committee. Students may eliminate deficiencies while concurrently enrolling in graduate courses, provided prerequisites are met. While submission of Graduate Record Examination scores is not required for admission, students who have taken the GRE advanced physics test are urged to submit their test scores to the Physics Department to facilitate advising and placement.

Prospective students from foreign countries in which English is not the native language must submit TOEFL scores of 550 or above. To be considered for a teaching assistantship, a Test of Spoken English score of 50 or above is required.

Requirements for the Master of Arts Degree: The department offers a Masters of Arts Degree - Education concentration. This program is designed for in-service secondary school teachers or students interested in teaching physical sciences in Community Colleges. Students choosing this degree program must notify the Graduate Affairs Committee by April 30 in their first year of study. It requires 30 semester hours of graduate work. Prospective candidates for the Master of Arts degree - Education concentration are expected to have earned credit in courses equivalent to PHYS 2054, 2074, 3614, and 3113. Deficiencies may be removed either by taking the appropriate courses or by examination.

The candidate's program must include at least six semester hours of physics courses numbered 5000 or above, and at least three hours of 502V. Not more than nine semester hours of credit toward this degree will be allowed from physical science and graduate education courses. All courses selected to apply to this degree must be approved by the student's adviser in accordance with the above requirements. Recommended courses include PHYS 400V, 4113, 4213, 462L, 4053, 588V, and 590V.

Each person receiving the Master of Arts degree - Education concentration must have at least one hour of Master's Research, satisfied by a written research report based either on the 502V or a 588V project. A final comprehensive oral exam is given by an advisory committee.

Requirements for the Master of Science Degree: Students choosing this degree program must notify the Graduate Affairs Committee by November 30 of their first year of study. An advisory committee is then formed consisting of the research adviser as chair, two members of the physics faculty, and one member of the graduate faculty not from the Physics Department. Students in this degree program can choose either a 31 semester hour thesis path or a 37 semester hour non-thesis path.

Both degree paths require that the student complete PHYS 501V Seminar (Introduction to Research), PHYS 5073 Mathematical Methods of Physics I, PHYS 5413 Quantum Mechanics I, and PHYS 5333 Advanced Electromagnetic Theory. The student must complete one of the three courses in the Techniques in Research block: PHYS 5123 Condensed Matter Physics; PHYS 5133 Atomic, Molecular, and Optical Physics; or PHYS 502V Individual Study in Advanced Physics. Students must also complete at least one of the following three courses: PHYS 5754 Applied Nonlinear Optics, PHYS 5713 Solid State Physics, or PHYS 5513 Atomic and Molecular Physics. Thesis path students must complete at least nine additional hours in elective physics graduate courses and non-thesis path students must complete at least eighteen additional hours in elective physics graduate courses. Students will select electives from physics courses listed in the graduate catalog as appropriate to their field of specialization, with course selection approved by their advisory committee. Students who have had similar courses at another institution may substitute up to 12 credit hours, on a course-by-course basis, upon petitioning the Graduate Affairs Committee.

The thesis path will require completion of six masters thesis hours under PHYS 600V and will require a written thesis successfully defended in a comprehensive oral exam given by the student's advisory committee. The non-thesis path will require completion of three hours under PHYS 502V Individual Study in Advanced Physics, and will require a written project report successfully defended in a comprehensive oral exam given by the student's advisory committee.

Requirements for the Master of Science in Applied Physics Degree: Students choosing this degree program must notify the Graduate Affairs Committee by November 30 in their first year of study. An advisory committee is then formed consisting of the research adviser as chair, two members of the physics faculty, and one member of the grad-

uate faculty not from the Physics Department. Students in this degree program can choose either a 31 semester hour thesis path or a 37 semester hour non-thesis path. Students must maintain a grade point average of 3.00 in their graduate courses.

Both degree paths require that the student complete PHYS 501V Seminar (Introduction to Research), PHYS 5073 Mathematical Methods of Physics I, PHYS 5413 Quantum Mechanics I, and PHYS 5323 Advanced Electromagnetic Theory. The student must complete one of the three courses in the Techniques in Research block: PHYS 5123 Condensed Matter Physics; PHYS 5133 Atomic, Molecular, and Optical Physics; or PHYS 502V Individual Study in Advanced Physics. Students must also complete at least one of the following three courses: PHYS 5754 Applied Nonlinear Optics, PHYS 5713 Solid State Physics, or PHYS 5513 Atomic and Molecular Physics. Thesis path students must complete at least three additional elective courses, with at least one in physics. Non-thesis path students must complete at least six additional elective courses, with at least three in physics. Students will select electives from courses listed in the graduate catalog as appropriate to their field of specialization, with course selection approved by their advisory committee.

The thesis path will require completion of six masters thesis hours under PHYS 600V and will require a written thesis successfully defended in a comprehensive oral exam given by the student's advisory committee. The non-thesis path will require completion of three hours under PHYS 502V Individual Study in Advanced Physics, and will require a written project report successfully defended in a comprehensive oral exam given by the student's advisory committee.

Requirements for the Doctor of Philosophy Degree: Students choosing this degree program must notify the Graduate Affairs Committee by November 30 of their first year of study. The students must complete a minimum of 40 semester hours in graduate courses. These hours must include PHYS 501V Seminar (Introduction to Research), PHYS 5073 Mathematical Methods of Physics I, PHYS 5413/5423 Quantum Mechanics I and II, PHYS 5333 Advanced Electromagnetic Theory, PHYS 5713 Solid State Physics, PHYS 5513 Atomic and Molecular Physics, PHYS 5103 Advanced Mechanics, and PHYS 5213 Statistical Mechanics. The hours must also include a two semester course sequence in the Research Techniques block: PHYS 5123/6123 Condensed Matter Physics I and II; PHYS 5133/6133 Atomic, Molecular, and Optical Physics I and II; or PHYS 502V Individual Study in Advanced Physics. Nine additional hours in elective physics graduate courses will be required, and they must be selected from courses listed in the graduate catalog appropriate to the student's field of specialization and approved by the student's advisory committee. Students who have had similar courses at another institution may obtain a waiver for up to 21 credit hours, on a course-by-course basis, upon petitioning to the Graduate Affairs Committee. The students must also earn 18 hours of credit in Doctoral Dissertation, submit a dissertation, and defend it successfully in a comprehensive oral examination given by the advisory committee.

To be admitted to candidacy for the degree the student must (a) file a Declaration of Intent with the Graduate School, (b) form an advisory committee, (c) pass the candidacy exam, and (d) be approved by the physics faculty.The advisory committee consists of the research adviser as chair, three members of the physics faculty, and one member of the graduate faculty not from the Physics Department.

The candidacy examination consists of written and oral parts. The written part is taken at the end of the Spring semester of the student's first year; the oral part is taken in the Fall of the student's second year. The written exam covers Quantum Mechanics I, Advanced Electromagnetic Theory, and junior level Classical Mechanics; the minimum passing score is 60%. Students failing this part will be allowed to take the exam the following year for the final time.

The oral exam is a presentation of the student's research, and should include a discussion of future research plans. Students judged insufficient in this category may come back for a second and final attempt in the Fall of the following year. The oral exam committee consists of three faculty members in the appropriate research field (inasmuch as this is feasible) and the student's research adviser, although the latter acts only in an advisory capacity to the committee.

COURSES: PHYSICS (PHYS)

PHYS400V Laboratory and Classroom Practices in Physics (1-3) (FA, SP, SU) The pedagogy of curricular materials. Laboratory and demonstration techniques illustrating fundamental concepts acquired through participation in the classroom as an apprentice teacher. Prerequisite: PHYS 3114 and PHYS 3414.

PHYS4103 Physics in Perspective (SP, Odd years) Human implications of physics, including life's place in the universe, the methods of science, human sense perceptions, energy utilization, social impacts of technology, and the effect of physics on modern world views. No credit given toward a B.S. major in physics. Prerequisite: PHYS 3603 or PHYS 3614.

PHYS4113 Physics in Perspective (SP, Odd years) Human implications of physics, including life's place in the universe, the methods of science, human sense perceptions, energy utilization, social impacts of technology, and the effect of physics on modern world views. Credit allowed for only one of PHYS 4113 or PHYS 4103. Prerequisite: PHYS 3614.

PHYS4203 Physics of Devices (SP, Even years) Principles of physics applied in a selection of technologically important devices in areas including computing, communications, medical imaging, lasers, and energy utilization. Students will utilize technical journals. No credit given toward a B.S. major in physics. Prerequisite: PHYS 3603 or PHYS 3614.

PHYS4213 Physics of Devices (SP, Even years) Principles of physics applied in a selection of technologically important devices in areas including computing, communications, medical imaging, lasers, and energy utilization. Students will utilize technical journals. Credit allowed for only one of PHYS 4203 or PHYS 4213. Prerequisite: PHYS 3614.

PHYS4333 Thermal Physics (SP, Even years) Equilibrium thermodynamics, statistical physics, and kinetic energy. Prerequisite: PHYS 3614.

PHYS462VL Modern Physics Laboratory (1-3) (FA) Advanced experiments, projects, and techniques in atomic, nuclear, and solid state physics.

PHYS4653 Subatomic Physics (IR) Nuclear structure and nuclear reactions. Nature and properties of elementary particles and resonances, their interactions and decays. Phenomenological theory and discussion of experimental evidence. Prerequisite: PHYS 3614.

PHYS4713 Solid State Physics (SP) Crystal structure, diffraction and symmetry. Lattice vibrations, elasticity and optical properties. Electronic structure, band theory, transport and magnetism. Course emphasizes applications and current topics in semiconductors, optics and magnetism. Pre- or Corequisite: PHYS 3414 and PHYS 4333.

PHYS4803 Mathematical Physics (IR) Development of mathematics used in advanced physics, including tensors, matrices, group theory, special functions and operators. Prerequisite: MATH 2574.

PHYS501V Seminar (1-3) (FA, SP, SU) Regular informal discussions of research reported in journals and monographs.

PHYS502V Individual Study in Advanced Physics (1-3) (FA, SP) Guided study in current literature.

PHYS5073 Mathematical Methods of Physics I (FA) Applications of complex variables, differential equations, special functions, Green's functions, and matrix analysis to problems in physics. Introduction to numerical and statistical techniques used in physics research. (Same as MATH 5073) Prerequisite: MATH 3423.

PHYS5083 Mathematical Methods of Physics II (SP) Applications of matrices, tensors, and linear vector spaces to problems in physics. Introduction to groups and their representations, and symmetry principles in modern physics. (Same as MATH 5083) Prerequisite: PHYS 5073 or MATH 5073.

PHYS5103 Advanced Mechanics (SP) Dynamics of particles and rigid bodies. Hamilton's equations and canonical variables. Canonical transformations. Small oscillations. Prerequisite: PHYS 5033 and PHYS 5073.

PHYS5123 Research Techniques I: Condensed Matter Physics (SP) Experimental and theoretical approaches to research in condensed matter, with introduction to laboratory equipment and techniques used in MS level researh in these areas. Literature survey of current research topics. This course focuses on basic research techniques available in the department (on campus). Prerequisite: graduate standing

PHYS5133 Research Techniques I: Atomic, Molecular, and Optical Physics (SP) Experimental and theoretical approaches to research in atomic, molecular, and optical physics, with introduction to laboratory equipment and techniques used in MS level research in these areas. Literature surveys of current research topics. This course focuses on basic research techniques available in the department (on campus). Prerequisite: graduate standing.

PHYS5213 Statistical Mechanics (FA) Classical and quantum mechanical statistical theories of matter and radiation. Prerequisite: PHYS 4333 and PHYS 5064.

PHYS5333 Advanced Electromagnetic Theory (SP) Electrostatic boundary-value problems, Maxwell's equations, plane waves, waveguides, cavities, radiating systems, special relativity and relativistic electrodynamics. Prerequisite: PHYS 5073.

PHYS5413 Quantum Mechanics I (FA) Non-relativistic quantum mechanics; the Schrodinger equation; the Heisenberg matrix representation; operator formalism; transformation theory; spinors and Paull theory; the Dirac equation; applications to atoms and molecules, collision theory, semiclassical theory of radiation. Prerequisite: PHYS 5064.

PHYS5423 Quantum Mechanics II (SP) Non-relativistic quantum mechanics; the Schrodinger equation; the Heisenberg matrix representation; operator formalism; transformation theory; spinors and Paull theory; the Dirac equation; applications to atoms and molecules, collision theory, semiclassical theory of radiation. Prerequisite: PHYS 5064 and PHYS 5413.

PHYS5513 Atomic and Molecular Physics (SP, Even years) Survey of atomic and molecular physics with emphasis on the electronic structure and spectroscopy on 1 and 2 electron atoms, and diatomic molecules. Includes fine and hyperfine structure. Zeeman and Stark mixing of states, collision phenomena, radiative lifetimes, and experimental techniques. Prerequisite: PHYS 5054.

PHYS5523 Theory of Relativity (IR) Conceptual and mathematical structure of the special and general theories of relativity with selected applications. Critical analysis of Newtonian mechanics; relativistic mechanics and electrodynamics; tensor analysis; continuous media; and gravitational theory. Prerequisite: PHYS 5103 and PHYS 5323.

PHYS5713 Solid State Physics (SP, Odd years) Crystalline structure, lattice dynamics. Debye theory, electron theory of metals, band theory of solids, superconductivity, and magnetism. Prerequisite: PHYS 5054.

PHYS5734 Laser Physics (SP) (Formerly PHYS 5613) A combined lecture/laboratory course covering the theory of laser operation, laser resonators, propagation of laser beams, specific lasers such as gas, solid state, semiconductor and chemical lasers, and laser applications. Prerequisite: PHYS 3414 and PHYS 3544.

PHYS574V Internship in College or University Teaching (3-9) (FA, SP, SU) Supervised field experiences in student personnel services, college administration, college physics teaching, institutional research, development, or other areas of college and university work. May be repeated for 3 hours. Pre- or Corequisite: PHYS 400.

PHYS5754 Applied Nonlinear Optics (FA) (Formerly PHYS 5633) A combined lecture/laboratory course. Topics include: practical optical processes, such as electro-optic effects, acousto-optic effects, narrow-band optical filters, second harmonic generation, parametric amplification and oscillation, and other types of nonlinear optical spectroscopy techniques which are finding current practical applications in industry. Prerequisite: PHYS 3414 and PHYS 3544.

PHYS5774 Introduction to Optical Properties of Materials (FA) (Formerly PHYS 5723) A combined lecture/laboratory course covering crystal symmetry optical transmission and absorption, light scattering (Raman and Brillouin) optical constants, carrier mobility, and polarization effects in semi-conductors, quantum wells, insulators, and other optically important materials. Prerequisite: PHYS 3414 and PHYS 3544.

PHYS5794 Lightwave Communication (FA, SP, SU) A laboratory-based course in light propagation in planar and fiber waveguides, optical coupling, operation principles of semiconductor lasers, detectors, and LEDs, hands-on experience with applications in communication systems. Prerequisite: PHYS 3414 or ELEG 3703.

PHYS588V Selected Topics in Experimental Physics (1-3) (IR)

PHYS590V Master of Arts Research (1-6) (FA, SP, SU)

PHYS600V Master of Science Thesis (1-6) (FA, SP, SU)

PHYS6123 Research Techniques II: Condensed Matter Physics (FA) Experimental and theoretical approaches to research in condensed matter, with introduction to laboratory equipment and techniques used in PhD level research in these areas. This course concentrates on advanced research techniques, including examination of specific research methods and apparatus at research partner academic and industrial sites. Prerequisite: PHYS 5123.

PHYS6133 Research Techniques II: Atomic, Molecular, and Optical Physics (FA) Experimental and theoretical approaches to research in atomic, molecular, and optical physics, with introduction to laboratory equipment and techniques used for PhD level research in these areas. This course concentrates on advanced research techniques, including examination of specific research methods and apparatus at research partner academic and industrial sites. Prerequisite: PHYS 5133.

PHYS6413 Quantum Mechanics III (FA, Even years) Relativistic quantum mechanics, second quantization, with applications to quantizing electromagnetic fields and to many-body theory. Introduction to Feynman diagrams. Prerequisite: PHYS 5423.

PHYS6613 Quantum Optics (FA, Odd years) Properties of light and its interaction with atoms, particular attention given to the laser and recent experiments. Classical theory of resonance; Optical Bloch Eqs.; 2 level atoms in steady fields; pulse propagation; semiclassical theory of the laser, coherent states and coherent functions; gas, solid, and dye lasers; photon echoes and superradiance; quantum electrodynamics and spontaneous emission. Prerequisite: PHYS 5413 or equivalent.

PHYS6713 Advanced Solid State Theory (IR) Quantum mechanical approach to the theory of solids, including such topics as group theory, crystalline field theory, electron-photon interactions, band theory of solids, transport phenomena, superconductivity, and magnetic properties of solids. Prerequisite: PHYS 5713 and PHYS 5413.

PHYS700V Doctoral Dissertation (1-18) (FA, SP, SU)

DEPARTMENT OF PLANT PATHOLOGY (PLPA)

Sung M. Lim
Department Head
217 Plant Sciences Building
575-2446

- University Professors Kim, Riggs
- Professors Correll, Gergerich, Kirkpatrick, Lee, Lim, Robbins, Rothrock, Tebeest
- Associate Professors Fenn, Milus, Rupe
- Assistant Professor Cartwright, Korth, Yang

Degree Conferred: M.S. (PLPA)

Areas of Concentration: Fungal ecology and genetics, nematology, virology, soil ecology, molecular biology of plant pathogens, biological control of plant diseases and weeds, genetics and physiology of parasitism and resistance, plant disease control, and diseases of cotton, fruits, rice, soybean, turfgrass, vegetables and wheat.

Prerequisites to Degree Program: Although no specific prerequisites are required, a strong background in agricultural, biological and physical sciences is desirable. Deficiencies or prerequisites for advanced courses may be included in the student's program.

Requirements for the Master of Science Degree: A thesis reporting results of original research and a minimum of 24 semester hours of course work (including 15 semester hours in plant pathology) plus 6 semester hours of thesis credit are required. The student must pass an oral examination after the thesis is completed.

The Ph.D. program in Plant Science is an interdepartmental doctoral program involving the Departments of Plant Pathology and Horticulture. Most of the course work and the dissertation research may be completed in Plant Pathology.

COURSES: PLANT PATH (PLPA)

PLPA400V Research (1-6) (FA, SP, SU) Original investigations of assigned problems in plant pathology. Prerequisite: PLPA 3004.

PLPA4103 Plant Disease Control (FA) Principles, methods and mechanics of plant disease control. Emphasis is given to the integration of control measures and epidemiology of plant diseases. Lecture 3 hours per week. Prerequisite: PLPA 3004.

PLPA5001 Seminar (FA, SP) Review of scientific literature and oral reports on current research in plant pathology. May be repeated for 4 hours. Prerequisite: graduate standing.

PLPA502V Special Problems Research (1-6) (FA, SP, SU) Original investigations of assigned problems in plant pathology. Prerequisite: graduate standing.

PLPA504V Special Topics (1-4) (IR) Lecture topics of current interest not covered in other courses in plant pathology or other related areas. Prerequisite: graduate standing.

PLPA5303 Advanced Plant Pathology: Genetics and Physiology (SP, Odd years) Presentation of important contemporary concepts relative to the genetics, physiology, biochemistry, and molecular biology of plant pathogens and plant disease. Lecture 3 hours per week. Prerequisite: PLPA 3004 and graduate standing.

PLPA5313 Advanced Plant Pathology: Ecology and Epidemiology (SP, Even years) Presentation of important contemporary concepts relative to the ecology and epidemiology of foliar and soil-borne plant pathogens. Lecture 3 hours per week. Prerequisite: PLPA 3004 and graduate standing.

PLPA5404 Diseases of Economic Crops (SU) Diagnosis and management of important diseases of cotton, fruits, rice, trees, soybeans, wheat, and vegetables will be covered in a lecture, laboratory, and field format. Lecture 2 hours, laboratory 4 hours per week. Four 1-day field trips will be involved. Corequisite: PLPA 5400L. Prerequisite: PLPA 3004.

PLPA5400L Diseases of Economic Crops Laboratory (SU) Corequisite: PLPA 5404.

PLPA5532 Professionalism in Plant Science (SP, Odd years) Discussion of professionalism in science, science ethics and other topics associated with science as a profession such as research funding, writing for publication, career choices, and career development. Prerequisite: graduate standing.

PLPA5603 Plant Pathogenic Fungi (FA, Odd years) Plant Pathogenic Fungi is structured as an integrated lecture/laboratory class designed for students that are interested in developing an understanding and appreciation for taxonomy, biology, and ecology of plant pathogenic fungi and realted saprophytic fungi. Corequisite: PLPA 5600L. Prerequisite: PLPA 3004 or BOTY 4424 or graduate standing.

PLPA5600L Plant Pathogenic Fungi Lab (FA, Odd years) Corequisite: PLPA 5603.

PLPA5713 Introduction of Electron Microscopy (SP) Use of the electron microscope in biological research, including the preparation of various plant and animal specimens and their observation with the electron microscope. Lecture 1 hour, laboratory 4 hours per week. Prerequisite: graduate standing.

PLPA600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

PLPA6203 Plant Virology (FA, Odd years) Lecture emphasizing discussion of recent advances in plant virology. Laboratory concerned with techniques and equipment used in plant virus studies, including transmission of viruses, characterization utilizing ultracentrifugation, spectrophotometry, electrophoresis, electron microscopy, and serology. Lecture 2 hours, laboratory 3 hours per week. Corequisite: PLPA 6200L. Prerequisite: graduate standing.

PLPA6200L Plant Virology Lab (FA, Odd years) Corequisite: PLPA 6203.

PLPA6303 Plant Nematology (FA, Even years) Nematodes and their relationship to plant diseases, with consideration of identification, morphology, biology, distribution, association with disease complexes and control. Lecture 2 hours, laboratory 2 hours per week. Corequisite: PLPA 6300L. Prerequisite: graduate standing.

PLPA6300L Plant Nematology Laboratory (FA, Even years) Corequisite: PLPA 6303.

PLPA6503 Bacterial and Mycoplasmal Plant Pathogens (SP, Odd years) Plant pathogenic bacteria and mycoplasma, the types of diseases they cause, their identification, culture, classification, transmission infection processes, and control. To be taught Spring semesters of odd years. Lecture 2 hours, laboratory 2 hours per week. Corequisite: PLPA 6500L. Prerequisite: MBIO 2013 and MBIO 2011L.

PLPA6500L Bacterial and Mycoplasmal Plant Pathogens Laboratory (SP, Odd years) Corequisite: PLPA 6503. (FA, Odd years) (FA, Odd years)

COURSES: PLANT SCI (PTSC)

The doctoral program in Plant Science is an interdepartmental program involving the departments of Plant Pathology and Horticulture. See page 115 for graduate courses in Plant Science.

PLANT SCIENCE (PTSC) (Interdepartmental Doctoral Program)

David O. TeBeest
Chair of Studies
217 Plant Sciences Building
575- 2445

• University Professors Kim, Riggs • Professors Correll, Gergerich, Kirkpatrick, Klingaman, Lee, Lim, Morelock, Murphy, R Robbins Rothrock, TeBeest • Associate Professors Clark, Fenn, Milus, Rom • Associate Research Professors J. Robbins, Rupe • Assistant Professors Andersen, Cartwright, Korth, Lindstrom, Richardson, Yang

Degree Conferred: Ph.D. (PTSC)

Areas of Concentration: Biological control of plant diseases and weeds, breeding for disease resistance, fungal biology, forest pathology, diseases of crop plants, mycotoxicology, mycoplasmas, nematology, physiology of parasitism and resistance, plant disease control, phytobacteriology, soil microbiology, virology, genetics and plant breeding of fruit or vegetable crops, physiology and culture of fruit, vegetable or ornamental plants, and physiology and management of turfgrasses.

Prerequisites to Degree Program: In addition to the requirements for admission to the Graduate School, the student must submit to the Chair of Studies three letters of recommendation, which evaluate the potential of the student to pursue advanced graduate studies, and scores from the Graduate Record Examinations. Approval by the Plant Science Steering Committee is also necessary for acceptance into the program of study leading to the Doctor of Philosophy degree.

Requirements for Doctor of Philosophy Degree: Each candidate must present a doctoral dissertation based on original research. Course requirements are established by the student's major adviser and the graduate advisory committee. The student must pass a candidacy examination at least two semesters before the expected conferral date of the degree. A final examination on the doctoral dissertation and cognate areas must be passed at least two weeks before the time of expected degree conferral.

COURSES: PLANT SCI (PTSC)

PTSC5343 Seed Physiology (SP) Physiological process and molecular regulation in the development, dormancy, germination, and early growth of seeds. A basic knowledge of plants physiology expected. (Same as HORT 5343)

PTSC6101 Colloquium in Plant Sciences (SP) Advanced discussion of topics in plant science on a participatory basis. Topics in plant pathology, horticulture and forestry will be treated. May be repeated for 2 hours. Prerequisite: graduate standing.

PTSC6203 Laboratory Instrumentation in Plant Science (SP, Odd years) Principles, capabilities, and operation of laboratory instrumentation utilized in plant science research. Lecture 2 hours, laboratory 3 hours per week. Corequisite: PTSC 6200L.

PTSC6200L Laboratory Instrumentation in Plant Science Laboratory (SP, Odd years) Corequisite: PTSC 6203.

PTSC700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: graduate standing.

DEPARTMENT OF POLITICAL SCIENCE (PLSC)

Steven M. Neuse
Department Chair
428 Old Main
575-3356

• Professors Kelley, Neuse, Savage, Waligorski • Associate Professors Kerr, Miller, Reid, Ryan, Shields • Assistant Professors Conge, Okruhlik, Parry, Schreckhise, Zeng • Adjunct Professors Purvis, Smith

Degrees Conferred: M.A. (PLSC) M.P.A. in Public Administration (PADM) J.D./M.P.A. (Dual Degree)

Areas of Concentration: American politics, comparative politics, international politics, political theory, public administration.

Political Science (PLSC)

Prerequisites to the M.A. Degree Program: Applicants for graduate study in political science must be admitted to the Graduate School and also meet the following requirements: (1) satisfactory GRE scores, (2) submission of a written essay, and (3) three letters of recommendation from persons competent to judge applicant's potential for graduate studies. Students from all academic backgrounds are encouraged to apply. Students who have had few political science courses at the undergraduate level may be required to enroll in several undergraduate courses at the beginning of their course of graduate study.

Requirements for Master of Arts Degree:

Thesis Option-Thirty semester hours of course work at the graduate level, 24 hours of which must be distributed over three of the fields listed above. Ordinarily, 18 of the 24 hours must be fulfilled by two seminars in each of the three fields, following which the candidate takes comprehensive examinations in two of the fields studied. In exceptional circumstances, these field requirements may be waived. However, students selecting some alternative option will be required to stand for comprehensive examinations in two fields. At least three of the 30 hours of the M.A. degree must be in methodology. All M.A. candidates in this plan are required to write and defend an acceptable thesis.

Non-thesis Option-Thirty-six semester hours of course work at the graduate level. Ordinarily, a minimum of 18 of the 36 hours must be fulfilled by two seminars in each of three fields. In exceptional circumstances, these field requirements may be waived. However, students selecting some alternative option will be required to stand for examinations in three fields. At least three of the 36 hours must be in methodology. All 5000-level courses except those with variable credit are graduate seminars.

Concentration in Community College Teaching (6-9 hours)

For students interested in teaching in a community college, the Department of Political Science offers a concentration in Community College Teaching. In addition to departmental requirements, the student takes two 3-credit hour courses focusing on theories and strategies of effective community college teaching. The student's program may also include a 3-hour internship in a community college setting.

Courses to be taken:
HIED 699V, Community College Teaching I
HIED 699V, Community College Teaching II
HIED 674V, Internship

Public Administration (PADM)

The Master of Public Administration program is administered by the Department of Political Science. The major objectives of the program are:

1. to provide a broad flexible program to prepare students for careers in public service and nonprofit management;
2. to afford opportunities to practicing administrators for improving their career and services through advanced education and training; and
3. to prepare scholars for further graduate study in the field of public administration

Prerequisites for Admission to the M.P.A. Degree Program

1. Admission to the Graduate School
2. Minimum total score of 1,000 on the verbal and quantitative portions of the Graduate Record Examinations (GRE). (GRE scores may be waived under certain circumstances at the discretion of the PLSC Admissions Committee. Examples of possible exceptions include the successful completion of a master's

degree or the submission of GMAT or LSAT scores in lieu of GRE scores).
3. 3.20 minimum grade-point average in the last sixty hours of undergraduate course work.
4. Students deficient in (2) or (3) above may be admitted if they score a minimum number of points according to the following formula: A total of at least 1600 points from (200 x GPA) + GRE score on verbal and quantitative sections; GPA based upon the last 60 hours of undergraduate work.
5. A written essay, submitted in accordance with standards set by the PLSC Admissions Committee.
6. Three letters of recommendation from persons competent to judge the applicant's academic/work experience.
7. Academic prerequisites: The PLSC Admissions Committee may require appropriate course work related to an understanding of governmental processes and activities to cover deficiencies in past education.
8. All requirements listed above must be completed and reported before the beginning of the student's second semester or the student will not be admitted to courses that semester.

Requirements for the Master of Public Administration Degree:

The MPA requires a total of 42 semester hours of which 27 hours are to be 5000-level courses or above.

Required Courses (9 semester hours)

PLSC 5193, Seminar in Public Admin.
PADM 5803, Quantitative Methods Analysis
PADM 5813, Methods in Public Management Information

Select five (5) from the following ten (10) courses

PLSC 5103, Human Behavior in Complex Organizations
PLSC 5113, Seminar: Human Resource Management
PLSC 5123, Public Budgeting and Finance
PLSC 5133, Management in Complex Organizations
PLSC 5143, Administrative Law
PLSC 5163, Public Policy Formation and Analysis
PLSC 5183, Comparative Public Administration
PLSC 5243, Seminar in State and Local Politics
PADM 584V, Special Topics in Public Administration
PLSC 4283, Federalism and Intergovernmental Relations

Special Interest Concentrations

Twelve to 18 graduate semester hours, depending on exercise of the internship, may be chosen in PLSC/PADM and other disciplines with approval of the M.P.A. Program Director. The M.P.A Program Director, in consultation with the student, will develop a set of relevant graduate courses which will help the student in meeting career objectives. Concentrations may be developed for students interested in fields such as local and state government management, nonprofit management, community development, information and technology management, health services administration, human resource management, environmental policy management, and cultural resource management. Other concentrations may be exercised with the consent, advice, and approval of the M.P.A. Program Director.

Internship: (1-6 semester hours). The internship is recommended but not required. It will be offered on a credit/non-credit basis only. The number of semester hour credits depends on the length and full/part-time nature of the internship.

All students will be required to take a written comprehensive examination covering their M.P.A. program. This exam will be graded by at least a three person faculty committee selected by the M.P.A. Program Director. In addition to the successful completion of all course requirements and a passing grade on the written comprehensive examination, each student must present a minimum cumulative grade-point average of 3.00.

J.D/M.P.A. Program

The Department of Political Science, the Graduate School, and the School of Law cooperate in offering a dual degree program that allows a student to pursue the M.P.A. and the J.D. degrees concurrently. Students must be admitted to the M.P.A. program and the School of Law. If a student seeks to enter the dual degree program after enrolling in either the Law School or the M.P.A. program, he or she must obtain admission to the other degree program and the dual program during the first year of study.

The School of Law accepts 9 (nine)semester hours of MPA courses to satisfy requirements for the J.D. degree. Fifteen hours of law school courses may be counted toward the M.P.A degree. To qualify for J.D. credit, the M.P.A. courses must come from a set of core courses and must be approved by the law school. Students must earn a grade of B or higher in any M.P.A courses offered for credit toward the J.D. For purposes of the M.P.A. degree, fifteen hours of elective courses may be taken in the law school, provided they are not required for the J.D. degree and are in an area of concentration approved by the director of the M.P.A. program.

Students admitted to the dual degree program may commence their studies in either the law school or the M.P.A. program, but must complete first year course requirements before taking courses in the other degree program. If they do not maintain the academic or ethical standards of either degree program, students can be terminated from the dual degree program. Students in good standing in one degree program but not in the other may be allowed to continue in the other program in which they have good standing and must meet the degree requirements of that program. If for any reason a student admitted to the dual degree program does not complete the M.P.A. degree, he or she cannot count nine (9) hours of M.P.A. courses toward the J.D. degree. Likewise, M.P.A. students may not be able to count certain law courses if they decide to discontinue their studies in the law school. The J.D. will be awarded upon completion of all degree requirements; the M.P.A. will be awarded upon completion of the comprehensive examination and the internship (and internship report), or alternatively, six hours of additional course work.

All students will be required to take a written comprehensive examination covering their M.P.A. program. This exam will be graded by at least a three person faculty committee selected by the M.P.A. Program Director. In addition to the successful completion of all course requirements and a passing grade on the written comprehensive examination, each student must present a minimum cumulative grade-point average of 3.00.

COURSES: POLITCAL SCIENCE (PLSC)

PLSC400V Special Topics (1-3) (IR) Topics in political science not usually covered in other courses. May be repeated.

PLSC4053 Political Sociology (FA) Analysis of political institutions and movements in relation to power, social class, ideology, and related variables. (Same as SOCI 4053)

PLSC4193 Administrative Law (SP) Legal aspects of the administrative process and the effect of legal principles and processes upon administrative decision-making. Emphasis is given to the limitation of administrative discretion and the judicial review of administrative decision. Prerequisite: PLSC 3103 or PLSC 4253.

PLSC4203 American Political Parties (FA, SP) The nature, function, and history of political parties in then United States with emphasis on party membership, organization, campaign techniques, finance and electoral alliances. Prerequisite: PLSC 2003.

PLSC4213 Campaigns and Elections (IR) This course examines the American electoral process. It is an empirical course that provides opportunities for original analysis of survey data and election returns. Emphasis is placed on the most recent federal election.

PLSC4223 The American Congress (FA) Thorough examination of the constitutional role of the legislative branch under the Constitution; the internal procedures and personalities of the Senate and House; the central place of Congress in shaping domestic and foreign policy. Prerequisite: PLSC 2003.

PLSC4243 Minority Politics (SP) Reviews political action and concepts of political activity by minority groups, focusing on contemporary political behavior.

PLSC4253 The Supreme Court and the Constitution (FA) United States Supreme Court decisions involving the functions and powers of Congress, the Supreme Court, and the President and federalism. Prerequisite: PLSC 2003.

PLSC4263 The Supreme Court and Civil Rights (SP) United States Supreme Court decisions interpreting the political, economic, and civil rights of individuals and groups. Prerequisite: PLSC 2003.

PLSC4273 Political Psychology (SP) Examines role of the individual in the polity including basic psychological constructs of relevance to political action, the formulation and maintenance of stable political orientations, the patterns linking the individual to the polity, and major modes of inquiry. Prerequisite: PLSC 2003.

PLSC4283 Federalism and Intergovernmental Relations (FA, SP, SU) Analysis of changes in intergovernmental relations in the American federal system. Discussions will focus on political, economic/fiscal and administrative aspects of policy changes of the pre-and post-Reagan eras.

PLSC4373 Political Communication (SP) Study of the nature and function of the communication process as it operates in the political environment. (Same as COMM 4373)

PLSC4503 African Politics (SP) Comparative analysis of structures, processes and problems of selected Sub-Saharan African political systems.

PLSC4513 Creating Democracies (FA, Even years) Analyses of the creation of democracies in Europe, South America, Asia, Africa, the Middle East, East Europe, and the former Soviet Union. Prerequisite: PLSC 2013.

PLSC4543 Government and Politics of Eastern Europe (SP) Study of the politics of East European nations primarily after World War II, with emphasis on the role of the period of communist rule and democratization. Prerequisite: PLSC 2003 or PLSC 2013.

PLSC4563 Government and Politics of Russia (SP) Study of Russian and Soviet politics after 1917 and of the democratization of Russia and the other successor states. Prerequisite: PLSC 2003 or PLSC 2013.

PLSC4573 Gender and Politics (SP, Even years) Examines the significance of gender in politics. Includes discussion of the women's movement and feminist theory, but emphasizes the content and process of public policy as it relates to women and men. Focus is on the U.S. but final third is devoted to comparative topics. Prerequisite: PLSC 2003 or PLSC 2013.

PLSC4583 Political Economy of the Middle East (FA, SP, SU) Examines the links between politics and economics in the Middle East and the impact of that nexus on development. Analyses of global and regional integration, oil states, statist development, liberalization and privatization, and resources and population movements to understand power and class in the area.

PLSC4593 Islam and Politics (FA, SP, SU) Compares contemporary Islamist political movements. Seeks to explain causes, debates, agendas, and strategies of Islamists in the political realm. Addresses sovereignty, the rule of law, visions of the good state and society, and relations between nationalism, religion and political development. Focus on Middle East with comparative reference to other cases.

PLSC4803 Foreign Policy Analysis (SP) Comparative analysis of foreign policy, with attention paid to explanations at a variety of levels, such as the individual, group, organizational, societal, systemic.

PLSC4843 The Middle East in World Affairs (SP) An analysis of geo-political and socio-economic characteristics of Middle Eastern societies and their impact on world economic and political order. Special attention to such issues as the Arab-Israeli conflict, the promotion of lasting peace in the region, impact of oil on world politics, the involvement of superpowers, rehabilitation of Palestinian refugees and the role of the United Nations.

PLSC4873 Inter-American Politics (SP) An analysis of the political themes, regional organization, and hemispheric relations that constitute the inter-American system, with special emphasis on conflict and cooperation in the hemispheric policies of the American republics. Prerequisite: junior standing.

PLSC4903 Democratic Theory (FA, SP, SU) Analysis and comparison of classical and contemporary theories of democracy.

PLSC5103 Human Behavior in Complex Organizations (FA) Review of the fundamental literature and a systematic analysis of various theories and research focusing on organization and behavior in public administration, including the discussion of organizational development, human motivation, leadership, rationality, efficiency and conflict management in public organizations. Prerequisite: graduate standing.

PLSC5113 Seminar in Human Resource Management (SP) Intensive study of public personnel policies and practices, including legal foundations, classification and compensation plans, recruitment and selection processes, training, employment policies and morale, employee relations and organization. Prerequisite: graduate standing.

PLSC5123 Public Budgeting and Finance (FA) Focuses on the budgeting process and governmental fiscal policy formulation, adoption, and execution. Prerequisite: graduate standing.

PLSC5133 Management in Complex Organizations (FA, SP) This seminar focuses on the scope and nature of management in public organizations with special emphasis on relating contemporary management theory to the public organizational context. Prerequisite: graduate standing.

PLSC5143 Administrative Law (IR) A seminar which examines the constitutional and statutory basis and authority of public organizations. Special attention focuses on the nature of the rule-making and adjudicatory powers of public agencies and on executive, legislative, and judicial restraints on such activities. Also considered is the role, scope, and place of public regulatory activities. Prerequisite: graduate standing.

PLSC5163 Public Policy (SP) Research seminar examining the study of public policy making in complex human systems. Attention given to issues dealing with cognitive limitations in decisional settings, the use of reasoned persuasion vs. power, the appropriate application of technical analysis. Prerequisite: graduate standing.

PLSC5183 Comparative Public Administration (IR) A comparative study of administrative structures and processes in selected modern and modernizing political systems. Analysis includes the consideration of cultural, legal and political factors influencing the operation of bureaucratic institutions, developmental goals, and the methods of establishing and administering programs of social, economic and political development. Prerequisite: graduate standing.

PLSC5193 Seminar in Public Administration (FA) Introduction to and synthesis of public administration theory, functions, history, public accountability and management concerns, economic impact of administrative decisions, current problems, and issues in the public sector. Prerequisite: graduate standing.

PLSC5203 Seminar in American Political Institutions (FA) Research seminar dealing with selected aspects of the major governmental institutions in the United States. Prerequisite: graduate standing.

PLSC5213 Seminar in American Political Behavior (SP) Reading seminar surveying major works on representative processes in American national politics, including political opinion, political leadership, political participation, voting behavior, political parties, and interest groups. Prerequisite: graduate standing.

PLSC5223 Seminar in Legislative Processes and Behavior (FA) Research seminar dealing with legislative processes and behavior in the United States. Prerequisite: graduate standing.

PLSC5233 Disability Policy in the United States (FA, SP, SU) An analysis of public policy approaches to disability in the United States. Examines the political and philosophical origins of disability policy; reviews major disability legislation and its effects on policy stakeholders; describes recent policy initiatives; analyzes evolution of disability policy with context of changing societal, economic and political conditions. (Same as RHAB 6203) Prerequisite: graduate standing.

PLSC5243 Seminar in State and Local Politics (FA, SP, SU) Research seminar dealing with selected aspects of state and local institutions and politics such as comparative policy-making, political culture variations, and community power structures. Prerequisite: graduate standing.

PLSC5383 Seminar in Political Communication (IR) Research seminar focusing on selected topics such as candidate imagery, diffusion of political information, or political symbolism. (Same as COMM 5383) Prerequisite: graduate standing.

PLSC5503 Comparative Political Analysis (FA) A selection of topics to provide the theoretical, conceptual and methodological and foundation for the analysis of contemporary political systems. Prerequisite: graduate standing.

PLSC5513 Seminar in Politics of the Middle East (FA, SP, SU) Explores the major lines of inquiry on the politics of the state and society in the context of endogenous and exogenous forces that have influenced conceptions of power, legitimacy, and identity. Prerequisite: graduate standing.

PLSC5523 Topics in Politics of the Middle East (FA, SP, SU) Indepth analysis of specific political phenomena in the contemporary Middle East. Inquiry will vary but may focus on gender, political economy, politics of inclusion and exclusion (democratization and authoritarianism), or the politics of oil. Prerequisite: graduate standing.

PLSC5563 Russian and Soviet Political Systems (SP) Study of the political systems of the Soviet Union and the successor states. Prerequisite: graduate standing.

PLSC5573 Political Change in Latin America (SP, Even years) Research seminar analyzing obstacles to change in Latin America while utilizing both North American and Latin American research frameworks and techniques that deal with the theory and measurement of stability and development. Prerequisite: graduate standing.

PLSC560V Teaching Foreign Cultures in Social Studies Curriculum (1-6) (SU) Extensive examination of foreign cultures (West Europe, USSR, China, Latin America) and methods of teaching about them in secondary school social studies. Four week residential summer institute. (Same as CIED 567)

PLSC5803 Seminar in International Politics (FA) Research seminar providing intensive coverage of selected topics in theories of international relations, the comparative study of foreign policy making, and international organizations. Prerequisite: graduate standing.

PLSC5833 Seminar in Contemporary Problems (FA) Seminar with concentrated reading in selected and specialized areas of contemporary international relations. May be repeated for 6 hours. Prerequisite: graduate standing.

PLSC5843 International Legal Order (SP) Analysis of distinctive characteristics of contemporary international law. Topics include role of legal order in controlling the use of force in international relations and the impact of social and political environment on growth of international law and relations among international political systems. Prerequisite: graduate standing.

PLSC590V Directed Readings in Political Science (1-3) (FA, SP, SU) May be repeated for 6 hours. Prerequisite: graduate standing.

PLSC5913 Research Methods in Political Science (FA) Methods relevant to research in the various fields of political science. Required of all graduate students in political science. Prerequisite: graduate standing.

PLSC592V Internship in Political Science (1-6) (FA, SP, SU) Internship in a local, state, regional, or federal agency. Paper required on a significant aspect of internship experience. Prerequisite: graduate standing.

PLSC595V Research Problems in Political Science (1-3) (FA, SP, SU) May be repeated for 6 hours. Prerequisite: graduate standing.

PLSC5963 Modern Political Thought (FA) European political thinking since the rise of the nation-state and the relevance of that tradition to contemporary politics. Prerequisite: graduate standing.

PLSC5973 Contemporary Normative Political Theory (SP) Analysis of current normative problems of political theory such as obligation, dissent, justification, sovereignty and tolerance, and major schools of thought including Marxism, liberalism and western conservatism. Prerequisite: graduate standing.

PLSC600V Master's Thesis (1-6) (FA, SP, SU)

COURSES: PUBLIC ADMIN (PADM)

PADM5803 Quantitative Methods Analysis (FA) Data analysis techniques, including descriptive and inferential statistics and packaged computer programs. Prerequisite: (Appropriate undergraduate statistics course or equivalent) and graduate standing.

PADM5813 Methods in Public Management Information (SP) Quantitative approaches toward an understanding of public administration and statistical tools for analysis of administrative problems and programs. Prerequisite: PADM 5803 or equivalent and graduate standing.

PADM584V Special Topics in Public Administration (1-3) (FA, SP, SU) Topic varies.

PADM587V Internship in Public Administration (1-6) (FA, SP, SU)

PADM588V Directed Readings (1-3) (FA, SP, SU) Prerequisite: graduate standing.

PADM589V Independent Research (1-3) (FA, SP, SU) Prerequisite: graduate standing.

DEPARTMENT OF POULTRY SCIENCE (POSC)

James H. Denton
Department Head
0114 Poultry Center
575-3699

• University Professor Waldroup (P.W.) • Professors Anthony, Bottje, Chapman, Coon, Jones, Kuenzel, Slavik, Wideman • Research Professors Huff (B), Rath • Associate Professors Erf, Goodwin, Kirby, Marcy, Li • Assistant Professors Clark, Emmert, Okimoto, Owens, Parcells, Watkins • Research Assistant Professors Balog, Beers, Huff (G) • Adjunct Professors Bristor, Keck, Plue, Porter, Rhoads, Steelman • Adjunct Associate Professor Story • Adjunct Assistant Professors Breeding, Cook, Davis, Fussell • Adjunct Research Assistant Professor Pumford

Degrees Conferred: M.S., Ph.D. (POSC)

Areas of Concentration: Graduate studies may be pursued in subject matter areas of food safety, genetics, immunology, microbiology, nutrition, parasitology, pathology, product technology, poultry health, management, and physiology. Poultry and laboratory animals are available for research programs in the Poultry Science Department.

Prerequisites to Degree Program: The student pursuing a program for a Master of Science degree must meet all general requirements of the Graduate School. In addition, the student must have completed the B.S. degree in a college or university with a major or equivalent in one of the areas of the Poultry Science Department. All applicants must submit at least three letters of recommendation and scores on the Graduate Record Examinations.

For acceptance into the Ph.D. degree program, a grade-point average of 3.00 on all previous graduate work and scores on the Graduate Record Examinations must be presented.

Requirements for the Master of Science Degree: The student and adviser will prepare a program of work that may include additional undergraduate basic courses and at least 24 semester hours of studies plus the completion of a thesis and one research paper. Any deficiencies in undergraduate major requirements or prerequisites for advanced courses may be included in the student's program; however, they may not be included as part of the 24 hours needed to fulfill the M.S. degree.

Requirements for the Doctor of Philosophy Degree: In addition to the general requirements of the Graduate School are those of the Department, which consist of a program of research, appropriate course work and seminars as specified by the student's graduate committee. In addition, a dissertation and two research papers acceptable to the committee are required.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in this degree program as in-state students for fee purposes. See page 163 for details.

COURSES: POULTRY SCIE (POSC)

POSC4213 Integrated Poultry Management Systems (SP) Major managerial systems in the integrated commercial poultry industry. Development of an understanding of the basic decision making processes of poultry companies and the factors influencing those decisions. Prerequisite: POSC 2353.

POSC4223 Risk Analysis for Biological Systems (FA, Odd years) Principles of risk assessment including exposure assessment and dose response, and risk management. Methods of risk analysis modeling and simulation with computer software. Applications of risk analysis in animal, food and environmental systems. (Same as FDSC 4223) Prerequisite: STAT 2023 (or STAT 2303 or AGST 4023) and BAST 2903 (or BAEG 1022).

POSC4333 Poultry Breeding (FA, Odd years) Application of new developments in poultry breeding for efficient egg and meat production. Lecture 3 hours per week. Prerequisite: (POSC 3123 or ANSC 3123) and junior standing.

POSC4343 Poultry Nutrition (SP) Principles of nutrition as applied to the formulation of practical chicken and turkey rations. Lecture 3 hours per week. Prerequisite: CHEM 2613 and CHEM 2611L and junior standing.

POSC4434 Fundamentals of Reproductive Physiology (FA) Principles of avian reproductive physiology with emphasis on poultry. Lecture 3 hours, laboratory 3 hours per week. Corequisite: POSC 4430L. Prerequisite: POSC 1003 and POSC 1002L and POSC 3123.

POSC4430L Fundamentals of Reproductive Physiology Laboratory (FA) Corequisite: POSC 4434.

POSC4743 Analytical Methods in Animal Nutrition (SP) Experience in the techniques used in the modern animal nutrition laboratory and the interpretation of experimental data. Lecture 1 hours, laboratory 4 hours per week. (Same as ANSC 4743) Corequisite: POSC 4740L or ANSC 4740L. Prerequisite: CHEM 1123 and CHEM 1121L.

POSC4740L Analytical Methods in Animal Nutrition Laboratory (SP) Corequisite: POSC 4743.

POSC500V Special Problems (1-6) (FA, SP, SU) Work in special problems of poultry industry. Prerequisite: graduate standing.

POSC510V Special Topics in Poultry Sciences (1-4) (IR) Topics not covered in other courses or a more intensive study of specific topics in poultry science. May be repeated. Prerequisite: graduate standing.

POSC5122 Parasites of Poultry (SP, Odd years) Lectures and discussions of the protozoan, helminth, and arthropod parasites of poultry. Emphasis is placed upon the significance of these parasites to the poultry industry. Topics covered include host-parasite relationships, life cycles, pathogenesis, epidemiology and management, immunology, chemotheraphy, and practical methods of control. Lecture 1 hour, laboratory 2 hours per week. Corequisite: POSC 5120L.

POSC5123 Advanced Animal Genetics (FA, Even years) Specialized study of animal genetics. Lecture 3 hours per week. (Same as ANSC 5123) Prerequisite: POSC 3123 or ANSC 3123.

POSC5120L Parasites of Poultry Laboratory (SP, Odd years) Practical investigations of the protozoan, helminth, and arthropod parasites poultry. Laboratory 2 hours per week. Corequisite: POSC 5122. Prerequisite: POSC 1003.

POSC5143 Advanced Animal Nutrition (FA, Even years) Nutritional basis of livestock and poultry feeding; nutritional requirements of animals; recent developments in animal nutrition and application to feeding under Arkansas conditions. Lecture 3 hours per week. (Same as ANSC 5143) Prerequisite: CHEM 3813 and (ANSC 3143 or POSC 4343). (SP, Odd years)

POSC5313 Domestic Animal Bacteriology (FA) A study of bacteria pathogenic for domestic animals. Lecture 3 hours per week.

POSC5343 Advanced Immunology (FA) Aspects of innate, cell-mediated, and humoral immunity in mammalian and avian species. Molecular mechanisms underlying the function of the immune system are emphasized. A course in Basic Immunology prior to enrollment in Advanced Immunology is recommended but not required. Lecture 3 hours per week.

POSC5352L Immunology in the Laboratory (SP) Laboratory course on immune-diagnostic laboratory techniques and uses of antibodies as a research tool. Included are cell isolation and characterization procedures, immunochemistry, flow cytometry, ELISA and cell culture assay systems. Laboratory 6 hours per week. (Same as MBIO 5352L, VTSC 5352L) Prerequisite: POSC 5343 or MBIO 5343 or MBIO 4714.

POSC5742 Advanced Poultry Diseases (FA) The most important diseases of poultry will be covered in depth and the course will focus on understanding mechanisms of pathogenesis, diagnostic techniques and principles of prevention. Lecture/discussion 2 hours per week with Kodachrome slides and microscopic slides utilized. Prerequisite: POSC 3223.

POSC5743L Advanced Analytical Methods in Animal Sciences Laboratory (FA) Introduction into theory and application of current advanced analytical techniques used in animal research. Two 3-hour laboratory periods per week. Prerequisite: CHEM 3813 and PHYS 2013 and PHYS 2011 and (ANSC 4743 or POSC 4743).

POSC5752L Advanced Poultry Diseases Laboratory (SP) This course covers laboratory techniques utilized for the isolation, identification and diagnosis of poultry diseases with a microbial cause. Students will learn diagnostic virology, bacteriology, serology and mycology. Laboratories 3 hours twice weekly and then as needed to complete assignments. Prerequisite: POSC 3223 and POSC 5742.

POSC5853 Advanced Meats Technology (SU, Even years) An intensive study of processed meats, relating the science, technology, and quality of further processed meat and poultry products. Product development, sensory and chemical analysis, microbiology, nutritional aspects, and product labeling are covered. Lecture 2 hours, laboratory 2 hours per week. (Same as ANSC 5853) Prerequisite: ANSC 3614 or POSC 4314.

POSC5901 Graduate Seminar (FA, SP) Critical review of the current scientific literature pertaining to the field of poultry science. Oral reports. Recitation 1 hour per week. Prerequisite: senior standing.

POSC5922 Neurophysiology of Domestic Animals (FA) Neurophysiology, including mechanisms of nerve conduction, understanding of central integration and processing of signals with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for first 8 weeks of semester). (Same as ANSC 5922) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5920D. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042.

POSC5920D Neurophysiology of Domestic Animals Drill (FA) Corequisite: POSC 5922.

POSC5932 Cardiovascular Physiology of Domestic Animals (FA) Cardiovascular physiology, including mechanisms of heart function and excitation, and blood vessel mechanisms associated with the circulatory system in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as ANSC 5932) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5930D. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042.

POSC5933 Environmental Physiology of Domestic Animals (FA, Odd years) Study of the environment of domestic animals and its effect on physiological systems that affect maintenance, growth, production, and reproduction. Lecture 3 hours per week. (Same as ANSC 5933) Prerequisite: (ANSC 3032 or POSC 3032) and CHEM 3813.

POSC5930D Cardiovascular Physiology of Domestic Animals (FA) Corequisite: POSC 5932.

POSC5942 Endocrine Physiology of Domestic Animals (FA) Endocrine physiology, including mechanisms of hormone secretion, function, and regulation. Mechanisms associated with the endocrine system will be discussed for domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as ANSC 5942) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5940L. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042.

POSC5940D Endocrine Physiology of Domestic Animals Drill (FA) Corequisite: POSC 5942.

POSC5952 Respiratory Physiology of Domestic Animals (SP) Respiratory physiology, including mechanisms of lung function and gas exchange. Mechanisms associated with the interaction of the respiratory system with other bodily systems in domestic animals and poultry will be

discussed. Lecture 3 hours; drill 1 hour per week for first 8 weeks of semester. (Same as ANSC 5952) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5950D. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042.

POSC5950D Respiratory Physiology of Domestic Animals Drill (SP) Corequisite: POSC 5952.

POSC5962 Gastrointestinal/Digestive Physiology of Domestic Animals (SP) Gastrointestinal and hepatic physiology, including mechanisms of digestion, absorption of nutrients with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as ANSC 5962) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5960D. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042

POSC5960D Gastrointestinal/Digestive Physiology of Domestic Animals Drill (SP) Corequisite: POSC 5962.

POSC5972 Renal Physiology of Domestic Animals (SP) Renal physiology, including mechanisms of renal clearance with emphasis on cellular control mechanisms in domestic animals and poultry. Lecture 3 hours; drill 1 hour per week (for second 8 weeks of semester). (Same as ANSC 5972) Pre- or Corequisite: CHEM 3813. Corequisite: POSC 5970D. Prerequisite: ANSC/POSC 3032 and ANSC/POSC 3042.

POSC5970D Renal Physiology of Domestic Animals Drill (SP) Corequisite: POSC 5972.

POSC600V Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

POSC6343 Vitamin Nutrition in Domestic Animals (SP, Even years) The vitamins required by domestic animals with emphasis upon their role in animal nutrition, physiological functions, and consequences of failure to meet the requirement of the animal. Lecture 3 hours per week. (Same as ANSC 6343) Prerequisite: (ANSC 3143 or POSC 4343) and CHEM 3813.

POSC700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: graduate standing.

COURSES: FOOD SCIENCE (FDSC)

FDSC600V Master's Thesis (1-6) (FA, SP, SU) Prerequisite: graduate standing.

DEPARTMENT OF PSYCHOLOGY (PSYC)

David A. Schroeder
Department Chair
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• Professors Jackson, Knowles, Lohr, Schroeder, Stripling, Witte • Adjunct Professor Bolton • Associate Professors Behrend, Bonge, Freund, Petretic-Jackson, Westendorf • Assistant Professors Beike, Brown, Hilsenroth, Lampinen • Adjunct Assistant Professors Jenkins, Matthews, Patton, Perry

Degrees Conferred: M.A., Ph.D. (PSYC)

Areas of Concentration: The degree of Doctor of Philosophy is offered in the fields of experimental psychology and clinical psychology. The program is designed to produce experimental and clinical psychologists with broad knowledge of the field. Specialization for research is required during the student's last two years of study.

Prerequisites to Degree Program: The candidate for admission to graduate study in psychology must satisfy the requirements of the Graduate School and have the approval of the Admission Committee of the appropriate training program. Scores on the Aptitude Section and the Advanced Psychology Section of the Graduate Record Examinations must be submitted with the application. The student normally will be expected to have had at least 18 semester hours in psychology, including statistics and research methods, or their equivalents.

The program of study is designed primarily for the student who seeks the Ph.D. degree. However, all Ph.D. candidates must complete requirements for the M.A. degree.

Requirements for the Master of Arts Degree:

Clinical-A student who seeks only the Master of Arts degree will be advised on selection of courses which will meet specific objectives. The student must complete 24 semester hours of course work and submit a research thesis. The thesis should be finished no later than the end of the second year of study.

Experimental-A student who seeks only the Master of Arts degree must complete 24 hours of courses, including the following required courses: PSYC 4123, 5013, 5063, 5113, 5123, 5133, 5143, 523V (2 hours), and 6133. In addition, the student must submit a research thesis.

Requirements for the Doctor of Philosophy Degree:

1. Students in the experimental psychology program must fulfill all the requirements for the Master of Arts degree and take four 6000-level experimental psychology seminars.
2. The clinical student must take the following required courses: PSYC 5013, 5023, 5033, 5043, 5053, 5063, 5113, 5133, 5143, 5163, 5313, 6133 (or 4123), 6163, 6213, and 6233.
3. The clinical student must take a clinical practicum each semester on campus. The student must complete a one-year internship at an approved facility. It may precede or follow completion of the dissertation at the discretion of the advisory committee, but it must be completed prior to formal granting of the degree.
4. All students must pass a written candidacy examination at a time recommended by the student's advisory committee.
5. All students must complete a dissertation demonstrating independent scholarship and originality in research, and its oral defense.

The candidacy examination focuses upon methods characteristic of the field and upon specific content areas which are appropriate for each student. This examination may not be given until the M.A. thesis has been accepted, and it must be completed before dissertation research is begun. The final oral examination deals primarily with the dissertation research.

COURSES: PSYCHOLOGY (PSYC)

PSYC4013 Exceptional Children (IR) Study of children whose development follows atypical patterns, including for example, the mentally deficient, the physically and emotionally handicapped. Prerequisite: PSYC 2003.

PSYC4023 Adulthood and Aging (SP, Even years) Psychological factors occurring from young adulthood through old age. Emphasis on cognitive, personality, physical, and psychological factors. Prerequisite: PSYC 2003.

PSYC4033 Educational Psychology (IR) Psychological theories and concepts applied to the educational process. Investigates the learner and instructional variables in a wide range of educational settings. Prerequisite: PSYC 2003.

PSYC4053 Psychological Tests (FA) Nature and theory of individual and group tests of intelligence, personality, interests, and attitudes. Prerequisite: PSYC 2013.

PSYC4063 Psychology of Personality (SP) Development and nature of the normal personality. Prerequisite: PSYC 2003.

PSYC4073 Psychology of Learning (FA, SP, SU) Basic principles of learning showing how these principles are derived from experimental studies and how they are applied to explain more complex forms of behavior. Prerequisite: PSYC 2003.

PSYC4123 Perception (FA) Survey of principles and theories of sensation and perception. Content covers the classical senses with emphasis on integrating physical, physiological, and psychophysical evidence concerning the operation of sensory system in humans and other animals. Prerequisite: PSYC 2003.

PSYC4133 Behavior Modification (SP, Odd years) Introduction to the basic principles of behavior modification and contingency management. Presents procedures of conditioning, reinforcement, token economy and self-control of individuals and groups in a variety of settings with emphasis on discussions of research and ethics. Prerequisite: PSYC 2003.

PSYC4143 History and Systems of Psychology (FA) Examination of the concepts, methods, and systems which have contributed to the development of modern psychology. Prerequisite: PSYC 2003.

PSYC4183 Physiological Psychology (FA) Examination of the biological basis of behavior. Surveys neuroanatomy, neurophysiology, and neuropharmacology, and then investigates how the nervous system produces various types of behavior. Prerequisite: PSYC 2003.

PSYC4193 Comparative Psychology (SP) Similarities and differences in behavior across different species, including man. Special reference is made to principles concerning the organisms adjustment to its environment. Prerequisite: PSYC 2003.

PSYC5013 Advanced Developmental Psychology (SP) Critical examination of the research relevant to the psychological factors influencing the growth processes of the individual from birth to maturity. Prerequisite: PSYC 4073.

PSYC5023 Objective Personality and Neuropsychological Assessment (FA) Training in the theory, administration, scoring, and interpretation of individual and group objective personality tests and neuropsychological assessment tools. Prerequisite: PSYC 5043.

PSYC5033 Psychopathology (FA) Psychological and somatic factors contributing to pathological behavior. Interrelations of these factors will be analyzed in terms of how they lead to differential abnormal states. Prerequisite: PSYC 3023.

PSYC5043 Assessment of Intellectual and Cognitive Abilities (FA) Training in the theory, administration and interpretation of individual tests of intelligence and mental ability. Prerequisite: PSYC 4053.

PSYC5053 Advanced Personality Assessment (SP) Training in the theory, administration and interpretation of individual and group tests of personality, with emphasis upon the projective techniques. Prerequisite: PSYC 5043.

PSYC5063 Advanced Social Psychology (SP) Theory, methodology, and contemporary research in the major areas of social psychology. Topics include attitude theory and measurement, group processes, social and cultural factors.

PSYC507V Clinical Practicum I (1-3) (FA, SP) Provides supervised experience in the application of the more commonly used psychodiagnostic techniques and training and experience in psychotherapeutic techniques

with simple maladjustments and behavior problems. Level of complexity and responsibility to increase in 508V.

PSYC5113 Theories of Learning (FA) Major concepts in each of the important theories of learning. Prerequisite: PSYC 4073.

PSYC5123 Cognitive Psychology (SP, Even years) Contemporary theories and research on human information processing including topics such as memory, language, thinking, and problem solving.

PSYC5133 Inferential Statistics for Psychology (FA) Inferential statistics, including representative parametric tests of significance. Special emphasis on analysis of variance, covariance, and component variance estimators as applied to psychological research. (Same as STAT 5133) Prerequisite: PSYC 2013 or STAT 2013.

PSYC5143 Advanced Descriptive Statistics for Psychology (SP) Special correlation techniques followed by a survey of representative nonparametric tests of significance. Major emphasis on advanced analysis of variance theory and designs. (Same as STAT 5143) Prerequisite: PSYC 5133.

PSYC5163 Theories of Personality (SP) Major systematic positions, i.e., Freud, Lewin, Sullivan, Murray, Allport, etc., in the field of personality. Major emphasis is put on the various theoretical interpretations of human dynamics. Prerequisite: PSYC 4063.

PSYC523V Research Practicum (1-3) (FA, SP) Presentation, evaluation, and discussion of on-going research proposals. Required of all experimental graduate students in the first 2 years of their program.

PSYC5313 Clinical Research Methods (FA) Provides an overview of issues that must be faced in conducting research in clinical and other applied areas of psychology. General issues of empirical psychology research will be addressed followed by an application to psychopathology and psychology treatment. Content enables the student to become actively involved in research conducted by Psychology faculty.

PSYC600V Master's Thesis (1-6) (FA, SP, SU)

PSYC602V Seminar: Teaching Psychology (1-3) (FA, SP) Survey of the literature on teaching of psychology in college. Includes: planning the course, method, examining and advising students. Prerequisite: teaching assistant.

PSYC607V Clinical Practicum III (1-3) (FA, SP) Provides supervised experience in the application of the more complex and lesser known psychodiagnostic techniques and training and experience in psychotherapeutic techniques with the more severe functional disorders. Level of responsibility and independence to increase in 608V. Prerequisite: PSYC 507V and PSYC 508V.

PSYC608V Clinical Practicum IV (1-3) (FA, SP) Provides supervised experience in the application of the more complex and lesser known psychodiagnostic techniques and training and experience in psychotherapeutic techniques with the more severe functional disorders. Prerequisite: PSYC 507V and PSYC 508V.

PSYC609V Clinical Graduate Seminar (1-3) (FA, SP) Provides intensive coverage of specialized clinical topics. Open to all graduate students.

PSYC611V Individual Research (1-18) (FA, SP, SU)

PSYC6133 Advanced Physiological Psychology (FA) Examination of the biological basis of behavior, with emphasis on underlying neural mechanisms.

PSYC6163 Techniques of Psychotherapy (SP) Critical evaluation of the major theories and methods of psychotherapy. Prerequisite: PSYC 5033.

PSYC6173 Clinical Child Psychology (SP, Even years) Intensive study of psychopathology, assessment, and treatment of children. Broad survey with emphasis on theory, practice, and research from a developmental perspective. Prerequisite: PSYC 5033 and PSYC 5043 and PSYC 5053.

PSYC6183 Group Psychotherapy (FA, Even years) Examination of theory, research, and practice in group psychotherapy.

PSYC6203 Marital and Family Psychotherapy (FA, Odd years) Examination of theory, research, and practice in marital and family psychotherapy. Includes supervised clinical experiences.

PSYC6213 Behavior Therapy (FA, Even years) Provides clinical experience and training in the major behavior modification technique. Includes also a critical evaluation of theory, research, and issues in the area.

PSYC6223 Ethnic and Gender Influences on Clinical Practice (SP, Odd years) Study of ethnic and gender influences on psychopathology, assessment, treatment, and research in clinical psychology. Broad survey with an emphasis on clinical practice.

PSYC6233 Professional Issues (SP) Examination of major professional problems: includes ethics, research with human subjects, standard for providers of professional service, licensing laws, third party payments and services, expert witness.

PSYC6323 Seminar in Developmental Psychology (FA, Odd years) Discussion of selected topics in the area of human development. Emphasis will be on a review of current theory and empirical research. Topics selected for discussion could range from early development (child psychology), to later development (psychology of adulthood and aging-gerontology), to current attempts to integrate the field (life-span developmental psychology).

PSYC6353 Seminar in Learning/Memory/Cognition (SP, Odd years) Discussion of selected topics in learning, memory, or cognition. Emphasis on current theory and empirical research. Topics selected for discussion may be in the areas of learning, memory, problem solving, or language.

PSYC6373 Seminar in Personality and Social Psychology (FA) Discussion of selected topics in social psychology and personality. Current theoretical positions and recent research findings are emphasized. Topics selected for discussion will be in areas of intrapersonal processes, interpersonal processes, group processes or any of various areas of personality.

PSYC6413 Seminar in Physiological Psychology (SP, Odd years) Discussion of selected topics in physiological psychology. Emphasis will be on a review of current theory and empirical research. Each offering of the seminar will examine the biological basis of a specific aspect of behavior, utilizing both animal and human data.

PSYC698V Field Work (1-3) (FA, SP, SU) Provides academic credit for field work in multidisciplinary setting, involving supervised experiences in assessment and psychotherapy. May be repeated.

PSYC699V Clinical Psychology Internship (1-3) (FA, SP, SU) Supervised experience in a multidisciplinary setting of assessment and psychotherapy. May be repeated.

PSYC700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

PUBLIC ADMINISTRATION

(See Political Science)

PUBLIC POLICY (PUBP)

Will Miller
Chair of Studies
438 Old Main
575-6442

For faculty list, see http://policy.uark.edu/policyphd/

Degree Conferred: Ph.D. (PUBP)

This interdisciplinary policy program has a strong emphasis on public affairs and will train policy leaders to directly address the policy issues of the people of Arkansas, the region, and the nation. The program provides a vehicle for the consideration of policy issues by students, faculty, and the larger community. Therefore, students and faculty will participate in colloquia, projects, and research that contribute to successful public policy. Leadership and administrative skills are included in the course of study, along with a strong emphasis on policy analysis which recognizes the complex nature of policy problems. Such an analytical approach will prepare students for work with governmental, educational, professional and private sector experts who must cooperate in shaping public policy.

Areas of Concentration: Agricultural Policy, Community Development and Growth Management, Disability Policy, Environment, Family Policy, Health Policy, Public Policy Leadership, Recreation Policy, , Transportation Policy. (Other specialization options are possible. Contact us for more information.)

Prerequisites to Degree Program: Applicants must have a master's degree completed prior to beginning the doctoral program. The master's degree should be relevant to the policy area of their specialization. For example, students with a masters in geology might enter the agriculture policy specialization, but not the family policy specialization. If students enroll in classes designated to address deficiencies, they may enter a specialization outside of their masters area. These decisions will be made by the program faculty. An application should include identification of the applicant's objectives and supportive background information including three letters of recommendation evaluating the applicant's ability to successfully pursue a Ph.D. A GPA of at least a 3.00 on a 4-point scale for all graduate course work is required.

Requirements for the Doctor of Philosophy Degree: In addition to the general requirements of the Graduate School, the doctoral program consists of a minimum of 63 hours including:

22 Hours of Core requirements:
- PLSC 5163, Public Policy
- RSOC 5623, Community Development, OR SOCI 5133, Contemporary Community Systems
- Economics and Policy (three hours selected from approved courses)
- PUBP 6023, Law and Policy
- PUBP 6103, Policy and Leadership Seminar
- PUBP 6113, Agenda Setting and Policy Formation
- PUBP 6134, Capstone Seminar in Public Policy

11 hours of methods:
- SOCI 5213, Social Evaluation
- PUBP 6012, Legal Research
- EDFD 6533, Qualitative Methods
- Advanced Research Methods (selected from approved courses)

12 hours of electives in area of concentration

See program director for concentration requirements.

18 hours of Dissertation Research (PUBP 700V)

The following graduate courses, or their equivalent, in Research Statistics and Research Methods are considered prerequisites:

Social Research Methods (for example: Research Methods in Political Science, Research Methods in Education, Advanced Social Research in Sociology)

Statistics for Research (for example: Applied Data Analysis in Sociology, Inferential Statistics for Psychology, Statistical Methods in Statistics)

After completing approximately two years of graduate study, and at least one year before completing all other requirements, the prospective candidate must take candidacy examinations covering both core and specialization studies. The examinations will be both written and oral. All students must demonstrate a capacity for research by writing an original dissertation on a topic in their area of concentration. The student's final examination will be an oral defense of the dissertation.

COURSES: PUBLIC POLCY (PUBP)

PUBP6012 Legal Research (FA) This course examines primary and secondary level materials and techniques for effective legal research in print and electronic formats.
PUBP6023 Law and Public Policy (SP) This course focuses on the legal aspects of public policy, with emphasis on the regulatory process and its legal constraints. Also considered are the process of administrative decision making, judicial review, legislative oversight, and pubic access to government information.
PUBP6103 Policy Leadership Seminar (FA) This interdisciplinary seminar will explore the relationship between policy, public administration, and organizations in the community. Stakeholder groups will be considered as part of the newer approaches to practice-driven scholarship. The class will examine innovative approaches to decision making, strategic management and policy leadership in complex interorganizational and inter agency settings.
PUBP6113 Agenda Setting and Policy Formulation (SP) This course is a seminar on agenda and policy formation focusing on the classic theoretical and empirical literature. The course is designed to introduce graduate students to a variety of theories typologies, concepts, and ideas relating to the study of public policy.
PUBP612V Research Problems in Policy (1-6) (FA, SP, SU) May be repeated for 6 hours.
PUBP6134 Capstone Seminar in Public Policy (SP) This course is intended to integrate various policy interested in a specific community based project.
PUBP6301 Policy and Administrative Ethics (SP) This class will introduce the broad subject area of ethics in public administration and public policy.
PUBP700V Doctoral Dissertation (1-9) (IR) May be repeated for 18 hours. Prerequisite: candidacy.

RECREATION (RECR)

(See also Health Science, Kinesiology, Recreation, and Dance; Health Science; Kinesiology; and Physical Education)

Ro DiBrezzo
Department Head of Health Science, Kinesiology, Recreation, and Dance
306 HPER Building
575-2857

Dean Gorman
Coordinator of Graduate Studies
308W HPER Building
575-2890

Degrees Conferred: M.Ed., Ed.D. (RECR)

Areas of Concentration: recreation management, therapeutic recreation, and sports management.

Prerequisites to Degree Program: For acceptance to the master's degree program in recreation, the Program Area stipulates, in addition to the general requirements of the Graduate School, an undergraduate degree in recreation or in a field closely related to recreation. Additional prerequisites may be prescribed by Program Area.

Requirements for the Master of Education Degree: Candidates for the Master of Education degree in recreation must complete 27 semester hours of graduate work and a thesis (6 hours) or 33 semester hours without a thesis in the recreation management and therapeutic recreation concentrations. Candidates for a master's degree in sport management must complete 30 semester hours of graduate course work and a thesis or 36 semester hours without a thesis. In addition to the program requirements listed below, all candidates must successfully complete a written comprehensive examination.

Recreation Management: (33 hours)

Required Research Component (6 hours)
EDFD 5393, Applied Educational Statistics or
EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Courses (18 hours)
RECR 5813, Principles of Recreation
RECR 5843, Tourism
RECR 5853, The School and Community Recreation Program
RECR 5883, Recreation Service Promotion
HKRD 5873, Leadership in HKRD Services
HKRD 5893, Public & Private Finance in HKRD

Approved Electives (9 hours)
Must include RECR 605V (Independent Study-master's degree project) or RECR 600V (Master's Thesis)

Therapeutic Recreation: (33 hours)

Required Research Component (6 hours)
EDFD 5393, Applied Educational Statistics or
EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Courses (21 hours)
RECR 4093, Fundamentals of Therapeutic Recreation
RECR 5473, Techniques in Therapeutic Recreation
RECR 5483, Treatment Planning in Therapeutic Recreation
RECR 5493, Trends and Issues in Therapeutic, Recreation
RECR 5813, Principles of Recreation
RECR 5853, The School and Community Recreation Program
RECR 5893, Field Work in Recreation

Approved Electives (6 hours)
Must include RECR 605V (Independent Study-master's degree project) or RECR 600V (Master's Thesis)

Sports Management: (36 hours)

Required Research Component (6 hours)
EDFD 5393, Applied Educational Statistics or
EDFD 6403, Educational Statistics and Data Processing
HKRD 5353, Research in HKRD

Required Courses (24 hours)
RECR 5293, Sport Management
KINS 5753, Research in Sport Psychology or MGMT 5343
HKRD 5893, Public & Private Finance in HKRD
RECR 6533, Legal & Political Aspects
HKRD 5873, Leadership in HKRD Services
HKRD 5883, Sports Facilities Management or
RECR 4263, Aquatic Facilities Management
RECR 5813, Principles of Recreation
RECR 5883, Recreation Service Promotion
or MKTT 5103, Marketing Concepts

Approved Electives (6 hours)
RECR 574V, Internship, and
RECR 5853, The School & Community Recreation Program or
RECR 600V (Master's Thesis)

Area of Concentration: The program prepares qualified students for professional competence and service in area of recreation.

Prerequisites for Acceptance to the Ed.D. Program: In addition to meeting university requirements for admission to the Graduate School, all students seeking admission to the Ed.D. program must complete College of Education and Health Professions application procedures which includes a personal interview with members of the recreation faculty.

Requirements for the Doctor of Education Degree: This program is designed for those wishing to prepare for college, university or community college positions in recreation. The program must include the general degree requirements of the College of Education and Health Professions in addition to courses selected with the approval of the candidate's advisory committee.

COURSES: RECREATION (RECR)

RECR4093 Fundamentals of Therapeutic Recreation (FA) An introduction to the field of therapeutic recreation. This survey encompasses history, philosophy, programs, treatment, research, populations served, and professional aspects of therapeutic recreation practice. Requirements are different for graduate credit.
RECR4263 Aquatic Facilities Management (SP) Prepares students to organize, administer, and supervise aquatic facilities, staff, and programs in school, community, and camp settings.
RECR5003 Graduate Prerequisites (FA) Gives students entering a recreation degree program with no course background in recreation the necessary understanding of the recreation field. This course will not count toward a graduate degree in recreation.
RECR5213 Social Psychology of Recreation (IR) Application of social psychological theory to leisure, recreation, and travel behavior. Additional emphasis placed on the contribution of this theory to current practice in the recreation and tourism management field.
RECR5223 Applied Leisure Behavior (IR) Examines antecedents and consequences of leisure behavior from a social psychological perspective. Emphasis on assisting recreation managers to facilitate quality leisure experiences in their agency programs.
RECR5273 The Intramural Sports Program (FA) Historical development, aim and objectives, organization, administration, units of competition, program of activities, schedule making, scoring plans, rules and regulations, awards, and special administrative problems.
RECR5293 Sports Management (FA) (Formerly PHED 5293) Deals primarily with high school athletics and considers historical development, objectives, controlling agencies, eligibility and contest regulations, local organization and administration, staff program, finances, inventories, facilities and equipment, safety, legal aspects, awards, publicity, and public relations.
RECR5433 Medical Aspects of Disability (FA) Orientation to medical and medically related aspects of various disabling conditions with emphasis on the severely disabled. (Same as RHAB 5433)
RECR5453 Psychological Aspects of Disability (SP) Intensive study of the psychological aspects of adjustment to atypical physique and prolonged handicapping condition. (Same as RHAB 5453)
RECR5473 Techniques in Therapeutic Recreation (SU) Advances the student's understanding and application of therapeutic recreation techniques. It provides knowledge and the opportunity to apply skills for the student to gain competencies necessary for the provision of therapeutic recreation services. Prerequisite: RECR 4093.
RECR5483 Treatment Planning in Therapeutic (SP) Prepares students with the skills and understanding to apply the "TR Process" (assessment, planning, implementation, evaluation) in the development of individual client treatment plans in Therapeutic Recreation. Prerequisite: RECR 4093.
RECR5493 Trends and Issues in Therapeutic Recreation (SU) Advances the student's knowledge of issues and concerns that moderate therapeutic recreation services to the client. The student is expected to critically examine and discuss each issue in an effort to develop a sound, practical philosophy of therapeutic recreation. The ultimate goal is to prepare the student to enter the profession confident in his or her ability to provide exemplary services. Prerequisite: RECR 4093.
RECR560V Workshop (1-3) (IR)
RECR574V Internship (1-3) (IR)
RECR5813 Principles of Recreation (SU) Considers history, philosophy, current trends, basic issues, and fundamental principles of recreation. Using these principles as basic criteria, students make critical appraisals of current practices in organization and administration of recreation programs, program content, leadership methods, and evaluative procedures.
RECR5823 Outdoor Recreation Program (IR) Considers the values and scope of outdoor recreation programs. Attention is given to the influence of geographical factors, land use, standards, economics, and legislation on program planning and operation.
RECR5833 Recreation for Special Populations (SP, SU) Skills, knowledge, and concepts within recreation which are appropriate to planning and implementing recreation programs and services for the handicapped.
RECR5843 Tourism (FA) Explores major concepts of tourism to discover what makes tourism work, how tourism is organized, and its social and economic effects.
RECR5853 The School and Community Recreation Program (SP) Nature, background, significance, and trends in recreation in the school and community. Attention is given to departmental organization, administrative practices, program financing, personnel, safety, and legal aspects.
RECR5863 Operation of Commercial Recreation Enterprise (IR) Explores the operational requirements of commercial recreation enterprises. Students analyze the current status and future prospects of various recreational enterprises with respect to entry opportunities, operational and financial requirements, and market orientation.
RECR5883 Recreation Services Promotion (SP) Examines specific strategies for promoting recreation programs in the local community.
RECR5893 Field Work in Recreation (FA, SP, SU) Provides practical work experience in recreation programs and the opportunity to study special programs under the supervision of specialists.
RECR599V Seminar (1-3) (IR)
RECR600V Master's Thesis (1-3) (FA, SP, SU)
RECR605V Independent Study (1-3) (FA, SP, SU)
RECR612V Directed Reading in Recreation (1-3) (FA, SP, SU) Critical analysis of literature in the area of recreation.
RECR6533 Legal and Political Aspects (SP) An overview of major legislation affecting HKRD professions; how to operate within these laws; and methods for influencing new legislation. Also discusses political aspects of professions both outside and inside government agencies.
RECR674V Internship (1-3) (FA, SP, SU) Students will learn diverse teaching techniques and implement them in an on-going undergraduate recreation class serving as the teaching laboratory. The 'what "when" and "how" relative to integrating various teaching techniques with specific content areas in the class will be explored by both the student and the instructor.
RECR699V Seminar (1-3) (FA, SP, SU) Discussion of selected topics and review of current literature in the recreation field. Prerequisite: advanced graduate standing.

DEPARTMENT OF REHABILITATION EDUCATION AND RESEARCH (RHAB)

Jason Andrew
Department Head & Graduate Coordinator
319 West Avenue Annex
575-6412

• University Professors Bolton, Roessler
• Professors Anderson, Cook, Means, Watson
• Research Professors Boone, Schroedel
• Associate Professor Andrew • Research Assistant Professors Cochran, Geyer, Moore
• Instructor Lefebure, Musteen, Wheeler-Scruggs

Degrees Conferred:
M.S., Ph.D. in Rehabilitation (RHAB)
M.S. in Communication Disorders (CDIS)

(See Communication Disorders)

Master of Science in Rehabilitation

Areas of Concentration: vocational rehabilitation counseling, independent living rehabilitation counseling, and deafness rehabilitation counseling.

Prerequisites to the Degree Program: For acceptance into the master's degree program in Rehabilitation, the program stipulates, in addition to the general requirements of the Graduate School, an undergraduate degree in a social or behavioral science, or other related fields.

Requirements for the Master of Science Degree: Candidates for the master's degree in all three emphasis areas must complete 48 semester hours. A basic program of study is required. Students select electives with the permission of their adviser. A thesis may be included within any of the three emphases.

An emphasis in vocational rehabilitation counseling requires the following courses:

	HOURS
Rehabilitation Education courses:	39
Counselor Education:	6
Research Methods	3

An emphasis in independent living rehabilitation counseling requires the following courses:

Rehabilitation Education courses:	39
Counselor Education:	6
Research Methods:	3

An emphasis in deafness rehabilitation counseling requires the following courses:

Rehabilitation Education courses:	39
Counselor Education:	6
Research Methods:	3

The program in vocational rehabilitation (48 hours) stresses the skills of case management and vocational counseling with people who are disabled. The independent living program (48 hours) emphasizes case management and life planning for people with disabilities who may not be ready for vocational planning. The deafness rehabilitation counseling program (48 hours) emphasizes the skills of case management and vocational rehabilitation counseling with hearing-impaired persons. A student in the vocational rehabilitation track completes a practicum and internship in a vocational rehabilitation setting. A student in independent living completes a practicum and internship in an Independent Living Center or rehabilitation facility. A student in the deafness rehabilitation counseling track completes a practicum and internship in a vocational rehabilitation setting that serves people who are hearing-impaired.

Doctor of Philosophy

Prerequisites to the Degree Program: The applicant must have completed a master's degree or its equivalent in rehabilitation counseling or a closely related discipline and must meet the general admission requirements of the Graduate School. Applicants are encouraged to have had three years of successful experience related to the applicant's degree and career objectives. After gaining admission to the Graduate School, the applicant must be accepted by the Rehabilitation Education faculty. The review process consists of an interview and evaluation of the applicant's personal, social, and academic attributes, and includes three letters of reference. A prospective candidate must present a graduate GPA of 3.50 or better and a score of at least 1500 on three parts of the Graduate Record Examinations (GRE). Additional prerequisites may be prescribed after review of the applicant's materials.

Requirements for the Doctor of Philosophy Degree: A minimum of 60 semester hours, including 18 hours of dissertation, must be taken from the U of A after admission into the Ph.D. program. A doctoral advisory committee will be established by the student, in consultation with the program chair, during the first semester of enrollment. The nature of the student's program will vary depending on the student's career objectives. The degree program also requires successful completion of candidacy examinations, an acceptable doctoral dissertation, and oral defense of the dissertation. These last requirements are described elsewhere in this catalog.

Curriculum Core Requirements

RHAB 6213, Advanced Psychosocial Aspects of Disability
RHAB 6233, Employment Practices and Interventions
RHAB 6243, Advanced Rehabilitation Research
RHAB 699V, Seminar

Research and Statistical Requirements

A minimum of 15 hours approved by the doctoral advisory committee.

Field of Study

The student, in consultation with the doctoral advisory committee, will identify further course work comprising a field of study in rehabilitation.

COURSES: REHAB EDUC (RHAB)

RHAB5333 Counseling Persons Who Are Deaf or Hard of Hearing (FA, SP) Focuses on the application of basic principles underlying all forms of therapeutic interaction to professional counseling practices with individuals who are deaf or hard of hearing.

RHAB534V Supervised Rehabilitation Counseling (1-3) (FA, SP, SU) Gives the student practice in counseling under supervision with rehabilitation clients in selected settings and agencies.

RHAB5353 Hearing Impairment and Human Behavior (FA, SP) Focuses on an interdisciplinary study of the impact for profound hearing loss on the educational, psychological, social, and vocational functioning of persons who are deaf or hard of hearing.

RHAB5363 Employer Relations and Placement Practicum (FA, SP, SU) Students address the placement needs of rehabilitation agencies and their clients by implementing the RehabMark approach to employer development. Prerequisite: RHAB 5493.

RHAB5373 Multicultural/Gender Issues in Rehab (SU) This course examines multicultural and gender issues of importance to rehabilitation practice and research, including study of women and men with disabilities within different minority cultures. The course uses a power analysis and a minority model of disability as a basis for understanding the relationship between disability, gender, race and ethnicity.

RHAB5423 Vocational Rehabilitation Foundations (FA) Survey of the philosophy of vocational rehabilitation, including history and legislation.

RHAB5433 Medical Aspects of Disability (SP) Orientation to medical and medically related aspects of various disabling conditions with emphasis on the severely disabled. (Same as RECR 5433)

RHAB5443 Rehabilitation Case Management (SP) Counseling process in the rehabilitation setting. Focusing upon effective counseling strategies, representative cases, and effective case management methods.

RHAB5453 Psychological Aspects of Disability (SP) Intensive study of the psychological aspects of adjustment to atypical physique and prolonged handicapping condition. (Same as RECR 5453)

RHAB5463 Independent Living and Community Adjustment (FA) Study of the problems and practices involved in developing and maintaining independent living rehabilitation programs for people who are disabled physically, developmentally, and mentally.

RHAB5473 Placement of Persons with Disabilities (SU) Focuses on placement theory and practice as they apply to persons who experience disabilities. Special attention is given to RehabMark approach.

RHAB5483 Rehabilitation Counseling Research (FA) An indepth examination of rehabilitation research methodology and issues to prepare students to critically evaluate and use rehabilitation counseling research in their professional practice.

RHAB5493 Vocational Evaluation and Adjustment (SP) An indepth examination of theories and techniques related to: evaluation of vocational potential and work adjustment of people with disabilities.

RHAB560V Workshop (1-18) (FA, SP, SU)

RHAB568V Rehabilitation Research (3-6) (FA, SP, SU) Practical experience under the supervision of a faculty member in conducting rehabilitation research in a laboratory or field setting.

RHAB574V Internship (1-9) (FA, SP, SU)

RHAB599V Seminar (1-18) (FA, SP, SU)

RHAB600V Master's Thesis (1-6) (FA, SP, SU)

RHAB605V Independent Study (1-18) (FA, SP, SU)

RHAB6203 Disability Policy in the U.S. (FA) An analysis of public policy approaches to disability in the U.S. Examines the political and philosophical origins of disability policy; reviews major disability legislation and its effects on policy stakeholders; describes recent initiatives; analyzes evolution of disability policy within context of changing societal, economic, and political conditions. (Same as PLSC 5233)

RHAB6213 Advanced Psychosocial Aspects of Disability (FA) A theoretical and applied study of techniques that enable people to cope with 2 major life events: disability and unemployment.

RHAB6233 Employment Practices and Interventions (SP) An intensive study of the employment experiences of workers with disabilities with emphasis on disincentives and barriers to employment and interventions to enable people with disabilities to participate in employment. Prerequisite: RHAB 5493 or equivalent.

RHAB6243 Advanced Rehabilitation Research (SP) An advanced doctoral level course to facilitate the application of scientific values, research skills, and behavior to the generation of rehabilitation knowledge and problem solving.

RHAB625V Teaching Internship in Rehabilitation (1-18) (FA, SP, SU) Graduate teaching experience in the rehabilitation counseling curriculum. Under the supervision of a faculty member, will participate in the development of syllabi, course materials and examinations. Will team teach graduate rehabilitation courses with the faculty member. May be repeated for 18 hours.

RHAB6263 Practicum Supervision (SU) The study and practice of supervising master's rehabilitation counseling students in a clinical practicum setting. May be repeated for 3 hours. Prerequisite: doctoral standing.

RHAB6273 Administration & Supervision in Rehabilitation Settings (FA, Odd years) An examination of the basic knowledge and skills required to perform supervisory and administrative functions in rehabilitation settings. Includes a review of applicable laws, management theory, issues in human resource development, burnout, and exposure to organizational structure and function. Prerequisite: master's or doctoral standing.

RHAB675V Internship (1-18) (FA, SP, SU) Advanced supervised practice a rehabilitation setting.

RHAB699V Seminar (1-18) (FA, SP, SU) Discussion of pertinent topics and issues in the rehabilitation field. May be repeated for 18 hours. Prerequisite: advanced graduate standing.

RHAB700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

SECONDARY EDUCATION (SEED)

Priscilla Griffith
Department Head of Curriculum and Instruction
201 Graduate Education Building
575-4209

• Professors Besonen, Graening, Taylor, Totten • Associate Professors Digby, Farah, Wavering • Assistant Professor Morrow

Degrees Conferred: M.A.T., M.Ed. (SEED) Ed.S. (EDUC)

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree program. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Areas of Concentration for the M.A.T.: agricultural education, childhood education, middle-level education, physical education, secondary education, special education, and vocational education.

Prerequisites to the M.A.T. Degree Program: Students will be selected up to the maximum number designated for each cohort concentration. The total to be admitted to a cohort is fifty (50), contingent upon placement with partnership schools. Meeting or exceeding minimum requirements does not guarantee acceptance into the M.A.T. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all previous courses
3. Admission to the Graduate School
4. Admission to Teacher Education Program

The number admitted into specific teaching fields will be determined by both availability of internship spaces in the public schools which are participating in the partnership cohort agreements and job market potential.

5. Completion of the pre-education core with a minimum of "C" in all courses

6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Refer to list of steps and deadlines for acceptance into the Secondary Education M.A.T. program, available in the Boyer Center for Student Services.

Requirements for the Master of Arts in Teaching Degree Required M.A.T. Core: 10 hours

CIED 5022, Classroom Management Concepts for Teachers
CIED 5032, Curriculum Design Concepts for Teachers
CIED 5042, Reading and Writing Across the Curriculum
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Remaining Required for Concentration in Secondary Education: 23 hours

CIED 5201, Writing Across the Curriculum Practicum
CIED 5211, Reading Across the Curriculum Practicum
CIED 5221, Moral Dimension of Teaching
CIED 5232, Interdisciplinary Studies
CIED 5243, Special Methods of Instruction I
CIED 5253, Special Methods of Instruction II
CIED 5263, Measurement and Evaluation
CIED 5273, Research in Curriculum and Instruction
CIED 528V, Secondary Cohort Teaching Internship (6 hours)

Areas of Concentration for the M.Ed.: Candidates who receive the master's degree in secondary education must be eligible, upon completion of the degree requirements, to receive a standard certificate to teach in secondary schools. Areas of concentration are available in art, English, ESL (English as a second language), French, German, Spanish, biology, chemistry, physics, physical science, general science, earth and space science, speech, mathematics, social studies, journalism, or combinations of the above.

Prerequisites to the Master of Education Degree Program

Regular Admission

1. 2.70 grade-point average on all undergraduate courses
2. Submission of a Miller Analogies Test score
3. Graduate School admission and program area approval

Conditional Admission

1. 2.50 grade-point average on all undergraduate courses
2. Miller Analogies Test score of 50 or above
3. Graduate School admission and program area approval

Requirements for the Master of Education Degree: In addition to the program requirements listed below, all degree candidates must hold a valid secondary school teaching certificate and must successfully complete a written comprehensive examination and a second assessment.

M.Ed. Program Requirements

Required Core Courses: (9 semester hours-3 hours from each of the three areas below)

1. EDFD 5013, Research Methods in Education
   HKRD 5353, Research in HKRD
   EDFD 5393, Applied Educational Statistics
2. EDFD 5373, Psychological Foundations of Teaching and Learning
   EDFD 5473, Adolescent Psychology in Education
   EDFD 5573, Life-Span Human Development
3. EDFD 5303, Historical Foundations of Modern Education
   EDFD 5353, Philosophy of Education
   EDFD 5323, Global Education

Secondary Education Courses: (9 semester hours)

1. CIED 5623 The School Curriculum
2. Six semester hours selected with adviser consent (ESL endorsement candidates must complete CIED 528V, Internship and SEED 599V, Seminar: (ESL Integrated with Interdisciplinary Studies)

Area of Concentration: (15 semester hours must be selected from one of the following four options.)

Option 1 - Advanced Certification (mathematics, science, social studies, English, etc.) 15 hours of subject area courses in field of concentration.

Option 2 - Secondary Curriculum and Instruction

1. 9 additional hours in secondary education (SEED) courses
2. 6 hours selected through adviser consent.

Option 3 - Specialist Certification

15 hours leading to certification in reading, media, curriculum, supervision, or administration.

Option 4 - ESL Endorsement

1. Teacher certification in at least one field
2. CIED 5923, Second Languages Acquisition
   CIED 5933, Second Language Methodologies
   CIED 5943, Teaching People of Other Cultures
   CIED 5953, Second Language Assessment
3. SEED 599V
4. CIED 505, Seminar: Multicultural Issues

Requirements for the Educational Specialist Degree: This program is designed for curriculum and instruction directors, supervisors, department heads, and career teachers interested in secondary curriculum and instruction. Flexibility exists in planning the 60-hour minimum program to take into account the occupational needs and professional aspirations of each student. For instance, the continued study of secondary education may be combined with a component of educational technology, reading, or special education. In addition, each student must complete a research course (EDFD 5013, Research Methods in Education, or EDFD 5393, Applied Educational Statistics) and a project, and a minimum of nine graduate hours of cognate courses.

COURSES: SECONDARY ED (SEED)

SEED5153 Design and Preparation of Curriculum Materials (FA, SP, SU) Principles and procedures for the selection, development, and organization of curriculum materials including learning packages, simulation and gaming, units, courses of study or curriculum guides. Prerequisite: EDFD 5373 or equivalent.
SEED560V Workshop (1-18) (IR)
SEED599V Seminar (1-18) (IR)
SEED600V Master's Thesis (1-18) (IR)
SEED605V Independent Study (1-18) (FA, SP, SU)
SEED660V Workshop (1-18) (IR) Prerequisite: advanced graduate standing.
SEED674V Internship (1-18) (IR) Prerequisite: advanced graduate standing.
SEED680V Educational Specialist Project (1-6) (IR)
SEED699V Seminar (1-18) (FA, SP, SU)
SEED700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

SECONDARY MATHEMATICS

(See Mathematical Sciences)

DEPARTMENT OF SOCIOLOGY, SOCIAL WORK, AND CRIMINAL JUSTICE (SOCI)

William A. Schwab
Department Chair
211 Old Main
575-3205

• Professors Ferritor, King, Mangold, Morgan, Schwab • Associate Professors Koski, Patnoe, Schriver, Worden, Zajicek • Assistant Professors Adams, Holyfield, Taylor, Wiltfang • Visiting Assistant Professor Hall

Degree Conferred: M.A. in Sociology (SOCI)

Areas of Concentration: General sociology and rural sociology.

Prerequisites to Degree Program: Prior undergraduate work in social theory, research methods, statistics, and writing is considered necessary for successful performance at the graduate level. SOCI 3303 (or an approved equivalent), SOCI 3313, SOCI 4023 (or an approved equivalent), and SOCI 5053 (for students without a B.A. in sociology) are required to eliminate deficiencies. Undergraduate deficiencies must be removed by taking the appropriate undergraduate courses during the first twelve hours of graduate work or the first time the courses are offered.

Requirements for All Students Enrolled in the Graduate Program:

SOCI 5252, Classical Social Theory
SOCI 5262, Contemporary Social Theory
SOCI 5272, Theory Construction
SOCI 5311L, Applied Data Analysis Lab
SOCI 5313, Applied Data Analysis
SOCI 5013, Advanced Social Research
OR
RSOC 5463, Research Methodology in Social Science, for those enrolled in rural sociology concentration.
SOCI 5083, Methods of Field Research
Additional requirements for students enrolled in the Rural Sociology concentration:
RSOC 4623, Introduction to Community Development
RSOC 500V, Special Problems

See Human Environmental Sciences for program requirements for Rural Sociology concentration and Rural Sociology courses.

In addition to these core courses, the student must take sufficient hours of electives to reach 31 semester hours total. A maximum of three elective credit hours may be taken at the 4000 level without prior approval by the Graduate Committee. Students may apply three hours of independent study toward the degree provided that a research proposal is approved by the instructor prior to enrollment in the course. Except for courses in Rural Sociology, the student's adviser must authorize courses outside of the department. Except for rare circumstances, no more than three hours of credit outside of the department will count for the degree.

All students must submit a thesis that is approved by the student's thesis committee. In addition, all students must pass a comprehensive examination.

COURSES: SOCIOLOGY (SOCI)

SOCI4006 Internship in Sociology (FA, SP, SU) Supervised experience in municipal, county, or state agencies, or any other agency which is approved by the instructor. Prerequisite: SOCI 2013.

SOCI401V Special Topics in Sociology (1-6) (SP) Designed to cover specialized topics not usually presented indepth in regular courses. May be repeated for 6 hours. Prerequisite: SOCI 2013.

SOCI4023 Social Theory (FA) Nineteenth and 20th century sociological theory. Present-day currents in sociology are studied and related to political, philosophical, and psychological contemporary thought. Prerequisite: SOCI 2013 and junior standing.

SOCI403V Individual Study in Sociology (1-3) (FA, SP, SU) A reading and conference course on special topics in sociology for advanced students.

SOCI4043 Seminar in Sociology (SP) Prerequisite: senior standing.

SOCI4053 Political Sociology (IR) Analysis of political institutions and movements in relation to power, social class, ideology, and related variables. (Same as PLSC 4053)

SOCI4063 Organizations in Society (FA) An introduction to the study of organizations; provides a broad overview of issues and problems related to organizations in society. Prerequisite: SOCI 2013

SOCI4073 Peoples of East Africa (FA) The major institutional structures, dynamics and problems of the Africans, Asians, and Europeans of contemporary Uganda, Kenya, Tanzania, Somalia, Sudan, and Ethiopia. Prerequisite: SOCI 2013.

SOCI4083 Sociology of Medicine (IR) The sociological characteristics of sickness to include primitive medicine, the evolution of medicine, the organization of medical care, the relation between disease and the social environment, and the impact of ill health on society. Prerequisite: SOCI 2013.

SOCI4093 Sociology of Poverty (FA, Even years) The incidence and composition of poverty: educational and economic strategies for attacking poverty problems. Prerequisite: SOCI 2013.

SOCI4123 Black Ghetto (FA, SP) The origin, continuity, problems, and personalities, of the Black American community and its contributions to national and international life. Prerequisite: SOCI 2013.

SOCI4133 The Family (SP) A sociological analysis of the interactions and relationships which constitute the family as a group and as an institution, to include issues of gender and family diversity. Prerequisite: SOCI 2013 or SOCI 2033.

SOCI4163 Extremism (SP) Descriptions of, explanations for, religious cults and extremist political groups in America, including question(s) of appropriate response to them. Prerequisite: junior standing.

SOCI4203 Gender and Society (SP) Variations in gender roles, self-concepts and societal expectations, by generation, social class, and ethnic group; the present and changing statuses of men and women in society. Prerequisite: SOCI 2013 or HUMN 2003.

SOCI4213 Seminar in Violence (SP, Odd years) Explanations for, consequences of, and possible responses to individual, collective, and institutional violence; comparisons between socially acceptable and unacceptable forms of violence. Prerequisite: junior standing.

SOCI4603 Environmental Sociology (SP) The course provides a social perspective on environmental issues. It examines the linkage between society, ecological systems and the physical environment. It provides conceptual framework(s) for analyzing environmental issues, considers the role of humans in environmental issues, and enhances understanding the complexity of the relationship between societal organization and environmental change. (Same as RSOC 4603)

SOCI500V Advanced Problems in Sociology (1-6) (FA, SP, SU) Individual research on problems or problem areas. Prerequisite: graduate standing.

SOCI5013 Advanced Social Research (FA) Supervised field experience and other projects in social research. Prerequisite: SOCI 2013 and SOCI 3301L and SOCI 3303 and SOCI 3313 and SOCI 5313 and SOCI 5311L.

SOCI5023 Sociology of Education (FA, SP) Sociological theory and research relevant to education, the school as a social system, professionalization and career patterns of teachers, value conflicts, social stratification, role relationships, and other factors. Prerequisite: graduate standing.

SOCI5053 Advanced General Sociology (FA, SU) Advanced survey of the discipline and profession of sociology, including designation of the subject matter of sociology and relation to other disciplines, models of society and people, social units and social processes, methods, and sociology as a profession. Prerequisite: graduate standing.

SOCI5073 The Sociology of Law (IR) Sociological analysis of the role of law in American society, the creation of law, and the effects of law. Prerequisite: graduate standing.

SOCI5083 Methods of Field Research (SP) An introduction to research strategies including intensive interviewing, participant observational fieldwork, content analysis, historical analysis, and comparative research. Emphasis on the practical aspects of designing and executive research involving multiple methods of data gathering and analysis. Prerequisite: graduate standing.

SOCI5113 Seminar in Social Stratification (FA, Odd years) Major theories of stratification; types of stratification systems, comparisons of modern and traditional systems; emergent trends. Prerequisite: SOCI 4023 or SOCI 5053.

SOCI5133 Contemporary Community Systems (SP, Even years) Community human and physical systems and their relationships in a changing environment, quantitative evaluation of essential public services. Prerequisite: graduate standing.

SOCI5153 Sociological Perspective on Social Psychology (SP, Even years) Principles, concepts and methods used in analyzing effects of social structures and processes on the self and interaction. Topics include exchange theory, role analysis, symbolic interactionism, social construction of reality, socialization, interpersonal competence, organizational and leadership development, social dislocation, and stress. Prerequisite: graduate standing.

SOCI5173 Seminar in Social System Model Construction (IR) Methods and on-going research examples of data-based model construction for social system analysis. Emphasis on practical student projects in model construction and verification. Prerequisite: STAT 4003 or STAT 4033 or equivalent.

SOCI5213 Social Evaluation (IR) Examination of the process of social evaluation at the federal, state and local level, including topics in evaluation strategies, designs, problems encountered in field, and utilization of evaluation results, with special attention to the relationship between process and product evaluation in programs for families and young children. Prerequisite: SOCI 5013.

SOCI5233 Theories of Deviance (FA, Even years) A survey of major theories-classical, developmental, ecological, functionalist, conflict, subcultural, control, and phenomenological-explaining morally condemned differences in society. Particular emphasis is on practical implications of each perspective for policy and social control. Prerequisite: graduate standing.

SOCI5252 Classical Social Theory (FA) A survey of social theory up to the late 20th century. An introduction to the classical sociological themes that continue to inform research, analysis, and policy formation. Major issues will include the relationship between the individual and the community, and the sources of stability, conflict, and change. Prerequisite: graduate standing.

SOCI5262 Contemporary Social Theory (SP) Analysis of contemporary social theories & major theoretical debates. Emphasis is on critical evaluation & application of theoretical perspectives to current social issues affecting families and communities. Prerequisite: SOCI 5252.

SOCI5272 Theory Construction (SP) A survey of the main strategies of theory construction. Emphasis is on gaining practical experience in constructing theoretical models, generalizations and propositions. Relationships between theory construction & application will be underscored. Prerequisite: SOCI 5252.

SOCI5313 Applied Data Analysis (SP) Covers basic concepts and applications of the general linear model to a variety of sociological research issues and problems. Also provides an introduction to binary dependent and multivariate categorical data analysis for sociological research. Prerequisite: SOCI 3303 or an equivalent course in statistics. Familiarity with statistical computer programs is assumed.

SOCI5311L Applied Data Analysis Laboratory (SP) Provides instruction for data transformations required for the advanced statistical procedures used in the Statistical Package for the Social Sciences (SPSS). Also provides instruction in the use of advanced statistical procedures covered in SOCI 5313. Corequisite: SOCI 5313. Prerequisite: SOCI 3303 and SOCI 3301L.

SOCI5403 Survey Methods (SP, Odd years) Introduction to techniques of social survey research. Focuses on the development of survey research instruments and their construction. Measurement techniques are examined including issues of reliability and validity, scaling, and index construction. Elementary sampling considerations are discussed in the applied context of research. Techniques of file generation and manipulation relative to survey research are examined. Prerequisite: SOCI 3303 or equivalent.

SOCI5506 Research Internship (FA, SP) Supervised research experience in field setting. Prerequisite: graduate standing.

SOCI600V Master's Thesis (1-6) (FA, SP, SU)

SOCI6043 Public Policy, Children and Families (FA, SP, SU) The study of the impact of public policy on children and families, and the ways in which policies are created, modified, and changed. Includes the history of public policy concerning children and families.

COURSES: SOCIAL WORK (SCWK)

SCWK405V Special Topics in Social Work (1-6) (IR) Comprehensive study of various topics of importance in contemporary social welfare and social work practice. May be repeated. Prerequisite: junior standing.

SCWK4233 Seminar: Children and Family Services (FA, SP, SU) An examination of selected current issues in the field of children and family services through discussion, individual study, and interaction with professionals in the field.

SCWK4412 Field Seminar I (FA, SP, SU) An integrative seminar to assist students in comparing their practice experiences, integrating knowledge acquired in the classroom, and expanding knowledge beyond the scope of the practicum setting. Corequisite: SCWK 4434 and social work majors only.

SCWK4422 Field Seminar II (FA, SP, SU) An integrative seminar to assist students in comparing their practice experiences, integrating knowledge acquired in the classroom, and expanding knowledge beyond the scope of the practicum setting. Corequisite: SCWK 4444 (social work majors only).

SCWK4434 Social Work Internship I (FA, SP, SU) Arranged in connection with social service agencies. Credit is based on completion of all course objectives, including a minimum of 225 hours of field work under the supervision of a licensed social worker. Corequisite: SCWK 4412 (social work majors only). Prerequisite: SCWK 3073 and SCWK 3103 and SCWK 4333.

SCWK4444 Social Work Internship II (FA, SP, SU) Arranged in connection with social service agencies. Credit is based on completion of all course objectives, including a minimum of 225 hours of field work under the supervision of a licensed social worker. Corequisite: SCWK 4422 (social work majors only). Prerequisite: SCWK 4343 and SCWK 4733 and SCWK 4434 and SCWK 4432.

SCWK4633 Information Technology and the Human Services (FA, SP, SU) Overview of information technology and exposure to human service applications through lecture and lab experience. Prerequisite: SCWK 2133.

SPANISH

(See Foreign Languages)

SPECIAL EDUCATION (SPED)

Priscilla L. Griffith
Department Head of Curriculum and Instruction
201 Graduate Education Building
575-4209

• Associate Professor Gartin, Imbeau • Assistant Professor Stockall • Instructor Jordan

Degrees Conferred: M.A.T., M.Ed. (SPED)

The Master of Arts in Teaching (M.A.T.) degree program is a 33 semester hour degree program. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Prerequisites to the M.A.T. Degree Program: Students will be admitted up to the maximum number designated for each cohort area of emphasis. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all previous courses
3. Admission to the Graduate School
4. Admission to Teacher Education Program
5. Completion of the pre-education core with a minimum of "C" in all courses
6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Requirements for the Master of Arts in Teaching Degree

Required M.A.T. Core: 10 hours

CIED 5022, Classroom Management Concepts for Teachers
CIED 5032, Curriculum Design Concepts for Teachers
CIED 5042, Reading and Writing Across the Curriculum
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Required for Concentration in Special Education: 23 hours

CIED 5301L, Classroom Management Special Ed Laboratory
CIED 5311L, Curriculum Design Laboratory
CIED 5323, Transition Planning for Persons with Disabilities
CIED 5343, Applied Classroom Management
CIED 5353, Clinical Practicum (2 semesters; total of 6 hours)
CIED 5373, Advanced Methods for Teaching Students with Disabilities
CIED 528V, Internship (2 semesters; total of 6 hours)

Note: Due to certification changes in the state of Arkansas, new students are not being accepted into the M.A.T. program in Special Education.

M.Ed. Degree Program:

M.Ed. in special education is designed for those students who have special education teacher certification. Areas of concentration include mild disabilities, moderate-profound disabilities, serious emotional disturbance, gifted and talented, and reading specialist.

Admission to the M.Ed. program in special education is based on the general requirements of the Graduate School and submission of GRE or MAT scores prior to admission.

Requirements for the Master of Education Degree: All programs will require nine semester hours of core courses, three semester hours of cognate study, and 24 semester hours in special education. This course work is selected by students and faculty according to the needs of the student and certification requirements.

All programs require the completion of a minimum of 36 semester hours of work for the degree. Core course requirements can be satisfied by taking three hours from each of the areas listed below:

1. EDFD 5013, Research Methods in Education
   EDFD 5393, Applied Educational Statistics
2. EDFD 5373, Psychological Foundations of Teaching and Learning
   EDFD 5473, Adolescent Psychology in Education
   EDFD 5573, Life-Span Human Development
3. EDFD 5303, Historical Foundations of Modern Education
   EDFD 5323, Global Education
   EDFD 5353, Philosophy of Education

COURSES: SPECIAL EDUC (SPED)

SPED5103 Nature and Needs of the Moderately and Severely Retarded (FA, SP, SU) Educational, psychological, and social characteristics of children with moderate and severe mental retardation. Prerequisite: CIED 3023.

SPED532V Practicum in Special Education (1-6) (SU) Supervised field experiences in special education programs, schools, institutions, and other facilities for exceptional children. Prerequisite: acceptance into the M.A.T. program.

SPED560V Workshop (3-6) (FA, SP, SU)

SPED599V Seminar (1-18) (IR)

SPED600V Master's Thesis (1-3) (IR)

SPED605V Independent Study (1-18) (FA, SP, SU)

SPED699V Doctoral Seminar (1-3) (FA, SP, SU)

SPED700V Doctoral Dissertation (1-6) (FA, SP, SU) Prerequisite: candidacy.

STATISTICS (STAT)

William A. Feldman
Department Chair of Mathematical Studies
301 Science Engineering
575-3351

James E. Dunn
Chair of Studies
343 Science Engineering Center
575-5049

• Professors McNew, Tubbs • Associate Professors Gbur, Mauromoustakos, Meaux • Research Associate Thompson

Degree Conferred: M.S. (STAT)

The Master of Science degree program in statistics is intended to provide training for a professional career, principally in applied statistics. Toward this end, students with degrees other than in mathematics, as well as mathematics majors, are encouraged to apply for admission. Requirements for this degree may be satisfied by completing either the Statistics , Biometry, or Educational Statistics concentration. A suggested outline of course work may be obtained by contacting the Chair of Studies.

Requirements for the Master of Science Degree:

StatisticsConcentration: A candidate must complete a minimum of 30 hours of graduate credits which must include the following: STAT 4001L and 4003 or 4033, 4373, 5103, 5113, 5313, 5333, 5343, 5353, 5383 and 610V(3), in addition to MATH 4363. CSCI 1023/1021L, MATH 3083, and 4513 or 3423 (or their equivalent) are prerequisites and otherwise will be considered as deficiencies.

Biometry Concentration: A candidate must complete a minimum of 36 graduate credits which must include the following: STAT 4001L (or AGST 4011), 4003 (or AGST 4023), 4373 (or AGST 5014), 5103, 5113, 5313, 5333, and 5353, and AGST 5803, 5901, and 5913 MATH 2574 and 3083, or their equivalents, are prerequisites and otherwise will be considered as deficiencies.

Educational Statistics Concentration: A candidate must complete a minimum of 30 graduate credits which must include the following: STAT 4001L and 4003 (or EDFD 6403), 4373 (or EDFD 6413), 5103, 5113, 5313, 5333, and 5353, EDFD 6653, and 6 hours of EDFD 699V. Math 2574 and 3083, or their equivalents, are prerequisites and otherwise will be considered as deficiencies.

COURSES: STATISTICS (STAT)

STAT4003 Statistical Methods (FA, SP) Concepts of probability, sampling, regression, and experimental design. Corequisite: STAT 4001L. Prerequisite: MATH 2554.

STAT4001L Statistics Methods Laboratory (FA, SP) Emphasis on use of integrated statistical packages to complement statistical methodology being covered concurrently in STAT 4003. Corequisite: STAT 4003.

STAT4033 Nonparametric Statistical Methods (FA, SP, SU) Chi square tests. Kolmogorov-Smirnov goodness-of-fit tests, the Mann-Whitney and Wilcoxon 2-sampling tests, and various nonparametric measures of association. Prerequisite: MATH 1203 and junior standing.

STAT4043 Sampling Techniques (FA, SP, SU) Considers optimum techniques of simple random, stratified random, cluster, systematic and multistage sampling from finite populations subject to cost precision constraints. Wide range of application. Prerequisite: STAT 4003.

STAT4373 Experimental Design (SP) Topics in the design and analysis of planned experiments, including randomized block, Latin square, split plot, and BIB designs, use of fractional factorial replication, and repeated measures. Prerequisite: STAT 4003.

STAT5103 Theory of Statistics (FA) Fundamentals of probability, distribution theory, and random variables; expected value, moments, and generating functions; classic parametric families of distributions; central limit theorems, inequalities, and laws of large numbers. Prerequisite: MATH 2574.

STAT5113 Statistical Inference (SP) Statistical theory of estimation and testing hypothesis. Prerequisite: STAT 5103.

STAT5313 Regression Analysis I (SP) Matrix formulation of least squares and multiple regression models. Estimability and use of the generalized inverse in analysis of variance and covariance models of less than full rank. Computational aspects are emphasized.

STAT5322 Statistical Packages (FA, SP) Emphasis on use of digital computer to perform statistical data analysis through the use of integrated statistical packages. Instruction includes use of the SAS, SPSS, and BMD packages. Data management operations as well as formal statistical procedures such as ANOVA and regression are considered. Prerequisite: 3 hours of statistics.

STAT5333 Analysis of Categorical Responses (SP) A modern treatment, including extensions of classical probit analysis, multivariate logistic models, GSK model, log-linear models in analysis of multiway contingency tables, and nonmetric multidimensional scaling. Prerequisite: STAT 5313.

STAT5343 Stochastic Processes (FA, SP, SU) Markov chains, branching processes, birth-death processes, queuing theory with application. Prerequisite: STAT 5103.

STAT5353 Methods of Multivariate Analysis II (SP) Hotelling's T2 procedures, multivariate analysis of variance, discriminant function analysis and problems of classification, multidimensional scaling, and cluster analysis. Prerequisite: STAT 5313.

STAT5383 Time Series Analysis (FA, SP, SU) Identification, estimation and forecasting of time series. Spectral analysis including the fast Fourier transform computational aspects are emphasized. Prerequisite: STAT 5103.

STAT5413 Spatial Statistics (FA) Applied spatial statistics, covering univariate spatial modeling (kriging), multivariate spatial modeling (cokriging), methods of estimation and inference, and spatial sampling designs. Special relevance to remote sensing. Prerequisite: STAT 5313.

STAT610V Research in Statistics (1-4) (IR) Prerequisite: graduate standing.

STAT639V Topics in Statistics (1-3) (IR) Current state of the art on methodology in one of the topics: multivariate analysis, time series analysis, sequential analysis, factor analysis, or biostatistics. May be repeated.

TRANSLATION (TRAN)

John T. DuVal
Chair of Studies
333 Kimpel Hall
575-4301

See English and Foreign Language faculty lists.

DEGREE CONFERRED: M.F.A. (TRAN)

Candidate must demonstrate a satisfactory knowledge of two foreign languages.

The candidate must take a minimum of 60 graduate hours. A candidate who already holds a graduate degree may be able to complete the program with 42 hours; a candidate who does not have at least a minor in English may be required to take additional courses.

The following courses are required:

	HOURS
Translation and Workshop	15
Form and Theory of Translation OR Intro. to Comparative Literature	3
Fiction Writing Workshop	3
Form and Theory of Fiction	3
Poetry Writing Workshop	3
Form and Theory of Poetry	3

Twenty-four hours chosen from the literature of foreign languages, including at least 6 hours from each of the candidate's source languages. Teaching assistants may substitute ENGL 5003 (Composition Pedagogy) or FLAN 5063 (Teaching Foreign Languages at the College Level) for literature courses in a foreign language. Candidates without previous history of English or Latin courses must substitute ENGL 6193 or LATN 3063.

There will also be a thesis consisting of a translated collection of poems and/or stories or a translated novel, epic, or drama, as well as comprehensive written and oral examinations. A student must register for a minimum of six hours of M.F.A. thesis.

All degree requirements must be completed within six consecutive calendar years from the date of first enrollment.

Through an agreement with the Academic Common Market, residents of certain southern states may qualify for graduate enrollment in translation as in-state students for fee purposes. See page 163 for details.

Other Requirements: The policies and procedures approved for the Master of Arts and the Master of Science degrees also apply to the Master of Fine Arts degree. In addition to completing other requirements, the candidate must pass a comprehensive examination administered by the respective program area.

TRANSPORTATION AND LOGISTICS MANAGEMENT

(See Marketing and Transportation in the Graduate School of Business, page 40)

TRANSPORTATION ENGINEERING (TREG)

Robert P. Elliott
Department Head of Civil Engineering and Chair of Transportation Engineering Studies
4190 Bell Engineering Center
575-4954

• Professors Elliott • Associate Professors Gattis, Hall, Taylor, Wang • Assistant Professors Cole, Schwarz, Tooley

Degree Conferred: M.S.T.E. (TREG)

The Master of Science in Transportation Engineering program is designed to prepare graduates for careers with governmental transportation and planning agencies, transportation engineering consulting firms, and industrial transportation groups. The program is broad-based, built upon courses offered in the Departments of Civil Engineering, Industrial Engineering, and Marketing and Transportation. Students can focus their studies in one of four areas: transportation planning, facility design and construction, system operation, or industry logistics and operations.

The objective of the program is to develop transportation engineers with diverse backgrounds and perspectives. To this end, both engineering graduates and graduates of non-engineering programs are accepted into the MSTE program. The non-engineering graduates are required to complete a series of basic engineering courses to prepare them for graduate-level engineering studies and to assure that they are adequately prepared for entry-level positions in the transportation engineering field.

Areas of Concentration: transportation planning, facility design and construction, system operation, or industry logistics and operations.

Prerequisites to Degree Program: In addition to the general Graduate School requirements, applicants must meet the following specific requirements to be accepted into the MSTE program.

Applicants possessing an ABET Engineering Degree:

Applicants possessing a degree from a program accredited by the Engineering Accreditation Commissions of the Accreditation Board for Engineering and Technology (ABET) may be accepted unconditionally without prerequisite undergraduate course requirements. However, the student's major adviser and graduate study committee may identify areas of weakness that will require remedial study.

Applicants not possessing an ABET Engineering Degree:

Applicants not possessing a degree accredited by the Engineering Accreditation Commissions of ABET will be accepted into the program on the condition that they satisfactorily complete or demonstrate satisfactory completion of the following prerequisites:

Mathematics and Basic Science (32 hours minimum)

- At least 15 hours of mathematics beyond trigonometry, including differential and integral calculus and differential equations.
- General chemistry and calculus-based physics with a 2-semester sequence in at least one.

Humanities and Social Studies (16 hours minimum)

Engineering Topics (48 hours minimum)

- At least 16 semester hours must qualify as engineering design. Specific engineering topics that must be completed include:

TOPIC	TYPICAL CREDIT HOURS
Engineering statics	3
Dynamics	3
Mechanics of materials	3
Engineering economics	2
Computer applications	3
Basic transportation engineering	3

Other specific prerequisite engineering topics may be required depending on the graduate courses to be taken.

Credit for prerequisite courses taken at another institution is subject to the approval of the Chair of Transportation Engineering Studies. In particular, advanced (3000- and 4000-level at the University of Arkansas) engineering courses will normally not be accepted from institutions or degree programs that are not accredited by the Engineering Accreditation Commission of ABET.

Requirements for the Master of Science in Transportation Engineering Degree: In addition to the requirements of the Graduate School and the graduate faculty in Engineering, candidates for the MSTE degree must complete a course of study as prescribed below and as approved by the student graduate study committee. They must also demonstrate, to the satisfaction of their graduate study committee, that they possess those abilities and characteristics required of graduates from ABET accredited engineering programs. In consultation with the graduate study committee, the student may select either the thesis option or the non-thesis option.

Thesis Option: (30 hours)

24 hours of graduate-level coursework including:

- 12 hours of transportation engineering topics
- 3 hours of an approved course from Marketing and Transportation
- 3 hours of an approved course in statistics or quality management
- 6 hours of thesis research

Non-Thesis Option: (33 hours)

30 hours of graduate-level coursework including:

- 18 hours of transportation engineering topics
- 3 hours of an approved course from Marketing and Transportation
- 3 hours of an approved course in statistics or quality management
- 3 hours of independent study resulting in a written Master' Report

The following is a listing of courses that are acceptable transportation engineering topics for the MSTE degree (course descriptions are listed under Civil Engineering and Industrial Engineering):

- CVEG 4003, CAD and Visualization for Civil Structures
- CVEG 4403, Public Transportation
- CVEG 4413, Pavement Evaluation and Rehabilitation
- CVEG 4423, Geometric Design
- CVEG 4433, Transportation Pavements and Materials
- CVEG 5143, Transportation Soils Engineering
- CVEG 5343, Highway Bridges
- CVEG 5413, Transportation and Land Development
- CVEG 5423, Structural Design of Pavement Systems
- CVEG 5433, Traffic Engineering
- CVEG 5443, Transportation Planning Methods
- CVEG 5453, Asphalt Mix Design and Construction
- CVEG 5463, Transportation Network Modeling
- CVEG 5473, Transportation Systems Characteristics
- CVEG 5483, Transportation Management Systems

CVEG 5493, Infrastructure Management with GIS and DB
INEG 4323, Quality Engineering and Management
INEG 4333, Industrial Statistics
INEG 4723, Ergonomics
INEG 4733, Industrial Ergonomics
INEG 5333, Design of Industrial Experiments
INEG 5343, Advanced Quality Control Methods
INEG 5613, Optimization Theory I
INEG 5673, Graphs and Network Theory
INEG 5723, Advanced Man/Machine System Design
INEG 5823, Systems Simulation

Graduates must present a cumulative grade-point average of no less than 3.00 on all graduate courses and a cumulative grade-point average of no less than 2.70 on all courses that are prerequisites to acceptance into the program. They also must pass a final examination administered and graded by the candidate's major adviser and graduate study committee. The examination is to be comprehensive and will include either a defense of the candidate's thesis or a presentation and discussion of the candidate's Master's Report. The examination may be oral, written or a combination of both.

DEPARTMENT OF VOCATIONAL AND ADULT EDUCATION (VAED)

Barbara E. Hinton
Department Head
100 Graduate Education Building, 575-4758

B.R. Lyle
Graduate Coordinator

• Professors Dutton, Hinton, Thompson (C.) • Adjunct Professor Chen • Associate Professors Biggs, De Vore, Harvey, Lyle, Orr, Park • Adjunct Associate Professors Iley, Johnson, Marrs, Schwindt • Assistant Professor Thompson • Adjunct Assistant Professor Denton • Visiting Assistant Professors Brooks, Carder, Lofton • Instructor Wills • Adjunct Instructor Holt

Degrees Conferred:

M.A.T., M.Ed. In Vocational Education (VOED)
(See Vocational Education)
M.Ed. in Adult Education (ADED)
(See Adult Education)
Ed.S., Ed.D. (EDUC)

GRADUATE STUDIES

Graduate studies in the Department of Vocational and Adult Education at the University of Arkansas provide rigorous and intellectually stimulating programs compatible with graduate students' needs and goals and the requirements of vocational and adult education in the future. Individualized programs are designed to advance communications, critical thinking, human resource development, pedagogy/andragogy, problem solving, professional and personal development, research and scholarship, and technical skills.

Graduate programs are designed for entry into and advancement in professional careers in education, government, and the private sector. Graduate programs in vocational education and adult education studies serve professionals in a number of subject-matter specialties. By selecting appropriate course work and other experiences that strengthen a subject specialization, individuals prepare either for master teaching, or for supervisory and leading positions in public and private education, industry, and other agencies.

Specialty Studies

The Department of Vocational and Adult Education offers graduate work in the following areas, with (*) denoting state certification and (**) denoting state endorsement of the area:

Adult Education
Adult Education*
Adult Learners
Foundations/Philosophy
Literacy
Vocational Education
Applied Academics/Tech Prep**
Business*
Career Orientation**
Cooperative/Apprenticeship**
Foundations/Philosophy
Family and Consumer Sciences*
Industrial and Technical*
Vocational and Adult Education
Administration and Supervision**
Curriculum Design and Development
Human Resource Development
Research and Evaluation
Training and Development

Doctoral Studies

The doctorate represents significantly advanced work beyond the master's and/or specialist's level. Students desiring to work toward the doctoral degree should have the ability and desire to do quality research and be willing to seek innovative methods for providing leadership in vocational and adult education. This degree is not awarded simply on the basis of completion of minimum requirements.

Course work leading to the doctoral degree includes College of Education and Health Professions core, vocational and adult education core, specialty studies, substantive areas, research block and cognate areas. Students are encouraged to have at least one substantive area outside the Department of Vocational and Adult Education. A student becomes eligible to take the candidacy examination, consisting of both oral and written components, when most course work requirements have been completed. There are normally four steps required in the process leading to the doctoral degree: completion of all course work, the candidacy examination, completion of the dissertation, and the final examination.

The dissertation is a significant part of the doctoral program. The student and the major adviser, in consultation with the student's dissertation committee, are responsible for identifying and developing a tentative dissertation topic. This topic is then developed into a complete proposal and presented to the graduate committee. Once the proposal is accepted by the committee, the major adviser is responsible for direction of the research. The final examination, conducted by the graduate committee, is held no sooner than one academic year after the candidacy examination. This is an oral examination which is primarily focused on, but not limited to, the dissertation and related problems.

The graduate faculty in the Department offers the Doctor of Education (Ed.D) degree with a concentration in vocational or adult education. The Ed.D is designed for professionals who primarily synthesize and apply knowledge to problems of practice.

Course work taken beyond the master's degree (not to exceed 12 hours) in other departments or in other institutions prior to admittance may be accepted as part of the program of study at the discretion of the doctoral committee and with the approval of the Graduate Dean.

Requirements for the Educational Specialist Degree (Adult or Vocational Education Emphasis): The Ed.S. program contains a minimum of 30 semester hours of graduate work beyond the master's degree in a planned program. The program for each student must include the requirements listed below and any courses which are assessed for deficiencies. A master's degree and two years of experience related to the student's academic goal are prerequisites for entrance into the Educational Specialist degree program. After students have been admitted to the Graduate School, they may seek acceptance in adult education or vocational education. Departmental approval is based on the total profile of the applicant's educational background and career objectives. All candidates must have obtained a master's degree, have a cumulative grade-point average of at least 3.25, and submit a score on the Miller Analogies Test or on the Graduate Record

Examinations. Students with a grade-point average below 3.25 must submit a score of 55 or greater on the Miller Analogies Test or 1300 on the Graduate Record Examinations.

Educational Specialist Degree Requirements: 30 hours

1. College of Education and Health Professions Core (9 hours normally taken in the master's degree)
2. Vocational and Adult Education Core - 3 hours (VAED 6123 or 6213 or 6303)
3. Specialty Studies: 9-12 hours (Vocational and/or Adult Education)
4. Research: 6 hours (EDFD 5013 and EDFD 5393 or 6403)
5. Electives: 0-9 hours
6. Cognate (outside department): 9 hours
7. Project or Research: 1-6 hours

Requirements for the Doctor of Education Degree (Adult or Vocational Education Emphasis): A minimum of 96 semester hours of graduate study is required for the Ed.D. degree. Candidates for the doctoral degree will complete the requirements listed below plus any courses assessed for deficiencies. The Doctor of Education degree is offered in the general field of adult and vocational education. The nature of the program will vary, depending upon the field selected and the candidate's objective. A Residence Plan must be filed with a minimum of two semesters of residence required. With the help of the faculty advisers, doctoral students develop their individualized plan of study based on prior academic and professional experience, interests, and career objectives. All candidates must have obtained a master's degree, have a cumulative grade-point average of at least 3.50 and submit a score on the Miller Analogies Test or on the Graduate Record Examinations. Students with a grade-point average below 3.50 must submit a score of 55 or greater on the Miller Analogies Test or 1500 on the Graduate Record Examinations.

Doctor of Education Degree Requirements: 96 hours

1. College of Education and Health Professions Core (9 hours normally taken in the master's degree)
2. Vocational and Adult Education Core: 6 hours (VAED 6123 or 6213 or 6303)
3. Specialty Studies: 12-15 hours (Vocational and/or Adult Education)
4. Research: 9 hours(12 hours if EDFD 5013 has not been previously taken)
5. Electives: 0-6 hours
6. Cognate (outside department): 9 hours
7. Dissertation: 18 hours

COURSES: VOED/ADED (VAED)

VAED605V Independent Study (1-18) (IR)

VAED6113 Administrative Leadership for Vocational and Adult Education (FA, SP, SU) The function of administering vocational and adult education programming is addressed through the study of leadership style, function, and constituency.

VAED6123 Supervision in Vocational and Adult Education (SU) Principles and procedures of effective supervision; supervisory techniques and practices in facilitating and improving instructional programs and vocational and adult education.

VAED6133 Instructional Management in Vocational and Adult Education (FA, SP, SU) An analysis of designing and managing vocational and adult instructional programs with competency developing in directing curriculum development, improving instruction, formulating schedules, and installing competency-based education.

VAED6143 Student Services in Vocational and Adult Education (FA, SP, SU) A comprehensive course which includes managing student recruitment and admissions, providing systematic counseling and guidance services, maintaining overall school discipline, establishing a student placement service, and coordinating follow-up studies.

VAED6203 Instructional Materials in Vocational and Adult Education (FA, SP, SU) A comprehensive course designed to give students the opportunity to understand, prepare, and test materials leading toward excellence in instruction.

VAED6213 Curriculum Development in Vocational and Adult Education (FA, SP, SU) Determining principles of curriculum development, organizing curricula, and evaluating curriculum materials with special reference to vocational and adult education.

VAED6223 Advanced Methods in Vocational and Adult Education (FA, SP, SU) Improvement of instruction in vocational and adult education; particular emphasis upon formulating goals and objectives, structuring course of study, group and self-instructional methods, and evaluation of instruction.

VAED6303 Program Planning and Evaluation in Vocational and Adult Education (FA, SP, SU) Emphasis is given to understanding the theoretical foundation upon which the programming process is predicated, developing a theoretical mode, and acquiring the conceptual tools necessary for analyzing the programming process in any vocational or adult education organization.

VAED6403 Special Topics in Human Resource Development (FA, SP, SU) Designed for persons interested in exploring topics specific to vocational and adult education and human resource development in business and industry settings. Emphasis given to examining vocational and adult education research as applied in the public and private sector.

VAED6413 Developing Human Resources (FA, SP, SU) Practical and innovative strategies for making the optimum use of all employees in both private and public organizations.

VAED6423 Foundations of Human Resource Development (FA, SP, SU) An overview of human resource development (HRD) in organizations. Focus on the integration of individual development (training), career development, and organizational development. Topics include strategic planning for human resource development, needs assessment, program development, application of workplace learning theories, career development theories and methods, and application of organizational learning theories.

VAED6433 Facilitating Learning in the Workplace (FA, SP, SU) Facilitation of learning and performance improvement in the workplace. Application of instructional methods, informal and incidental learning strategies, coaching team building, and formal and informal on-the-job learning tactics. Focus on facilitating individual and group learning to affect organizational change.

VAED6443 Program Evaluation in Human Resource Development (SP, Even years) This course is a doctoral level course designed as an introduction to program evaluation in human resource development, training, and other HRD interventions. Emphasis is on (a) systems thinking applied to evaluation, (b) organizational development and program improvement, and (c) the integration of evaluation with strategic planning and performance improvement.

VAED6453 Training in the Workplace (FA, SP, SU) An introduction to and survey of current theories and practices in training in the workplace. Students are expected to explore selected interdisciplinary topics in areas such as adult education, vocational education, human resource development, organizational behavior, instructional technology, and economics as they relate to training in the workplace.

VAED6463 Training Needs Assessment (FA, SP, SU) Emphasis on analyzing, designing, developing, implementing, and evaluating training for business and industry.

VAED6503 Computer Technology in Vocational and Adult Education (FA, SP, SU) A study of computer technology as it relates to vocational and adult education. Brief introduction to computers, overview of hardware and software, hands-on learning of word processor, spreadsheet, data base, desktop publishing, telecommunication, graphics, CAD/CAM, and/or CAI/CMI packages are covered.

VAED6513 Continuing Education in Vocational and Adult Education (FA, SP, SU) Examination of the continuing education or public service functions of higher education institutions. Includes history, philosophy, and models for effective organization and dissemination systems.

VAED660V Workshop (1-18) (FA, SP, SU) May be repeated for 6 hours. Prerequisite: advanced graduate standing.

VAED674V Internship (1-18) (IR) Prerequisite: advanced graduate standing.

VAED680V Educational Specialist Project (1-6) (IR) An original project, research paper, or report required of all Ed.S. degree candidates. Prerequisite: admission into E.D.S. program.

VAED692V Directed Field Experience (1-18) (IR) Teaching and supervision in secondary or post-secondary schools or work in business or industry under guidance. For students who desire or need directed experience.

VAED699V Seminar (1-18) (IR)

VAED700V Doctoral Dissertation (1-18) (IR) Prerequisite: candidacy.

VOCATIONAL EDUCATION (VOED)

Barbara E. Hinton
Department Head of Vocational and Adult Education
100 Graduate Education Building
575-4758

B.R. Lyle
Graduate Coordinator

- Professors Biggs, Hinton, Thompson (C.)
- Associate Professors De Vore, Park
- Assistant Professors Orr, Thompson
- Visiting Assistant Professors Brooks, Carder
- Instructor Wills

Degrees Conferred:
M.A.T., M.Ed. (VOED)
Ed.S., Ed.D. (EDUC)

(See Vocational and Adult Education)

The Master of Arts in Teaching (M.A.T.) degree program is a 33-semester-hour degree program. The M.A.T. degree is the initial teaching certification program for students at the University of Arkansas.

Areas of Concentration for the M.A.T.: agricultural education, childhood education, middle-level education, physical education, secondary education, special education, and vocational education.

Prerequisites to the M.A.T. Degree Program: Students will be selected up to the maximum number designated for each cohort area of emphasis. Admission requirements for the M.A.T. degree program for initial certification are as follows:

1. Completion of an appropriate undergraduate degree program
2. Cumulative GPA of 2.70 in all courses completed prior to receipt of a bachelor's degree program7

3. Admission to the Graduate School
4. Admission to Teacher Education Program
5. Completion of the pre-education core with a minimum of "C" in all courses
6. Completion of all prerequisite courses in teaching field
7. Payment of internship fee

Requirements for the Master of Arts in Teaching Degree:

Required M.A.T. Core: 10 hours
CIED 5012, Measurement/Research/ Statistical Concepts for Teachers
CIED 5022, Classroom Management Concepts for Teachers
CIED 5042, Reading and Writing Across the Curriculum
CIED 5052, Seminar: Multicultural Issues
ETEC 5062, Teaching and Learning with Computer Based Technologies

Remaining Required for Concentration in Vocational Education: 23 hours
VOED 5004, Cohort Directed Field Experience
VOED 5016, Cohort Teaching Internship
VOED 5103, Teaching Strategies in Vocational Education
VOED 5113, Laboratory Management in Vocational Education
VOED 5191, Applied Research
VOED 599V, Seminar (3 hours)

Requirements for the Master of Education Degree (Vocational Education): The basic M.Ed. program is a 33-hour thesis or non-thesis non-certification program; however, certification and/or endorsement is available for public school teachers who meet the requirements. The student's program of study consists of the requirements listed below. All candidates who seek admission to this program must have a cumulative grade-point average of 2.70 or higher; demonstrate professional promise; and have obtained a bachelor's degree from an accredited institution.

Master of Education Degree Requirements - 33 hours
1. College of Education and Health Professions core: 9 hours
2. Vocational Education core: 3 hours (VOED 5823)
3. Specialty Studies: 12-15 hours (VOED and VAED)
4. Electives: 6-9 hours
5. Thesis: 6 hours (VOED 600V), optional

Requirements for the Educational Specialist and Doctor of Education Degrees: See Vocational and Adult Education (VAED).

COURSES: VOCATION ED (VOED)

VOED5004 Cohort Directed Field Experience (FA, SP, SU) A minimum of 8 weeks will be spent in an off-campus school, at which time the student will have an opportunity to observe 6 classroom teachers and to teach under supervision. Prerequisite: cohort year status.

VOED5016 Cohort Teaching Internship (FA, SP, SU) A minimum of 10 weeks will be spent in an off-campus school, at which time the intern will have an opportunity under supervision to observe, to teach, and to participate in other activities involving the school and the community. Prerequisite: cohort year status.

VOED5103 Teaching Strategies in Vocational Education **Methods and techniques in teaching vocational business, home economics, and industrial technology education.**

VOED5113 Laboratory Management in Vocational Education **Selection, design, and evaluation of laboratory experiences in vocational business, home economics, and industrial technology education.**

VOED5123 Current Design and Evaluation in Vocational Education (FA, SP, SU) Methods and techniques in developing, organizing, implementing, and evaluating programs in vocational education.

VOED5191 Applied Research (FA, SP, SU) Interpretation and evaluation of research in education for classroom utilization.

VOED5203 School-To-Workforce (FA, SP, SU) This course is designed to provide information on the role of the school in workforce development and to introduce a teacher to the skills desired in a seamless educational curriculum model.

VOED5233 Cooperative Education/Apprenticeship (FA, SP, SU) Planning, organizing, and directing cooperative and apprenticeship programs in vocational education.

VOED5253 Career Orientation Programs (FA, SP, SU) Provides a survey of types and sources of occupational information and methods of providing occupational-oriented experiences. Designed for teachers and future teachers of career orientation and is 1 of 2 required courses for vocational career orientation.

VOED5263 Applications in Career Orientation (FA, SP, SU) Student is introduced to various teaching methods and techniques of managing hands-on activities in career orientation class setting.

VOED5283 Special Programs in Vocational Education (FA, SP, SU) Consideration of procedures and problems in organizing and directing programs for youth and adults with special occupational education needs.

VOED5303 Trends and Issues in Business and Marketing Education (FA, SP, SU) Advances the student's knowledge of issues and concerns in planning for teaching in business and marketing education. Considers history, current trends, issues, program contents, and problems in business and marketing education.

VOED5313 Improvement of Instruction in Business and Marketing Education (FA, SP, SU) Studying ways that business or marketing education teachers can plan improvement of instruction mainly in the classroom of middle schools up through post-secondary schools.

VOED5403 Home Economics Education and Social Change (FA, SP, SU) Analysis of socio-economic problems which affect the family and their meaning, including consideration of the impact of technological development upon the home and its relationship to education in home economics.

VOED5413 Home Economics Occupational Programs (FA, SP, SU) Methods and materials in teaching home economics-related occupational courses and supervising occupational programs in secondary home economics.

VOED5503 Trends and Issues in Industrial and Technology Education (FA, SP, SU) A comprehensive technology education methods course pertaining to the teaching of communication, construction, manufacturing, and transportation.

VOED560V Workshop (1-18) (IR)

VOED574V Internship (1-18) (IR)

VOED5803 Contemporary Issues in Vocational Education (FA, SP, SU) A study of issues, problems, and challenges pertaining to the goals, objectives, organization, and curriculum of the vocational education program.

VOED5823 Foundations of Vocational Education (FA, SP, SU) Surveying and interpreting the origin, principles, and objectives of vocational education and its relationship to other educational programs. Required for all graduate degree candidates in vocational education.

VOED599V Seminar (1-18) (IR)

VOED600V Master's Thesis (1-18) (IR)

VOED700V Doctoral Dissertation (1-18) (FA, SP, SU) Prerequisite: candidacy.

The University

UNIVERSITY LIBRARIES

The library system of the University of Arkansas, Fayetteville, is composed of the David W. Mullins Library (the main research facility on campus) and five branch libraries: the Robert A. and Vivian Young Law Library, the Fine Arts Library, the Chemistry Library, the Physics Library, and the Learning Resources Center. The combined holdings of the libraries total over 1.5 million volumes of books and bound periodicals and over 1.8 million items in microform. The Libraries currently receive over 14,000 separate journal and serial publications by subscription, gift, and exchange. Other resources in the collections include approximately 650,000 government documents and several thousand maps, sound recordings, electronic databases, and manuscripts.

The University Libraries maintain a membership in the AMIGOS Bibliographic Council. Through OCLC, the Libraries share cataloging and interlibrary loan information with hundreds of libraries all over the world. The University of Arkansas Libraries' records are computerized on the InfoLinks library system. Holdings information may be accessed and searched from computers within the library, as well as from computers in homes, offices, or dorm rooms via modem or network connection. Other library catalogs, general and specialized indexing and abstracting databases, as well as many electronic full-text resources, may also be accessed through InfoLinks. The library's electronic home page (accessed through the University home page or directly at the library home page: *www.uark.edu/libinfo*) provides a wide variety of information services, including a "virtual reference desk."

Anyone with a University identification card may check out materials through the Libraries' convenient electronic check-out system. Students may also renew library materials and request holds electronically, without assistance, by using an assigned PIN number to access their circulation record. Loan periods are of various lengths as defined by circulation policies, which are available at the circulation desk or through the library home page. When faculty members or graduate students need items that are not available in the University Libraries, the interlibrary loan department provides the service of obtaining materials from other cooperating libraries.

The reference department assists users in locating and using library materials. Reference librarians are ready to help students use InfoLinks, the CD-ROM databases, and networked electronic resources. In addition, librarians offer orientation sessions and lectures on research methods to various classes in all the colleges on campus.

The government documents department in Mullins Library assists library users in finding government information. The library is a depository for publications of the federal government and the state of Arkansas. In addition, the library archives selected documents from other states, foreign countries, the United Nations, and other international organizations. Information is available in print, microform, or electronic formats. The periodicals room houses the microform collections, as well as equipment for photocopying microforms, and offers check-out of microfilm readers for personal use.

The special collections division in Mullins Library acquires and preserves material for research in the history, literature, and culture of Arkansas and surrounding regions. Through this division, scholars have access to a rich assortment of books, pamphlets, periodicals, photographs, maps, and manuscript collections to support their work. Among the more than 14,000 linear feet of manuscript collections available are the papers of J. William Fulbright, David H. Pryor, Dale Bumpers, Joe T. Robinson, Hattie Caraway, John Paul Hammerschmidt, Ed Bethune, Beryl Anthony, Brooks Hays, Orval Faubus, Jeff Davis, Daisy Bates, Edward Durell Stone, William Grant Still and Verna Arvey, John Gould Fletcher, Frederick Lee Liebolt, James M. Hanks, Ruth Polk Patterson, Vance Randolph, Elizabeth Huckaby, Alfred E. Smith, Mary D. Hudgins and records of organizations such as the Arkansas Council on Human Relations, the Council of International Exchange of Scholars, Peace Links, and Southland College. The division also houses the library's Rare Book Collection and other material.

For information concerning collections and services, as well as information on carrel space, group study rooms, seminar rooms, reserve policies, book and journal ordering procedures, or any other library matter, inquire at any library public service desk or at the director's office in Mullins Library.

QUALITY WRITING CENTER

The Quality Writing Center, established in 1984, provides an array of services to the University of Arkansas community. The Center's primary focus is one-on-one tutorials with students, faculty, and staff who want to consult about problems with writing projects such as freshman essays, technical reports, research papers, theses and dissertations, or articles for publication.

Writing Center faculty and graduate tutors work with writers on various matters, including brainstorming, organization, transitions, style formats, revision and editing strategies, usage, grammar, and punctuation. During these sessions, staff members ask and answer questions, give reader responses, and help writers take charge of their writing.

The Center also assists faculty in planning and evaluating writing assignments and provides clients with assignments, models, articles and books for them to consult. Besides working with faculty and the general student body, the Center also helps students for whom English is a second language (ESL); books and handouts are available to review standard English, and the staff works directly with a client to help her or him understand the subtleties of writing assignments. Another small group the Center helps is non-traditional students who may need to review writing and grammar skills and who may need personalized help to regain confidence in writing. For students writing editorials, petitions, resumes, job applications, or essays for schol-

arships and medical or graduate school, the Center offers tutorials and provides resource books.

The Center has a computer lab where writers may research the Internet, access library resources, write, and easily revise their work after tutorials. Patrons may also access our services through the World Wide Web at *http://www.uark.edu/write*.

COMPUTING FACILITIES AND RESOURCES

The department of computing services supports research, academic and administrative computing activity on the University of Arkansas campus. Computer operations are maintained to provide access to the computing facilities and resources 24 hours a day, seven days a week.

A variety of host systems and servers are available for academic use. The primary host for academic and research computing is comp.uark.edu, a Sun Ultra Enterprise 5000, using the Unix operating system Solaris. Comp supports statistical packages (SAS, SPSS, MATLAB), programming languages (C, C++, FORTRAN, Pascal), e-mail software (Pine), and other Internet applications.

All students are automatically assigned an account on comp.uark.edu. Additionally, web development is available from comp (personal home pages) or via other specialized servers for faculty/instructor or departmental publications. Access to some student information, course schedules, schedule of classes, etc., is available through these systems. Mainframe accounts are also available for special purposes, including batch processing. Operating systems include OS/390, and IBM's VM/ESA and MVS/ESA. Some departments participate in Computing Services' Novell file service, allowing them access to PC and Mac-based software through these servers. Additionally, the General Access Computer Labs maintain software via a networked server, allowing access to the same products in multiple labs. Faculty also may access the administrative computing systems for advising purposes, roster generation, and grade reporting. Host peripherals include disk storage, tape systems, and laser printing.

UARKnet, the campus's backbone network, is managed by Computing Services. This network enables communication among networks, computers, and servers on campus, as well as on the Internet. Virtually all departments, as well as all our labs, are connected to the campus network. Network access is also available via dial-up modem connections. Dial-up access requires an ID and password.

The General Access Computer Labs offer approximately 273 network-attached PCs and Macintoshes for use by University students, faculty, and staff. These labs are located in the Arkansas Union, the Administrative Services Building, the Business Administration Building, Mullins Library, and the Science Engineering Building. The labs offer day, evening, and weekend hours. The lab in the Administrative Services Building is open 24 hours a day, seven days a week, and the Arkansas Union Lab has extended open-hours. In addition to being Internet-connected, a wide variety of products are installed on these machines, including web applications (Netscape), word processors (MS Word and WordPerfect), databases (MS Access), and spreadsheet programs (MS Excel). Laser printing is available from all supported software. Scanning facilities are available in the Administrative Services Building and the Arkansas Union labs.

Computing Services offers free, non-credit short courses every month on a variety of computer and internet-based topics, including operating systems, e-mail, word processing, web-page development, Internet navigation, presentation tools, and many others.

For faculty, the MultiMedia Resource Center (MMRC) provides access to and training for computers and applications that can be used to develop programs and classroom presentations. In addition, the MMRC features a training lab, including internet-connected computers equipped for video conferencing and distance education applications. The MMRC also has presentation equipment available for checkout. The Research Data Center provides researchers with assistance in data design and analysis, and with support for other needs, such as providing billable staff support for projects.

Computing Services' main office is located in the Administrative Services Building (ADSB) at 155 Razorback Road. Computing Services specialists offer assistance with operating systems, application programs, virus scanning, modem communications, Internet tools, research projects, general troubleshooting, etc. For more information, call the Computing Services Help Desk at 575-2905, Monday-Friday from 7 a.m. to 8 p.m., or visit the Computing Services web site at *http://www.uark.edu/campus/compserv/*.

UNIVERSITY MUSEUM

The University Museum has been an integral part of the Fayetteville academic community since 1873. It develops and maintains extensive collections in archaeology, ethnography, geology, history, physical anthropology, botany and zoology. The entirety is generally available for exhibition, research, education, and/or loan. Many of the collections are more suitable as education and research tools rather than as exhibition materials. The museum exhibits only a small fraction of its collections at any one time. However, to increase exposure of its acquisitions, to provide variety and interest for viewers at various locations in the community, and to enhance area educational programs, the museum curates traveling and special exhibits with specimens not included in the regular exhibits.

The University Museum provides facilities and personnel support for specialization in anthropological museology within the MA degree program in anthropology. Appropriate museum collections are assembled on request for university classes in the natural and social sciences, art and classics. Museum specimens and their associated documentation are available for comparative and research purposes by university faculty, qualified students, and visiting scholars. Some museum staff members teach in the Department of Anthropology's museology program, have research or administrative responsibilities in their areas of specialization, or serve as guest lecturers in university courses.

The University Museum fulfills its public service and outreach mission with loans of collections to other institutions for exhibit. In addition, the museum provides consultation services to other museums, conservation advice to the public, interpretive tours for visiting groups, discovery classes for students, field trips and workshops for adults, interactive exhibits in a discovery room for school groups and general visitors, and public information services. The Museum building houses exhibits, exhibit preparation shops, the Discovery Room, educational areas and administrative offices. Registration and curatorial facilities are in Vol Walker Hall, where the study collections are kept. Research and special laboratories are located in University House on Lindell Street. The University Museum is a unit of the J. William Fulbright College of Arts and Sciences.

FEES AND OTHER COST

Educational expenses will vary according to a student's course of study, personal needs, and place of residence. All fees, charges, and costs quoted in this catalog are subject to change without notice.

Financial obligations to the University must be satisfied by the established deadlines. Payment may be made at the University Cashier's Office in the lobby of Silas H. Hunt Hall by cash, personal check, money order, certified check, or VISA, MasterCard, or Discover credit cards.

Acceptance of payment for fees does not imply academic acceptance to the University.

ESTIMATED NECESSARY EXPENSES PER SEMESTER

Estimates of necessary expenses for one semester of the 2000-2001 academic year for a typical graduate student taking nine credit hours per semester at the University of Arkansas:

	Graduate Resident
Tuition*	$1,692.00 ($188/hr)
University Fees(A)	169.00
COLG Fee(B)	74.00
SUBTOTAL	**$1,935.00**
Room and Board(C)	$2,196.00
TOTAL	**$4,131.00**

	Graduate Non-Resident
Tuition*	$4,500.00 ($444/hr)
University Fees(A)	169.00
COLG Fee(B)	74.00
SUBTOTAL	**$4,248.00**
Room and Board(C)	$2,196.00
TOTAL	**$6,444.00**

(A) University fees comprise the following:
Health, physical education and recreation fee (HPER) $18
and the following student-initiated and student-approved fees:
Student Activity fee (ACTY) 15
Student Health fee (HLTH).....54
(Calculated at $6/Credit Hour)
Media fee (SMED) 8
Arkansas Union fee (ARKU) 18
calculated at $2/credit hour
Fine Art Activity Fee.....3
Technology fee (TECH) 18
calculated at $2/credit hour
Transit fee (TRST) 8
Network and Data Fee.....27
(Calculated at $3/Credit Hour)

(B) Teaching Equipment and Laboratory Enhancement fee. The COLG fee is an averaged fee weighted by enrollment and by college. The fee provides and maintains state-of-the-art classroom and laboratory equipment.

(C) An average expense for living in a residence hall, double occupancy, with an unlimited meal plan. Actual room and board fees vary from $2,132 to $2,295 per semester.

Other variable costs per year
Books, supplies, and lab fees $ 500 to 1,000
Personal expenses and travel $1,000 to 2,000

When paying tuition, room and board, and associated fees, anticipated financial aid for a current semester may be deducted when adequate documentation is provided to the University Cashier's Office in Silas H. Hunt Hall. Adequate documentation includes, but is not limited to, award notices, guarantee notices, scholarship letters, and promissory notes.

The latest information regarding costs and other aspects of University life may be obtained by calling or writing the Office of Admissions, 200 Hunt Hall, University of Arkansas, Fayetteville, AR 72701. In Arkansas call 1-800-377-8632; from outside of Arkansas call (501) 575-5346.

TUITION FEES

Students classified as "in-state" for fee payment purposes are assessed tuition fees. Students classified as "out-of-state" for fee payment purposes are assessed additional tuition fees.

Official policies of the University of Arkansas Board of Trustees provide the basis for classifying students as either "in-state" or "out-of-state" for purposes of paying student fees. Board policies relating to residency status for fee payment purposes are included in Appendix A of this catalog. Out-of-state students who question their residency classification are encouraged to contact the Office of Admissions, 200 Silas H. Hunt Hall, for more information about residency classification review procedures.

Academic Year

Graduate students enrolling in nine hours are assessed tuition fees of $1,692 each semester. Students with out-of-state residency status are assessed additional tuition fees of $2,313. Graduate students enrolled in more than 13 hours per semester are not charged additional tution.

Summer Sessions

Graduate students are assessed tuition fees of $188 per credit hour. Graduate students with out-of-state residency status are assessed additional tuition fees of $257 per credit hour. There are no maximum costs for tuition fees during the semester.

TEACHING EQUIPMENT AND LABORATORY ENHANCEMENT FEES (COLG)

These fees provide and maintain state-of-the-art classroom equipment and instructional laboratory equipment. These fees vary, based upon the student's college of enrollment.

During the regular fall and spring academic semesters, these fees are assessed on a per credit hour basis up to a maximum amount. During the summer sessions, these fees are assessed on a per credit hour basis with no maximum amount.

College or School	Per Credit Hour Fee	Maximum
Agricultural, Food and Life Sciences	$ 6.65	$ 79.80
Architecture, School of	$7.00	$84.00
Arts and Sciences	$6.20	$74.40
Business Administration	$14.80	$177.60
Education and Health Professions	$5.60	$67.20
Engineering	$23.90	$286.80

STUDENT ACTIVITY FEE (ACTY)

University Programs

University Programs are funded by the student activity fee. Students are admitted free to numerous programs presented throughout the year, except major, promoted concerts.

- During the regular fall and spring academic semesters, students enrolled in six or more hours are assessed a $10 student activity fee each semester.
- During the summer sessions, students are assessed a $1 student activity fee for each credit hour.

Associated Student Government

During the regular fall and spring academic semesters, students enrolled in six or more hours are assessed a $5.00 student activity fee each semester. These funds are allocated to registered student organizations.

HEALTH, PHYSICAL EDUCATION, AND RECREATION FEE (HPER)

This is a Board of Trustees mandated fee supporting various physical education activities including intramural programs. Students are allowed access to gyms, the pool, fitness center, sauna, racquetball courts, and the indoor track.

Academic Year

During the regular fall and spring academic semesters, students enrolling in six or more hours are assessed an $18 HPER fee each semester.

Summer Sessions

During the summer sessions, students are assessed a HPER fee of $1.80 per credit hour.

STUDENT HEALTH FEE (HLTH)

The student health fee covers the cost of office visits by physicians, registered nurses, and other health professionals, medical evaluations, women's health visits, and counseling and psychological service visits. Other services covered

by the health fee include health promotion and education and 24-hour emergency care for counseling and psychological needs.

All Academic Semesters

During the regular fall, spring and summer academic semesters, students are assessed a $6 per credit hour student health fee.

MEDIA FEE (MEDA)

The University's student publications, specifically the Arkansas Traveler newspaper and the Razorback yearbook, are partially funded by the media fee. Students reserving a copy are provided with a Razorback yearbook.

Academic Year

During the regular fall and spring academic semesters, students enrolling in six or more hours are assessed an $8 media fee each semester.

ARKANSAS UNION FEE (ARKU)

The Arkansas Union fills the role of the community center of the campus. This fee supports the renovation, expansion and partial operational costs of the Union.

All Academic Semesters

During the regular fall, spring, and summer academic semesters, students are assessed a fee of $2 per credit hour.

TECHNOLOGY FEE (TECH)

This fee provides improvements in computer access for students: increasing dial-up ports, network access, lab support, training programs and improvements in computing facilities.

All Academic Semesters

During the regular fall, spring, and summer academic semesters, students are assessed a fee of $2 per credit hour.

TRANSIT FEE (TRST)

The transit fee helps fund the Razorback Bus Transit System, which services the campus and neighboring community year round.

All Academic Semesters

During the regular fall, spring, and summer academic semesters, students are assessed a flat fee of $8.

FINE ARTS ACTIVITY FEE (CACT)

This fee supports cultural events free of charge, or with minimal charge, to students. These events include presentations in music, theater, drama, opera, visual arts, creative writing (poetry and fiction), and public speaking. Most of the events are held on campus or at the Walton Arts Center. The fee makes cultural presentations possible and encourages students to take advantage of activities. Fulbright College allocates the proceeds of the fee to support cultural programming.

All Academic Semesters

During the regular fall, spring and summer academic semesters, students are assessed a flat fee of $3.

Network Infrastructure and Data Systems Fee (NETW)

The network infrastructure and data systems fee provides support for the development and operation of the campus network, including electronic equipment, servers with software and cabling. The network systems serve computer labs, academic and administrative buildings, residence halls and off-campus access facilities. data systems will enable web-based access to the University's information systems for students, faculty and staff. It also provides support for upgrades and replacement of the student information system.

All Academic Semesters

During the regular fall, spring and summer academic semesters, students are assessed a fee of $3.00 per credit hour.

SPECIAL COURSE AND PROGRAM FEES

Fifth-year student internship fee 200.00
(Education majors only)
Special Education Practicum.....25.00
(SPED 532V)

OTHER FEES

Graduate application
for admission fee.....$ 40.00
Late payment fee:
Last day to receive 100% fee
cancellation 25.00
December 1, May 1, and
July 31 for fall, spring and
summer, if payment has not
been made 50.00
International student (nonimmigrant)
application fee 50.00
International student service fee
Per semester.....40.00
Mandatory international student
health insurance per year.....547.00
Transcript Fee
Official Copy 5.00
Unofficial Copy 2.00
Graduate fee for master's or specialist
degree.....30.00
Graduation Fee for doctoral degree
and Ed.D.
Fall 2000 .....85.00
Spring/Summer 2001 .....85.00
Renewal of Graduation Status Fee 5.00
Parking Permit (per vehicle)
On campus 45.00
Off campus.....30.00
Commuter 20.00
Installment Payment Plan Fee.....25.00
Returned Check Fee.....20.00
I.D. Card fee
First card 15.00
Each replacement card 10.00
Residence Hall application fee for new students.....15.00
Withdrawal from University Fee 45.00

Testing Fees

All student testing fees will be based upon the actual cost of the test to be administered plus a standard handling charge not to exceed $15.00 to be added to the University's cost for each individual test administered.

FEE ADJUSTMENTS

Academic Year

Students who officially withdraw (dropping ALL classes that have not been completed up to that time) from the University of Arkansas during the regular fall or spring semesters receive a cancellation of fees as follows:

Official withdrawal on or before the fifth day
of classes 100%
Official withdrawal on the sixth day of
classes through the tenth day of
classes.....50%
Official withdrawal on the eleventh day of
classes and thereafter .....None

For students dropping a course(s) on or before the fifth day of classes, but who continue to be enrolled, 100% of the tuition, and associated fees will be canceled for each hour. No adjustments are made for courses dropped after the fifth day of classes.

Summer Sessions

Students who officially withdraw from a summer session or who drop classes in the summer receive a cancellation of fees as follows:

One- to four-week courses
Prior to start of classes 100%
After classes have begun.....None

Five- or six-week courses
Up to and including second day of classes 100%
Third through fifth day of classes.....50%
After fifth day of classes .....None
Seven to nine-week courses
Up to and including third day of classes 100%
Fourth through seventh day of classes 50%
After the seventh day of classes ....None
Ten- or twelve-week courses
Up to and including fifth day of classes 100%
Sixth through tenth day of classes 50%
After the tenth day of classes .....None

Billing Statements

Students who pre-register for a semester will be mailed an invoice approximately three weeks prior to the first day of classes. Invoices will be mailed to the student's permanent address unless a separate billing address has been filed with the Treasurer's Office.

It is the responsibility of the student to ensure a correct billing address on the Student Information System. The late fee will not be waived because an invoice was not received.

Late Fees

Students who register for the fall 2000 and spring 2001 semesters are required to pay all registration-related fees and charges by the posted payment deadline. Students who fail to pay all registration fees and charges or execute an installment payment plan by the deadline may be assessed a late payment fee equal to the outstanding balance, not to exceed $25.00.

Any student with an outstanding balance, to include registration-related fees and/or housing charges, at the end of a semester will be assessed a late payment fee equal to the outstanding balance, not to exceed $50.00.

Disbursement Of Refund Checks

Disbursement of refund checks due to overpayments by scholarships, loans, and/or grants will be mailed approximately one week prior to the start of classes. Checks will be mailed to the student's permanent address unless a check address has been established with the student accounts office.

Addresses

Students may create a billing address, which will be used specifically for billing statements, and a check address, which will be used specifically for overpayment checks. These addresses may be created in addition to the local and permanent addresses. If a billing or check address is not created, the default address will be the permanent address. The student may pick up an address form in the Student Accounts Office, Hunt Hall 101.

WAIVER OF TUITION AND FEES FOR SENIOR CITIZENS

Students who are 60 years of age or older and show proper proof of age may have tuition and fees waived. This waiver is limited to credit courses. Admission and enrollment under these conditions is open only on a "space available" basis in existing classes. Enrollment during Priority Registration periods is not allowed.

ROOM AND BOARD

University Housing

(Rates are subject to change)

Single freshmen under 21 years of age are required to live in University residence halls, fraternity or sorority houses, or with their parents, unless permission to live off campus has been obtained through the Department of Residence Life and Dining Services. Permission to reside off campus is granted on a semester basis and must be obtained prior to enrolling or prior to the semester in which off-campus residency is desired.

Costs of room and board in University residence halls for one semester during the 2000-01 academic year range from $2,132 to $2,295 for double occupancy rooms and with an unlimited meal plan. Single rooms are an additional $300 per semester and are available on a first-come, first-serve basis. There is an additional $25 activity fee for residence hall tenants.

Housing for married students, students with family status, nontraditional, graduate, and law students is limited and requires early application. Carlson Terrace two-bedroom unfurnished units with utilities paid cost $336 per month. Terrace Manor one-bedroom furnished units with utilities paid cost $390 per month (phone & cable not included).

Summer rates for room and board in University residence halls with unlimited meal plans for 2000 summer sessions are $18.30 per day for double-occupancy room and $22.10 per day for a single. Charges start on the requested move-in day and run through the date of check-out.

Specific questions concerning on-campus living may be directed to Residence Life and Dining Services (501-575-3951). Specific questions concerning sorority and fraternity living may be directed to the Office of Greek Affairs (501-575-4001).

Off-Campus Housing

Students eligible to live off campus may contact the Off-Campus Student Association for referral sources in room 517 of the Arkansas Union or by telephone at (501) 575-4001.

OTHER GENERAL FEE INFORMATION

Checks tendered to the University are deposited immediately. The University does not accept postdated checks. Checks returned for "insufficient funds" (NSF checks) are generally presented for payment a second time without notice to the check maker. Each check returned by a bank for any reason will be assessed a returned check fee. The University may, at its discretion, verify available bank funds for any checks written for payment of indebtedness before accepting a check.

The University of Arkansas reserves the right to withhold transcripts or priority registration privileges, to refuse registration, and to withhold diplomas for students or former students who have not fulfilled their financial obligations to the University. These services may also be denied students or former students who fail to comply with the rules governing the audit of student organization accounts or to return property entrusted to them.

Requests for exceptions to University's fees, charges, and refund policies must be made in writing. Instructions for submitting requests for exceptions to the various fees, charges, and refund policies of the University may be obtained as follows:

- For residence life and dining services fees, charges, and refund policies contact Residence Life and Dining, Attention: Assistant Director for Business, Hotz Hall, 9th floor.
- For parking services fees, charges, and refund policies contact: Parking and Transit, Administrative Services Building, 155 Razorback Road.
- For all other fees, charges, and refunds, contact the Treasurer's Office at 205 Administration Building, Attention: Treasurer.

Students receiving financial aid are strongly encouraged to have sufficient personal funds available to purchase books and to meet necessary expenses for at least one month at the start of school as some aid funds may not be available for disbursement.

Students are allowed to have automobiles at the University, although parking is quite limited. There is a parking permit and registration fee ranging from $20 to $135 for each vehicle, depending upon the parking option selected.

STUDENT AFFAIRS

The University has many programs and services geared to meet the various needs that students may have while they are on the Fayetteville campus. They range from the services that every student requires such as food, housing, and books, to the special needs of minority groups, the handicapped, or those with specific health or academic problems.

Services for International Students

The International Programs Office assists international students and scholars in meeting their personal and educational goals while at the University of Arkansas. The office provides an orientation for newly admitted international students each semester including the Peer Educator Program, which offers one-on-one contact and group activities for new international students during their first semester on campus in an effort to assist them in their adjustment to both the academic and local communities. The office also provides immigration advising, workshops, retreats, programs and a support network to help them make their time at the University productive and enjoyable. The office is located in Holcombe Hall, Room 104.

The office administers a Friendship Family Program, a Language Partner Program and a Speakers' Bureau. These programs give students the opportunity to learn about American life, while the campus and local communities also learn from the students about other cultures.

The International Students Organization is a cultural organization for American and international students. Its activities include annual projects such as the international bazaar, international banquet and welcome parties. In addition, there are presently 18 other cultural organizations which provide activities for specific country or cultural groups.

Services for International Sponsored Students

The International Agricultural Programs Office (IAP) offers a program to sponsors of international students to facilitate the admission, support, and return home of sponsored students. IAP, on request, will coordinate admission, third-party billing, housing, special orientation, academic monitoring and reporting, sponsors' campus consultations, and travel arrangements. Full program description and management fees are available through IAP, 300 Hotz Hall; telephone 501-575-6857 or FAX 501-575-5055.

Judicial Affairs

The judicial system at the University of Arkansas provides a just and equitable process for dealing with alleged infractions by students of University rules, regulations, and/or laws. This system is informal and non-adversarial, and is intended to be part of the total educative process of the University. Students are encouraged to make responsible decisions and to be accountable for their actions. Peer review is an integral part of the process, and membership on the judicial boards is comprised mostly of students.

The Judicial Coordinator, located in the Arkansas Union, advises students, faculty, and staff on matters related to student discipline and the judicial process.

For more information, see the Student Judicial System in the Catalog of Studies.

Multicultural Student Services

The Office of Multicultural Student Services, located in the Arkansas Union, provides counseling, assistance, and referral information to minority students. The office staff seeks to provide for the social, cultural, and academic presence of minority students, as well as faculty and staff members. The staff assists in the area of retention and programming in addition to serving as a liaison between the University and its academic departments for the implementation of effective and meaningful multicultural programs.

Services for Disabled Students

All services, programs, and activities at the University are accessible to students with disabilities. The Office for Campus Access, located in the Arkansas Union, offers specific information on disabilities, campus services, and related resources. Persons with disabilities are encouraged to attend new student orientation on the date recommended by the Office for Campus Access whenever possible.

Accommodations provided for students are based on individual need. For further information, call 575-3104.

Non-Traditional Students

Increasing numbers of older students and other "non-traditional" students are attending the University. A non-traditional student is defined as one who is 25 years of age or older, one who has interrupted his or her education, or one who has dependents. Recent figures indicate that more than twenty-six percent of UA students are over 25 years of age.

The Office for Non-Traditional Students (ONTS) is dedicated to providing support and services that meet the unique needs of non-traditional students. The office provides an information resource center, assistance with University procedures, referrals to campus and community resources, and workshops on topics of interest to non-traditional students. ONTS is located in the Arkansas Union, telephone 575-4200.

In addition, several Student Services areas are providing programs for older students. Orientation has two summer sessions for transfer and adult students. Carlson Terrace and Terrace Manor apartments provide low-cost housing for student families; special wings in residence halls are set aside for older students. Residence Dining Services offer individual meals or meal ticket programs for off-campus students. Career Services has extended office hours beyond 4:30 p.m. Counseling and Psychological Services (CAPS) provides a number of workshops and support groups designed to meet the special needs of adult learners. Information on child care services is available in the Office for Non-Traditional Students.

Services for Students with Children

There are two services administered by the School of Human Environmental Sciences that can benefit young children whose parents are students at the U of A.

The Infant Development Center, located at 536 N. Leverett, provides care for children age three months to three years. At least one parent must be a U of A student and priority is given to undergraduate parents, single parents, and families where both parents are students.

The Nursery School, located in the Home Economics Building, provides care for children from the entire community who are between the ages of three to five years.

Enrollment in each of the programs is limited and no provision is made to accommodate "drop-ins." For costs and other information, call the School of Human Environmental Sciences at 575-4306.

Special Projects and Services Group

The Special Projects and Services Group, in the Division of Student Services, provides a variety of services to students and potential students of the University. In addition to testing services, other programs include tutoring, academic monitoring and cultural enrichment activities. Several programs provide academic enrichment and career-directed activities for participants. The programs that make up this unit are Educational Talent Search, Multicultural Center, Testing Services, Student Support Services, Upward Bound, Veterans Upward Bound, Youth Opportunities Unlimited (Y.O.U.), and Y.O.U. Follow-up.

Career Services and Cooperative Education

The staff of the Career Services and Cooperative Education Office provides a comprehensive career development program designed to meet the needs of University students, alumni and faculty. This department provides individual and group career advising sessions; a one-hour credit career course; workshops on resume preparation, interviews,

and job search techniques; vocational testing; and a career library. Programs such as the Part-time Job Referral Service assist students in obtaining valuable work experience while they are in school. Cooperative Education enables students to earn academic credit while working full-time or part-time in a paid, professional position related to the student's chosen career field.

Approximately 100 companies and organizations visit the campus each year to interview graduating students for full-time positions. On-campus recruiting is scheduled through this office during the spring and fall semesters. In addition, students can make employment contacts at the annual Career and Summer Job Fairs. Alumni may also receive career assistance by subscribing to an Alumni Vacancy Listing and participating in a registry by which their résumé is referred to requesting employers. Publications are also available to students informing them about academic programs, careers, employment trends, and salary data.

For further information, contact Career Services and Cooperative Education, 411 Arkansas Union, telephone (501) 575-2805.

University Health Center

The University Health Center provides medical and mental health care, and is an advocate and resource for health promotion and education for students, spouses of students, and employees of the University of Arkansas, Fayetteville.

The Health Center offers the following services: outpatient medical care; an allergy clinic; international travel immunizations; a women's health clinic; sports medicine; Counseling and Psychological Services (CAPS); substance abuse prevention; health education classes and programs; clinical laboratory, x-ray, and pharmacy. The medical staff is comprised of six board-certified physicians. The professional staff also includes full-time nurse practitioners, registered nurses, licensed practical nurses; health educators, psychiatrists, a psychologist, counselors, psychiatric social workers, registered lab and x-ray technicians, and licensed pharmacists.

Students taking six hours of course credit or more in any semester pay a semester health fee which covers professional office visit charges. Students taking fewer than six hours a semester and student spouses may pay the health fee on an optional basis.

The University strongly recommends that all students have health insurance. A policy endorsed by the Associated Student Government is available to all students, student spouses, and their dependent children. Students may enroll in this plan at the Student Health Insurance Office at the University Health Center.

Residence Life and Dining Services

Residence Life and Dining Services serves the University of Arkansas and the community at large by providing quality living, dining, and learning programs in an ethical, professional, and financially responsible manner.

Each residence hall has a resident director or Head Resident Director chosen for their academic credentials, their interest in helping others, and their ability to work well with college students. Every area or floor is staffed by a resident assistant (RA), an upperclass student with training, experience, and knowledge to answer questions, and more importantly, help students find their own answers. Full time, master's degree level, residence life professionals called area coordinators live on campus with responsibility for three to six residence halls. Access to halls is provided by use of electronic card readers which allow only residents of that building and escorted guests to enter. Residential living includes several options: apartments for non-traditional students and families; and male, female, graduate, and co-ed residence halls. Rooms are available for visually and hearing impaired students as well as those who are physically challenged. Special interest living options are also available for students whose interests are: wellness, honors programs, global issues, architecture, and engineering areas.

The dining facilities provide a natural setting for socializing with friends and enjoying a wide variety of high quality, nutritious meals. Each of the three separate dining facilities located on campus is managed by a professional staff. Students living in residence halls have several meal plans available. All students living in the residence halls are required to have a meal plan except students living in Futrall or residing in summer school housing.

Arkansas Union

The Arkansas Union serves as the community center of the University for all members of the college family. The Union provides services, conveniences, and amenities to the campus community. Included in the Union are meeting, reception, and banquet rooms; lounges; a games room; a ballroom; a theater; a video theater; and an art gallery. Food service is provided at a cafeteria providing hot foods, Mexican specialties, baked goods, soups, and salads. Food is also provided by a snack bar, a pizza shop, a frozen yogurt and submarine sandwich shop, and by a complete catering operation. In addition, the Union houses the University Bookstore, a U.S. Post Office, a hair salon, the Quick Copy Center, the Razorback Shop, a computer store, and a travel agency. For reservations, catering information or additional information concerning Union services call 575-2146.

The Arkansas Union is the center of much student activity and is a perfect place to get involved on campus. The Campus Activities Center provides space and resources for student organizations. Many student events are provided by University Programs. These activities are planned, organized and presented almost totally by students. Typical programs are major concerts, symposium speakers, theater production, video programs, fine arts programs and art gallery exhibits.

The I.D. Card system, the Razorbuck$ program, and the Information Center are administered by the Arkansas Union. Offices for Student Services, Associated Student Government, Career Services, Campus Access and other programs are located in the Union.

Office for Student Involvement and Leadership

Office for Student Involvement and Leadership, located on the fifth floor of the Arkansas Union, is the central location for student organizations and activities for the University of Arkansas. The main goal for the Office for Student Involvement and Leadership is to provide all students with opportunities for involvement and to enable students to learn and practice leadership and management skills which complement classroom learning. Office for Student Involvement and Leadership is responsible for the oversight and administration of three major areas:

Registered Student Organizations

Student organizations, including living groups, must register annually with Campus Activities. This registration information is kept on file to assist students and administrators in learning more about particular organizations. Office for Student Involvement and Leadership provides student organizations with assistance and services to help them succeed, including the annual Student Involvement Fair, facility reservation and fund-raising forms, mailboxes, lockers and file space. Office for Student Involvement and Leadership also assists student organizations in event planning and presentation. Limited office space in the Arkansas Union is awarded annually to organizations by the Union Governing Board.

Leadership Development Office

The Leadership Development Office (LDO) is designed to help students gain and refine leadership and management skills. Several programs, developed by a Leadership Advisory Committee, are offered free of charge to students. Some require an application and/or a small fee. Programs include: Emerging Leaders, Leadership Conferences, the Leadership Resource Area, and the Student Development Transcript. The Volunteer Action Center, a part of the LDO, serves as a clearinghouse of

information to enable willing volunteers to provide service in the community. The staff is available to assist students in planning for training needs and to serve as presenters on various leadership topics.

University Programs

University Programs is a volunteer student organization responsible for coordinating and planning over 350 events annually for the campus community. Office for Student Involvement and Leadership staff serve as advisers to University Programs.

University Programs provides University of Arkansas students with cultural and educational experiences, entertainment and fun. Eight committees, committee chairpersons and two executive officers select, schedule and produce events such as concerts, movies, lectures, fine arts performances, gallery exhibits and much more for the U of A community. University Programs provides excellent opportunities to develop leadership skills and to gain practical experiences in a variety of areas.

Some annual events include Merchants' Fair, Welcome Week, Make a Difference Day, Academic Festival, and Who's Who Among Students in American Universities and Colleges.

STUDENT ACTIVITIES

An integral part of a University education is what can be gained through the worthwhile use of leisure time. Students are encouraged to balance involvement with their academic pursuits and interests. There are organizations, intramural sports, spectator sports, lectures, concerts, theatrical offerings, and other activities in which the student is encouraged to participate. The Northwest Arkansas area represents one of the prime recreational resources in the nation.

Organizations

Student organizations vary from those in professional fields to those representing extracurricular activities. They include religious organizations, community-oriented outreach programs, political interest groups, student publications, minority groups, departmental and professional organizations, social/fraternal organizations, and various honorary and recognition societies.

Fifteen or more religious organizations conduct programs of spiritual guidance and social activity at the University of Arkansas and many have student centers near campus.

Sports and Recreation

The University is a member of the Southeastern Conference with competition for men in football, basketball, cross-country, baseball, golf, swimming, tennis, and indoor and outdoor track. The winning tradition is a way of life for the nationally known Razorbacks. Intercollegiate athletic competition for women is available in basketball, golf, soccer, softball, volleyball, swimming, tennis, indoor and outdoor track, and cross country.

The intramural/recreational sports at the University of Arkansas involve more students than any other single program on the campus. The program consists of more than 100 activities including flag football, tennis, golf, badminton, table tennis, racquetball, bowling, swimming, frisbee, pool, cross-country, volleyball, basketball, handball, waterpolo, softball, track, horseshoes, and free-throw shooting.

The sports club program offers a variety of clubs. Some of these—soccer, rugby and judo, for instance—compete on an intercollegiate basis.

The Health, Physical Education, and Recreation (HPER) Building is the center of recreational activity on campus and contains four gyms, an indoor jogging track, two ultramodern dance studios, ten racquetball courts, a fitness-weight training center, and a uniquely-designed Olympic-sized swimming pool. The Outdoor Recreation Center, located on the first floor, provides camping and sporting equipment, trip and outdoor recreation information, and seminars on various outdoor sports and activities.

Other recreational facilities include an outdoor track; 18 outdoor tennis courts; multipurpose fields for softball, soccer, and football; and game rooms in the Union and residence halls.

Fayetteville is in the heart of one of the best outdoor recreational areas in the nation. The Buffalo National River, recreation areas in the Ozark National Forest, lakes, and state parks are all near Fayetteville, and they offer opportunities for canoeing, backpacking, hiking, fishing, camping, boating, and water skiing.

ANNUAL NOTICE OF STUDENT RIGHTS UNDER THE FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. They are as follows:

1. The right to inspect and review the student's education records, with some exceptions under the Act, within 45 days of the day the University receives a request for access. Students should submit to the Registrar's Office written requests that identify the record(s) they wish to inspect. The appendix to Universitywide Administrative Memorandum 515.1 provides a list of the types and locations of education records, the custodian of those records, and copying fees for each individual campus. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the student's education records that the student believes are inaccurate or misleading. Students should write the University official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. A sample form, which may be used in making this request, is contained in the appendix to Universitywide Administrative Memorandum 515.1.

   If the University decides not to amend the record as requested by the student, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing and is also contained in the Universitywide Administrative Memorandum 515.1
3. The right to withhold consent of disclosure of directory information, which information: the student's name; address; telephone number; date and place of birth; nationality; religious preference; major field of study; classification by year; number of hours in which enrolled and number completed; parent's or spouse's names and addresses; marital status; participation in officially recognized activities and sports; weight and height of members of athletic teams; dates of attendance including matriculation and withdrawal dates; degrees, scholarships, honors, and awards received, including type and date granted; most recent previous education agency or institution attended; and photograph.

   This information will be subject to public disclosure unless the student informs the Registrar's Office in writing each semester that he or she does not want his information designated as directory information. To prevent publication of name in the printed student directory, written notice must reach the Registrar's Office by August 31 of the Fall semester
4. The right to consent to disclosures of personally identifiable information con-

tained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.

One exception, which permits disclosure without consent, is disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent): a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an educational record to fulfill his or her professional responsibility.

Upon request, the University also discloses education records without consent to officials for another school in which a student seeks or intends to enroll.

5. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the university to comply with the requirements of FERPA. The name and address of the office that administers FERPA is:

   Family Policy Compliance Office
   U.S. Department of Education
   400 Maryland Avenue, SW
   Washington DC 20202-4605

6. Universitywide Administrative Memorandum 515.1 is available on request in the main library on campus.

PHOTOGRAPHIC AND VIDEO IMAGES

The University is proud to publish and display photographic and video images of UA students, their activities and accomplishments. Any student who does not wish to be represented in such photographic and video images by the University should notify the Office of the Registrar, Hunt 146, in writing before the end of the first week of classes each semester. The request will be honored for all publications and communications undertaken during the remainder of any semester when notification has been received.

ACADEMIC GRIEVANCE PROCEDURES FOR GRADUATE STUDENTS

The grievance procedure for graduate students is under revision. The new policy will be posted on the Web when it is available at http://pigtrail.uark.edu/catalogofstudies. Contact the Graduate School for more information.

RESEARCH MISCONDUCT POLICIES AND PROCEDURES

(Campus Council, May 4, 1989)

The University of Arkansas, Fayetteville, will pursue allegations of research misconduct. This pursuit will involve an inquiry of the allegation; an investigation if the inquiry indicates one is warranted; and imposition of sanctions if justified.

I. Definitions of Terms

Research misconduct means (1) fabrication, falsification, plagiarism, deception, or other practices which seriously deviate from those commonly accepted within the research community for proposing, conducting, or reporting the results of research; (2) material failure to comply with federal, state, or local requirements for protection of researchers, human subjects, the public, or laboratory animals, or other requirements which relate to the conduct of research; or (3) failure to meet other material legal requirements governing research. The term research misconduct as used in this document does include such improper activities as plagiarism of original literature and unauthorized copying of original artwork.

Inquiry means information gathering and initial fact-finding to determine whether an allegation or an apparent instance of research misconduct warrants an investigation.

Investigation means the formal examination and evaluation of all relevant facts to determine if research misconduct has occurred.

The appropriate office of research administration for the University of Arkansas, Fayetteville, is either the Office of Research and Sponsored Programs or the University of Arkansas Agricultural Experiment Station.

The date of initiation of the investigation is the day the Vice Chancellor for Academic Affairs is notified by the Chair of the Research Council that an investigation is necessary.

PROCESS FOR HANDLING RESEARCH MISCONDUCT

II. The Inquiry

A. An inquiry is not a formal hearing; it is designed to separate allegations deserving further investigation from frivolous, unjustified, or clearly mistaken allegations. The inquiry must result in either dismissal of the allegation or a call for an investigation. A suspected criminal act will result in the suspension of the inquiry until the appropriate law enforcement agency allows it to continue.

B. Allegations of research misconduct will be submitted to the Vice Chancellor for Academic Affairs and should be as specific and detailed as conditions permit. These allegations will normally be submitted in writing and signed by the complainant(s). When the complainant(s) elect(s) to not submit a signed document, the Vice Chancellor for Academic Affairs shall exercise discretion as to whether the information presented warrants an inquiry. Whenever possible, the Vice Chancellor shall counsel confidentially with the complainant(s).

C. The Vice Chancellor for Academic Affairs will immediately charge the Chair of the Research Council with conducting an inquiry into the allegation of research misconduct. The inquiry will then be conducted by the Research Council. All members of the Research Council must disclose potential conflicts of interest to the Council which will determine if conflicts exist and excuse member(s) from the inquiry as appropriate. In the event the Chair of the Research Council has possible conflicts of interest, the Research Council will elect a chair of the inquiry from its membership. That person will perform the same duties detailed for the Chair of the Research Council.

D. The inquiry must be initiated immediately upon receipt of an allegation of research misconduct by the Chair of the Research Council. The inquiry should be completed within 60 calendar days of the date the chair received the allegation. If circumstances clearly warrant a period of longer than 60 calendar days for the inquiry, the reasons for the extended time period shall be submitted in writing to the Vice Chancellor for Academic Affairs.

E. If criminal conduct is suspected, the appropriate authorities will be notified and the inquiry will be suspended until those authorities notify the Research Council that it is appropriate to reconvene the inquiry.

F. A written record must be kept of the inquiry including, if necessary, the reasons for an extended inquiry period. The safety and security of the record will be assured. The Chair of the Research Council will assume responsibility for the written record and other materials acquired during the progress of the inquiry. The materials and record will be kept in the Office of Research and Sponsored Programs. Members of the Research Council wishing to view those materials and/or the written record at times other than when the Council is

in session (for purposes of conducting the inquiry) must go to the Office of Research and Sponsored Programs. Only the Chair of the Research Council or those designated by the Chair may remove the record or materials and then only to bring to the Council for the purpose of conducting the inquiry.

G. During the inquiry stage, the University of Arkansas, Fayetteville, will protect the confidentiality of all parties involved to the maximum extent possible. Whether a case can be reviewed effectively without the involvement of the complainant(s) or the person(s) alleged to have committed research misconduct depends upon the nature of the allegation and the evidence available. Cases that depend specifically upon the observations or statements of the complainant(s) may not proceed without the involvement of that individual; other cases that rely on documentary evidence may permit the complainant(s) to remain anonymous. It may be necessary to involve the person(s) alleged to have been involved in research misconduct during the inquiry. In such instances the person(s) must be advised of the allegation of research misconduct.

H. The complainant(s) and the person(s) alleged to have been involved in research misconduct shall supply information and material as requested by the Research Council.

I. Both the complainant(s) and the person(s) charged in the allegation may seek legal counsel. Such counsel will not be allowed to be physically present during the inquiry sessions.

J. The completion of an inquiry is marked by the Research Council's determination of whether or not an investigation is warranted and the preparation of written documentation to summarize the process and conclusion of the inquiry. The Chair of the Research Council will provide a written report of the findings of the inquiry to the Vice Chancellor for Academic Affairs. If an investigation is needed, the Vice Chancellor for Academic Affairs will so notify in writing the complainant(s), the person(s) alleged to have been involved in research misconduct, the appropriate deans and chairs, the appropriate office of research administration, and all other persons who have been informed of the inquiry by the Research Council or University officials. If the allegations have been found to have no substance, the Vice Chancellor for Academic Affairs will immediately notify in writing only those persons informed of the inquiry and move to restore all situations to as close to their original conditions as possible.

K. If the need for an investigation is determined, any agency sponsoring the research will be immediately notified in writing by the appropriate office of research administration. The funding agency may be informed before the inquiry is complete if (1) the seriousness of alleged misconduct is apparent; (2) immediate health hazards are involved; (3) the funding agency's resources, reputation, or other interests need protecting; (4) federal action may be needed to protect the interests of a subject of the investigation or of others potentially affected; or (5) the community or the public should be informed. If at any point in an inquiry criminal violations become apparent, the funding agency will be notified within 24 hours if at all possible. The appropriate legal authorities will also be notified. The funding agency will be notified if the alleged research misconduct is going to be publicly announced by the University.

L. During the inquiry, interim administrative action may be taken by the Vice Chancellor for Academic Affairs when justified by the need to protect the health and safety of research subjects, the interests of students and colleagues, or the University. Administrative action may range from slight restrictions of activities, reassignment of activities, or suspension of all research activities of the person(s) alleged to have committed research misconduct. Interim administrative action will be taken in full awareness of how it might affect the individuals and the ongoing research within the institution.

III. Rights of the Complainant(s) and Persons Alleged to have Committed Research Misconduct

A. The proceedings of an inquiry, including the identity of the person(s) alleged to have committed research misconduct, will be held in strict confidence to protect the parties involved. If confidentiality is breached and the inquiry finds the allegation to be unsupported, the Vice Chancellor for Academic Affairs will take reasonable steps to minimize the damage to reputations which may result from inaccurate reports.

B. If an allegation is found to be unsupported but has been submitted in good faith, no further formal action will be taken other than the notifications required by paragraphII.J above. Allegations that have not been brought in good faith will lead to appropriate disciplinary action. Complainants should be aware from the outset that their confidentiality will not be maintained if the Research Council determines that the complaint is maliciously motivated and false. Such complaints will be considered to be research misconduct.

C. Where a complaint has been brought in good faith even if mistaken, the University will protect the complainant(s) against retaliation. Individuals engaging in acts of retaliation will be disciplined in accordance with the policies of the University of Arkansas, Fayetteville.

IV. The Investigation

A. The investigation's purpose is to explore further the allegations and determine whether research misconduct has been committed. The investigation will focus on accusations of research misconduct as defined previously and examine the factual materials of each case. The investigation will look carefully at the substance of the charges and examine all relevant evidence.

B. Once the Research Council has determined an investigation is required, it must be conducted. The person(s) alleged to have committed research misconduct does not have the right to challenge the initiation of the investigation.

C. The Research Council will determine the composition of the investigative committee and insure that it has the appropriate expertise to evaluate the evidence. It may be possible to utilize an existing committee, the presence of which may be mandated by federal agencies. For example, the Institutional Animal Care and Use Committee may be the appropriate body to investigate an allegation of mistreatment of laboratory animals. Members of the investigative committee may come from within or outside the University of Arkansas, Fayetteville. The Vice Chancellor for Academic Affairs will provide the necessary resources for outside experts when sufficient expertise does not exist at the University of Arkansas, Fayetteville. The minimum number of committee members will be five. The Research Council will appoint the chair of the investigative committee.

D. Conflicts of interest must be avoided. Those investigating the allegations will be selected and serve with full awareness of the closeness of their professional or personal affiliation with the complainant(s) and/or the person(s) alleged to have committed research misconduct. Any person appointed to an investigative committee who may have a conflict of interest in a given case must disclose potential conflicts to the Chair of the Research Council in writing within one week. The Research Council will determine if a conflict exists and rescind or continue the appointment as appropriate.

E. The Vice Chancellor for Academic Affairs and the person(s) alleged to have committed research misconduct will be notified in writing by the Chair of the Research Council as to the composition of the investigative committee.

F. The person(s) alleged to have committed research misconduct shall have an opportunity to respond to the allegation. Any initial response to the allegation should be received in writing by the Chair of the Research Council within 15 calendar days following the date of the notification letter described in IV.E. The Chair of the Research Council shall immediately forward any response to the chair of the investigative committee.

G. The investigation will be conducted as expeditiously as possible. In most cases the investigation will be completed within 120 calendar days of its initiation. In certain cases 120 days may be insufficient. In such cases the investigative committee will prepare an interim written report by the 120th calendar day after the initiation of the investigation to report progress to date, including reasons for the extra time required for the completion of the investigation. The chair of the investigative committee will distribute the report to the Vice Chancellor for Academic Affairs, the person(s) alleged to have committed research misconduct, the appropriate office of research administration, and the Chair of the Research Council.

H. Written records and all other materials pertinent to the investigation will be kept in the Office of Research and Sponsored Programs and will be available only to individual investigative committee members. Only the chair of the investigative committee or his/her designee may remove the records and material.

I. In the course of an investigation, additional information may emerge which justifies broadening the scope of the investigation beyond the initial allegations. Any such change in scope will be immediately reported in writing by the chair of the investigative committee to the Chair of the Research Council who will notify the Vice Chancellor for Academic Affairs, the complainant(s), the person(s) alleged to have committed research misconduct, and the appropriate office of research administration. The appropriate office of research administration will report significant new developments during the investigation to any sponsor(s) of the research as they occur.

J. The person(s) alleged to have committed research misconduct must provide information requested by the investigative committee. All involved parties are obligated to cooperate with the investigative committee in providing information relating to the case.

K. Throughout the investigation, the person(s) alleged to have committed research misconduct may, at the discretion of the investigative committee, be advised of the progress of the investigation and afforded the opportunity to respond and/or provide additional information to the investigative committee.

L. The person(s) alleged to have committed research misconduct will be allowed to submit written statements from others, to appear before the investigative committee and make an oral statement, and answer questions. In any appearance before the investigative committee, the person(s) alleged to have committed research misconduct may be accompanied by one person, who may be an attorney, to advise him/her. The adviser shall not address the investigative committee, speak on behalf of the person, or otherwise participate actively in the investigation. The person(s) alleged to have committed research misconduct may not be present during testimony of other witnesses or during committee deliberations, nor may he/she have access to committee records.

M. In the event criminal actions are discovered during the investigation, the proper authorities will be notified and the investigation will be suspended until those notified authorities approve its resumption.

N. During the investigation, interim administrative action may be taken by the Vice Chancellor for Academic Affairs when justified by the need to protect the health and safety of research subjects, the interests of students and colleagues, or the University. Administrative action may range from slight restrictions of activities, reassignment of activities, or suspension of all research activities of the person(s) alleged to have committed research misconduct. Interim administrative action will be taken in full awareness of how it might affect the individuals and the ongoing research within the institution.

O. The investigation into allegations of research misconduct may have any number of outcomes, including but not limited to a determination that:

1. no research misconduct or serious research error was committed;
2. no research misconduct was committed, but serious research errors were discovered in the course of the investigation; or
3. research misconduct was committed.

P. The investigative committee will provide a draft report to the Chair of the Research Council who will provide copies to the person(s) alleged to have committed research misconduct, the complainant(s), and the Vice Chancellor for Academic Affairs for their comment prior to preparation of the final written report. This report will contain the tentative findings of the investigative committee with its rationale. The investigative committee will allow at least 15 calendar days from the date the report is mailed to the Chair of the Research Council for input from any of the parties receiving the draft report before preparing the final report. Copies of the final report will be distributed by the Chair of the Research Council to the person(s) alleged to have committed research misconduct, the complainant(s), the Vice Chancellor for Academic Affairs, and the appropriate office of research administration.

V. Procedures Once the Investigation is Complete

A. The Research Council will conduct a substantive review of the findings and rationale of the investigative committee within 15 calendar days from the date of the final report of the committee. The Research Council may accept or modify the findings of the investigative committee and shall recommend corrective or disciplinary action, if appropriate. The Chair of the Research Council will report in writing the action of the Research Council to the Vice Chancellor for Academic Affairs, the chair of the investigative committee, the complainant(s), those alleged to have committed research misconduct, the appropriate office for research administration, and others notified of the investigation.

B. No Finding of Research Misconduct: When the investigation finds no support for allegations of research misconduct and the Research Council concurs, the University of Arkansas, Fayetteville, will retain the findings of the investigation in a confidential and secure file in the Office of Research and Sponsored Programs. The Chair of the Research Council will notify in writing all persons informed of the investigation that the allegation lacked substance. The Vice Chancellor for Academic Affairs will take reasonable steps to repair the reputations of those alleged to have committed research misconduct. If the allegations of research misconduct are found to be maliciously motivated, appropriate disciplinary actions will be taken against those responsible. If the allegations, however incorrect, are found to have been made in good faith, no disciplinary measures will be taken against the complainant(s), and efforts will be made to

prevent retaliatory actions. The Vice Chancellor for Academic Affairs will be responsible for these efforts.

C. Serious Research Error is Found: When serious research error has been found, the University of Arkansas, Fayetteville, will consider means of correcting the research record. When appropriate, this will involve written notification by the Chair of the Research Council to the editors of appropriate journals or other documents in which the errors were reported.

Sanctions may be imposed on those found to have committed serious research error. The Chair of the Research Council will notify all persons informed of the investigation that serious research error has occurred.

D. Finding of Research Misconduct: Sanctions will be imposed on those found to have committed research misconduct.

VI. Sanctions

A. The Vice Chancellor for Academic Affairs will review the corrective or disciplinary action recommended by the Research Council. The Vice Chancellor may implement the action as recommended or modify it as appropriate.

B. Institutional disciplinary actions include but are not limited to:
   1. special monitoring of future work,
   2. letter of reprimand,
   3. removal from a particular project,
   4. probation,
   5. suspension,
   6. salary reduction,
   7. rank reduction, and
   8. termination of employment.

C. The Vice Chancellor for Academic Affairs will report in writing the sanctions imposed to the person(s) found to have committed serious research error or misconduct, the complainant(s), the Chair of the Research Council, the appropriate deans and chairs, and the appropriate office of research administration which will notify the research sponsor(s).

VII. Brief Final Report

A. The Chair of the Research Council will prepare a brief final report which summarizes the findings of the investigative committee, the action of the Research Council, the sanctions imposed by the Vice Chancellor for Academic Affairs, and any additional related actions by the involved parties. When no finding of serious research error or misconduct is found, the Chair of the Research Council will distribute the final report only to those informed of the investigation. When serious error or misconduct has been found, the Chair of the Research Council will distribute the final report to those informed of the investigation and to appropriate individuals and agencies in the following list. The list is illustrative but not exhaustive of those who should receive the brief final report:
   1. sponsoring agencies, funding sources;
   2. co-authors, co-investigators, collaborators;
   3. editors of journals in which inappropriate research was published;
   4. state professional licensing boards;
   5. editors of journals or other publications, other institutions, sponsoring agencies, and funding sources with which the individual has been affiliated;
   6. professional societies;
   7. legal authorities if appropriate; and
   8. the person(s) who committed the research error or misconduct.

The original copy of the final report will be stored in the Office of Research and Sponsored Programs with the other documents pertaining to the investigation.

VIII.

The Vice Chancellor for Academic Affairs will issue a press release following a finding that serious research error or misconduct has occurred and sanctions have been imposed.

IX.

The University of Arkansas, Fayetteville, recognizes that sponsoring agencies can conduct their own inquiries and investigations and impose their own sanctions.

FINANCIAL ASSISTANCE

Graduate Assistantships

Graduate assistantships are available for qualified students in numerous fields, but must be obtained from the department in which the student is majoring or another appropriate unit. Recipients of these appointments serve as laboratory assistants, research assistants, readers, and teaching assistants, and are expected to carry a limited program of graduate studies. Graduate students appointed to the position of graduate assistant whose appointment is equal to or greater than twenty-five percent shall, in addition to any stipend, be classified as an in-state student for tuition and fee purposes. In addition, in-state registration fees are paid for appointees of fifty percent or more although tuition is normally not paid for audited courses. Successful applicants must have good academic records and adequate preparation for graduate study in their major field and regular admission to the Graduate School, and must maintain a cumulative grade point average of at least 2.85 on all work taken for graduate credit. If a student's cumulative gpa falls below 2.85 on 12 or more hours of graduate work, notification will be sent to the student and his/her department. If the cgpa is below 2.85 at the end of the next semester, the department will not be allowed to appoint the student to an assistantship until such time as his/her cgpa has been raised to the required level. Graduate students on 50% appointment must be enrolled in a minimum of 6 hours of graduate credit during the academic year, and a minimum of 3 hours during the summer. For the full policy, see the Graduate School Handbook, available on the Graduate School website at http://www.uark.edu/depts/gradinfo.

Application blanks may be obtained from the Dean of the Graduate School or from the head or chair of the department in which the student seeks to do the major work.

Information on other financial aid (loans and jobs) can be obtained at the Office of Scholarships and Financial Aid in Hunt Hall.

Graduate School Fellowships

Exceptionally promising new entrants to doctoral programs may be nominated at the time of application for University Doctoral Fellowships. These Fellowships are awarded competitively, and the stipend may be held in addition to a graduate assistantship.

Students on academic probation who have been in residence at UA Fayetteville for two or more semesters will not be allowed to receive a doctoral fellowship.

Students from under-represented minority groups who have been regularly accepted into a graduate degree program, are enrolled full time, and whose tuition and registration fees are not paid on their behalf from another source will be eligible for Benjamin Franklin Lever Minority Graduate Student Fellowships.

Contact the Graduate School, 119 Ozark Hall, 575-4401, for further information about the University Doctoral and the Benjamin Franklin Lever Fellowships.

Veterans Benefits

The University of Arkansas is approved by the Arkansas Department of Education for veterans and veterans' beneficiaries who are working toward a degree. Veterans of recent military service, service members, members of reserve units, and the dependents of certain other servicemen may be entitled to educational assistance payments under the following programs: Title 38, Chapter 30, Montgomery GI Bill for Veterans; Title 38, Chapter 32, Veterans Educational Assistance Program (VEAP); Title 38, Chapter 35, Survivors and Dependents Education; and Title 10, Chapter 106, Montgomery GI Bill for Selective Reserves.

All students must be working toward a degree and should follow the curriculum outline for their objectives, since only specific courses may be applied toward VA certification and graduation. Persons eligible for educational benefits should contact the Office of the Registrar for information.

University Centers and Research Units

Research programs are the means by which the University contributes to the generation as well as to the preservation and dissemination of knowledge. With nationally recognized programs in many areas and funding from government, industry, and other private sources for many, the research effort of the University is strong and diversified and provides special learning opportunities for students as discoveries are made.

In addition to the extensive work performed by faculty through individual and team efforts in academic departments, special programs of research are conducted by the University divisions described below.

AGRICULTURAL EXPERIMENT STATION

The Arkansas Agricultural Experiment Station, a statewide unit of the University of Arkansas Division of Agriculture, conducts scientific research on the dynamic biological, environmental, economic, and social systems involved in the production, processing, marketing, and utilization of food and fiber, community development and family studies.

The experiment station is one of the most comprehensive research organizations in Arkansas, with a faculty of approximately 200 doctoral-level scientists. It is an essential part of the research and technology infrastructure that supports Arkansas agriculture and the food and fiber sector.

Experiment station research is conducted in agricultural and environmental sciences, marketing and economics, social issues affecting families and rural communities, nutrition, microbiology, genetics, molecular biology, and other dynamic scientific disciplines.

Many experiment station scientists also are on the teaching faculty of the Dale Bumpers College of Agricultural, Food, and Life Sciences. The result is a wealth of opportunity for students to study and work with some of the nation's most respected scientists. Graduate students work on master's thesis and doctoral dissertation research projects as a part of a team of experiment station scientists in modern laboratories, greenhouses, and field research facilities.

Experiment station research is closely coordinated with the Arkansas Cooperative Extension Service. Together, they comprise the statewide UA Division of Agriculture.

The vice president for agriculture heads the division of agriculture for the University of Arkansas system. The associate vice president - extension provides leadership to the cooperative extension service and reports directly to the vice president for agriculture. The dean of the Dale Bumpers College of Agricultural, Food and Life Sciences also serves as the associate vice president - research and provides leadership for the agricultural experiment station. The associate vice president - research reports directly to the vice president for agriculture for agricultural research programs and as the dean to the vice chancellor for academic affairs for instructional programs. The associate director of the experiment station also serves as an associate dean in the college and the associate dean serves as an associate director in the experiment station, respectively.

The mission of the Division of Agriculture, through the combined efforts of the Experiment Station and Extension Service, is to provide new knowledge to strengthen the state's food and fiber sector; assure a safe food supply; conserve natural resources and protect the environment; and assist in the economic and social development of communities, families, and individuals, particularly in the rural areas of the state.

ARKANSAS ARCHEOLOGICAL SURVEY

The Arkansas Archeological Survey is a research and public service organization charged by the legislature with statewide responsibility for conserving and investigating the state's archeological heritage and with making information on this rich heritage available to all. To this end it has an extensive publication and public relations program. With a staff of 40 (approximately half of whom are professional archeologists), it is recognized as one of the most effective state-supported archeological research organizations in the country. The survey's coordinating office on the Fayetteville campus consists of the director, the state archeologist, computer services, editorial, graphics, and other support staff. There are also several research archeologists who carry out archeological investigations under contracts as required by law to protect the state's archeological resources. There is a station archeologist at each of 10 research stations around the state, including the Fayetteville campus, who are available for graduate guidance. The survey works closely with the University's department of anthropology in training students. It cooperates with the state historic preservation officer and other state and federal agencies and trains and assists citizen groups interested in archeological conservation. The Arkansas Archeological Survey is a separate University-wide administrative unit with the director responsible to the Board of Trustees through the system president.

ARKANSAS CENTER FOR TECHNOLOGY TRANSFER

The Arkansas Center for Technology Transfer (ACTT), founded in 1985, is the industrial outreach arm of the College of Engineering. ACTT coordinates technical efforts and forms working partnerships with Arkansas industries to improve processes and help solve technical problems. The mission of ACTT is to "increase the economic well-being of the citizens of Arkansas by providing technical assistance and training to industries of Arkansas." The specialized units described below conduct its work.

The Advanced Manufacturing Technology Laboratory works hand-in-hand with industry to resolve problems to strengthen their competitive posture. The laboratory has experience in productivity improvement, process improvement, product development, quality control, and structural analysis. Utilizing advanced engineering tools such as finite element analysis, computer aided design, and computer modeling/simulation,

the Manufacturing Technology Lab can tackle a broad range of industrial issues.

The Applied Electronic Systems Design Laboratory employs a multi-disciplinary approach to a broad base of applied and basic research topics. The laboratory's mission is to "increase the body of knowledge associated with electronic and optical systems, image processing, and digital design, through the development of advanced electronic and electro-optical systems and theories."

The Industrial Training and Multi-Media Development Laboratory specializes in the design and development of computer-based training programs for industry. Computer Based Training (CBT) combines sound, still pictures, video, animation, and graphics in a variety of customized, interactive, instructional programs. The training lab is staffed by skilled instructional designers, programmers, and graphic artists, and routinely collaborates with University faculty, and private sector experts to meet industries' changing technical training needs.

Engineering Extension Service provides short-term assistance to Arkansas businesses, industries, or local governments in seeking solutions to technical, quality, or safety problems. A full-time staff of professionals with extensive industrial experience is available to help clients throughout the entire state.

Contact information: Arkansas Center for Technology Transfer, Engineering Research Center, Research Center Blvd., Fayetteville, AR 72701. Arkansas Watts 1-800-334-3571 or (501) 575-3747, Internet: http://actt.engr.uark.edu.

ARKANSAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

The Coop Unit is a cooperative venture among the U.S. Geological Survey, Arkansas Game and Fish Commission, the University of Arkansas, and the Wildlife Management Institute. The Arkansas Coop Unit was established in 1988 and is part of a network of cooperative fish and wildlife research units that exist in 43 state and land-grant colleges across the United States. The purpose of the Coop Unit program is to conduct applied and basic wildlife and fish research, to train graduate students in research and management methods, and to participate in graduate education and technical assistance. The three unit leaders are federal employees stationed on the University of Arkansas Fayetteville campus.

ARKANSAS HOUSEHOLD RESEARCH PANEL

The Arkansas Household Research Panel (AHRP) is a continuing project of the department of marketing and transportation. AHRP consists of several hundred Arkansas households that respond to quarterly questionnaires.

The AHRP has been used for both academic, student, and business-related research. The panel's funding comes from the professional fees that are generated.

ARKANSAS WATER RESOURCES CENTER

The Arkansas Water Resources Center, established by Public Law in 1964, utilizes scientific personnel and facilities of all campuses of the University (and other Arkansas colleges and universities) in maintaining a water resources research program. The center supports specific research projects throughout Arkansas, which often provide research training opportunities for undergraduate and graduate students, and disseminates information on water resources via publications and conferences. The center works closely with federal, state, municipal, educational, and other public groups concerned with water resources in development of its research, training and dissemination programs.

BESSIE BOEHM MOORE CENTER FOR ECONOMIC EDUCATION

The Bessie Boehm Moore Center for Economic Education, established in 1978, promotes an understanding of the American economy among the people of Arkansas. Its major efforts are directed to elementary and secondary school children. The center's faculty and staff hold workshops and seminars for public school teachers, conduct research in economic education, develop instructional materials, maintain a lending library, and sponsor adult economic educational programs for business, labor, industry, and the general community. The center is officially certified by the Arkansas Council on Economic Education and the National Council on Economic Education.

BIOMASS RESEARCH CENTER

The Biomass Research Center currently houses the food safety laboratory, which includes the hybridoma laboratory, the agricultural research services laboratory, and one of the entrepreneurial clients of GENESIS.

CENTER FOR ADVANCED SPATIAL TECHNOLOGIES

The Center for Advanced Spatial Technologies (CAST), established in 1991, is an element of the J. William Fulbright College of Arts and Sciences but has a campus-wide focus. The center has particularly close relationships with the departments of anthropology; crop, soil and environmental science; biology; geosciences; and landscape architecture. Other related partners include the environmental dynamics program, the Arkansas Water Resources Research Center and the Arkansas Archeological Survey. CAST focuses on making geographic information systems (GIS) and related technologies available to a wide audience through research, undergraduate and graduate education, spatial data distribution, technology transfer, professional education, digital photogrammetry, remote sensing and interoperability.

CAST has been selected as a Center of Excellence by the Intergraph Corporation, by Trimble Navigation Inc. and by the Oracle Corpora-tion. These and other corporate sponsors have provided more than $9 million in support of the research and teaching facilities of the center. The center has extensive hardware and software capabilities including more than 50 high performance workstations, four large servers (combined 1.5 terabyte online) large format plotters and scanners, many other peripherals and an comprehensive inventory of software.

CAST staff are engaged in research projects in a wide range of areas. Recent projects involve a NASA-funded project to develop methods to increase availability of remote sensing data; assessment of the habitat and distribution of at-risk avian species in the western hemisphere using GIS and remote sensing methods, funded by the Nature Conservancy; creation of a seamless, on-line spatial data warehouse accessible from the World Wide Web and many others. There are extensive opportunities for undergraduate and graduate student participation in CAST efforts.

The National Center for Resource Innovations-Southwest (NCRI-SW) is one of six regional centers throughout the United States whose mission is to transfer GIS and related technologies to county and local governments. Established at the University of Arkansas in 1990, NCRI -SW became part of CAST in 1991. For more information on the CAST and NCRI visit www.cast.uark.edu.

CENTER FOR ARKANSAS AND REGIONAL STUDIES

A multidisciplinary agency within the J. William Fulbright College of Arts and Sciences, the Center for Arkansas and Regional Studies encourages research, publication and dissemination of knowledge about life and culture in Arkansas and the surrounding region. The Center administers the interdisciplinary major in American Studies, and sponsors lectures, seminars, conferences, radio programs and international student exchanges. The Center also produces workshops and audio and video documentary recordings, and works with Mullins Library to locate and collect Arkansiana and other regional materials.

CENTER FOR BUSINESS AND ECONOMIC RESEARCH

The Center for Business and Economic Research (CBER) is both a student-faculty research center and a public service/outreach unit. An integral part of the Sam M. Walton College of Business Administration, the CBER promotes research on business and economic conditions in Arkansas, and the staff responds daily to requests for state and local economic and demographic data.

Arrangements through the CBER enable faculty and students to conduct research in their fields of interest. In this regard, the CBER maintains an electronic database library of economic and financial information to serve the needs of students and faculty. Additionally, the CBER works on projects with state agencies such as the Arkansas Department of Finance and Administration, Arkansas Department of Parks and Tourism, and others to solve problems and address issues of Arkansas' business and economy.

The CBER publishes the Arkansas Business and Economic Review, a quarterly business and economics journal, which is dedicated to providing information about Arkansas' business and economic environment. The Review covers state, regional, and national business and economic issues. It includes state and regional economic indices relating to personal income, industrial output, employment, population and other factors.

The CBER is housed in room 217 of the Donald W. Reynolds Center for Enterprise Development. CBER staff can be reached by phone: (501) 575-4151, fax: (501) 575-7687, or e-mail:
cberinfo@cavern.uark.edu.

CENTER FOR MANAGEMENT AND EXECUTIVE DEVELOPMENT

The Center for Management and Executive Development provides executive and middle management training opportunities designed to enhance quality in leadership, management decision making, and human resource skills and abilities for corporate and public clients. Programs provide training for implementation of current acceptable practices and approaches to problem solving that support progressive management achievements. Programs are custom designed for individual clients or they are designed in modular fashion from several pre-prepared programs to meet the general leadership needs of organizations and include such topics as customer service, leadership, team development, total quality and continuous improvement, and personal skills development.

The Center serves local, national, and multinational businesses. The Center operates on a fee for service basis, and its activities are supported from fee based revenues. The Center also provides directive support for Arkansas manufacturers who seek to produce and market products for the mass market and for mass market retailers through the Support Arkansas Made program. Support Arkansas Made assists manufacturers in the evaluation of new products and product ideas based upon marketable criteria.

CENTER FOR PROTEIN DYNAMICS

The Center for Protein Dynamics is an interdisciplinary unit for research and teaching within the departments of chemistry and biochemistry and biological sciences in the J. William Fulbright College of Arts and Sciences. The center raises funds from federal, state, and private sources and sponsors faculty- and student-initiated basic research on the properties of protein molecules and their diverse functions in biological systems.

CENTER FOR RETAILING EXCELLENCE

The Center for Retailing Excellence promotes superior performance in retail practice through both research and education programs. Through its efforts, the center promotes student interest in and preparation for careers in retailing and closely related businesses. The center works to develop strategic alliances between business academics and industry by focusing on interdisciplinary issues and concerns of retailers and vendors in both its activities and research programs. By means of its initiatives and support, the center stimulates research that advances our knowledge of retailing and addresses problems faced by retailing organizations and vendor firms. The Center for Retailing Excellence provides a range of benefits for constituent groups comprised of students, retail organizations and their suppliers, and faculty researchers.

CENTER FOR SENSING TECHNOLOGY AND RESEARCH (CSTAR)

The Center for Sensing Technology and Research (CSTAR) is a focused effort to draw upon unique campus strengths to carry out a high-impact research program directed toward fundamental and applied research in new sensor technology. The center pursues fundamental advances in sensing technology from the conceptual to implementation stages. Drawing upon present state-of-the-art campus facilities and faculty research and engineering strengths, the center emphasizes support of competitive research in this critical area of biotechnology. It is intended that CSTAR will become an important component of the state's research infrastructure, which is essential to the continued implementation of biotechnology within Arkansas-based businesses. Thus, synergistic interaction with industrial participants within the state is anticipated, with the expectation that they will provide "real-world" applications in need of advanced sensing technology.

The investigators who are involved in the CSTAR represent a broad range of scientists and engineers with research experience ranging from fundamental chemical studies of sensor materials and principles to fabrication and utilization of sensors in practical applications. It is envisioned that the proposed center will be the vehicle for synergistic cross-disciplinary interaction of the researchers and their students, which will result in highly effective and rapid implementation of new sensors in a variety of applications. At present, faculty from chemistry and biochemistry, chemical engineering, electrical engineering, and poultry science are participating in CSTAR research programs. In addition to present faculty participants, a new chemistry and biochemistry faculty member specializing in the field of combinatorial chemistry is currently being recruited. Addition of such an individual will permit the center research programs to more rapidly move into the important area of highly specific microsensor development, based upon developing requisition recognition functionality in synthetic materials. It is anticipated that the goal of combinatorial syntheses could well be the specific materials to be incorporated in sensors Those would be produced in the center by researchers who have expertise in microfabrication and who are interested in the viability of highly sensitive specific microfabricated sensors.

An essential goal of the center is to contribute to the graduate education of a new generation of scientists and engineers skilled in advanced sensing technology, therefore, the center provides support for recruitment and research of qualified graduate students to the relevant doctoral programs of the participating faculty.

CENTER FOR THE STUDY OF REPRESENTATION (CSR)

The Center for the Study of Representation (CSR) is a research center located in the department of political science at the University of Arkansas, Fayetteville. Created by the University of Arkansas Board of Trustees in 1999, the CSR is an officially recognized university research center.

The mission of the center is broadly defined in terms of scholarship and outreach related to representation, a topic that has long been the subject of theoretical discourse and empirical inquiry in the discipline of political science. In pursuit of its mission, the center performs two primary functions. First, it pro-

motes original research by faculty and students into various aspects of political representation. Second, the center seeks to foster a wider understanding of the process of representation through its civic education programs. Lectures, symposia, speakers, television and radio appearances, and publications supported by the center contribute to public education and the development of a better informed citizenry. The centerpiece of the center's civic education program is The Arkansas Poll, a semi-annual survey of the opinions and attitudes of Arkansans on matters of politics and public policy.

The diverse aspects of the center combine to create a unique set of resources with which to study representation. However, the center is more than a set of research projects and outreach programs. It is a group of individuals sharing in a common intellectual experience who are devoted to creating an environment that promotes scholarship and interest in representative democracy.

CENTER OF EXCELLENCE FOR POULTRY SCIENCE

With designation by the University of Arkansas Board of Trustees for poultry science as a center of excellence in the state's university system, the department of poultry science became a reality in 1992.

The Center of Excellence for Poultry Science (CEPS) is comprised of full-time poultry science faculty members, full-time USDA/ARS Poultry Research Group faculty members, graduate assistants, adjunct faculty and poultry science departmental staff. CEPS receives multidisciplinary contributions from several university departments including animal science; biological and agricultural engineering; biological sciences; crop, soil, and environmental sciences; entomology; food science; industrial engineering; the School of Human and Environmental Sciences and the UALR College of Pharmacy.

The department of poultry science and the research group are housed in the John W. Tyson Building, which is a 112,000-square-foot, state-of-the-art laboratory and office complex that was completed the fall of 1995 on the UA campus. In addition to the John W. Tyson Building on the main campus, CEPS is comprised of the following facilities:

- FDA-licensed feed mill;
- 10,000-square-foot processing plant used for teaching processing techniques and for ongoing food safety research projects;
- 12,000-square-foot John Kirkpatrick Skeeles Poultry Health Laboratory, which holds the highest bio-safety rating (P3) available in the country;
- poultry research farm facility including hatchery, genetics unit, pullet rearing facility, battery brooder, caged layer house, broiler breeder houses and turkey houses;
- four full-sized broiler houses equipped with computerized environmental control and data collection systems capable of commercial-type production research; and,
- breeder farm.

By majoring in poultry science, students are provided a scientific as well as a technical education preparing them for positions of leadership and responsibility in the expanding fields of poultry processing, marketing and production, breeding and genetics, nutrition, physiology, poultry health, poultry business management and food science.

Students in poultry science may also meet all pre-veterinary and pre-medical requirements necessary for entry into those professional areas.

DEPARTMENT OF REHABILITATION EDUCATION & RESEARCH

Regional Continuing Education Center in Rehabilitation

Established in 1974, this center provides human resource development programming for personnel employed in rehabilitation programs funded by the Rehabilitation Act. These programs include state vocational rehabilitation agencies, independent living centers, community rehabilitation programs, client assistance programs and projects with industries in the states of Arkansas, Louisiana, New Mexico, Oklahoma and Texas. The center is located in the Hot Springs Rehabilitation Center, Hot Springs, Arkansas.

Research and Training Center for People Who are Deaf or Hard of Hearing

Established in 1981, this national center conducts research and training programs to enhance rehabilitation efforts on behalf of the 24 million U.S. citizens who are deaf or hard of hearing. These programmatic efforts are directed toward enhancing the career preparation, job entry and placement, career advancement and workplace communication accommodations consistent with the Americans with Disabilities Act. The center is located in Little Rock and also operates two graduate training programs in deafness rehabilitation at that location.

ENGINEERING EXPERIMENT STATION

Research is a major function of each of the faculties within the seven departments in the College of Engineering. Research coordination is achieved through the Engineering Experiment Station, which was established for that purpose by an act of the Arkansas Legislature in 1920.

The overall goal of research in the College of Engineering is to provide engineering solutions to important problems that face our society. We utilize our faculty, staff, students, and facilities to enhance the well-being of both public and private sectors. Student involvement in research is especially important in that it helps link them to the needs of their future employers. All departments - biological and agricultural, chemical, civil, computer engineering, electrical, industrial, and mechanical engineering - conduct research over a broad spectrum of subjects that includes areas such as biological and chemical processes; electronics manufacturing; environmental and ecosystems analysis; material and manufacturing; software and telecommunications; and transportation, logistics and infrastructure. Funding for research within the college comes primarily through grants received from government and industry sources.

ENGINEERING RESEARCH CENTER

The Engineering Research Center provides the facilities and support services for a wide variety of research activities of the College of Engineering. The center houses the Engineering Experiment Station through which the research of individual departments of the college is handled, the Genesis Technology Incubator program, the Southwestern Regional Calibration Center, the High Density Electronics Center, the Arkansas Center for Technology Transfer, the Industrial Training Laboratory, the Center for Interactive Technology, the Systems Technology Laboratory, the Highway Construction Materials Laboratory, the Hydrology Laboratory, the Low-Speed Wind Tunnel Laboratory and the engineering extension office.

The center is located in a modern 186,000-square-foot facility on 32 acres located approximately two miles south of the main campus in Fayetteville.

FULBRIGHT INSTITUTE OF INTERNATIONAL RELATIONS

An interdisciplinary unit within the J. William Fulbright College of Arts and Sciences, the Fulbright Institute of International Relations encourages student and faculty research and scholarly analysis of foreign policy and international affairs.

The institute sponsors instructional activities, conferences, seminars, public events, and publications, including a major spring symposium on a significant topic in international affairs. The institute - a center for scholars and researchers from around the world - also sponsors a visiting fellows program which brings national and international scholars, journalists, and professionals to the campus.

The undergraduate international relations major is based in the institute, and there are five associated area studies programs. The institute's office of Study Abroad and International Exchange coordinates a number of overseas programs and provides support services for students interested in study abroad. In conjunction with Mullins Library, the institute also oversees the papers of J. William Fulbright, longest-serving chairman of the Senate Foreign Relations Committee.

GENESIS TECHNOLOGY INCUBATOR

GENESIS provides technology-based companies with research and development support by allowing these firms access to university labs and facilities as well as technical support from university researchers. Firms accepted into GENESIS are provided physical space in university research centers as well as office space, shared support services, and both business and technical guidance. GENESIS' goal is that of creating jobs for Arkansans skilled in the science and engineering professions as well as helping to diversify both Arkansas' technology and economic base. Applicants must meet strict technical guidelines as determined by a committee of university researchers, administrators, and a 15-member advisory board comprised of community business leaders. GENESIS was conceived to span all university colleges and departments by providing entrepreneurs needing research and development support a method for obtaining and coordinating the same through a program which focuses the resources of the entire campus for this common objective.

HIGH DENSITY ELECTRONICS CENTER

The High Density Electronics Center (HiDEC) was established in 1991 as an interdisciplinary research program in advanced electronic packaging technologies, particularly the rapidly developing technology of multichip modules (MCMs), which allow electronic systems to be small, fast and cheap.

With generous support from the Defense Advanced Research Projects Agency (DARPA), a large clean room was constructed and an MCM fabrication facility, unique among universities, was installed. Current research programs focus on 3-D electronic packaging, high density laminate substrates, cofired ceramic substrates for wireless applications, high temperature superconducting (HTSC) tunable filters, micro electromechanical systems (MEMS), and integrated passives development. The program involves faculty from six departments and more than 25 graduate students. Continuing funding comes from DARPA and several industrial sponsors. Significant national recognition has resulted from work performed at HiDEC.

INFORMATION TECHNOLOGY RESEARCH CENTER

The Information Technology Research Center (ITRC) is an interdisciplinary unit for research within the Sam M. Walton College of Business Administration. The mission of the ITRC is to advance the state of research and practice in the development and use of information technology for enhancing the performance of individuals and organizations; provide a forum for multi-disciplinary work on issues related to information technology; promote student interest in the study of information technology; and facilitate the exchange of information between the academic and business communities. The ITRC was established by a grant from the Walton Family Charitable Support Foundation.

LOGISTICS INSTITUTE (THE)

The Logistics Institute (TLI), located within the industrial engineering department, is a multi-campus, industry/university cooperative research center sponsored in part by the National Science Foundation. The University of Arkansas and Georgia Tech are in partnership with more than 20 corporations and government agencies.

TLI is dedicated to advancing logistics technology, education, and practice. TLI student researchers and faculty work with business partners to provide answers to world problems by employing a systems perspective and an engineering approach. These students receive hands-on industry experience, creating and utilizing leading-edge techniques to solve actual logistics problems while earning graduate credits and gaining publishing and employment opportunities.

Benefits to TLI business partners include being in partnership with an elite group of world leaders in logistics thought and innovation. They receive process improvement ideas from other project findings. A source for new talent is gained by providing an educational foundation for a new breed of logistics engineers and managers. Customized tools and techniques, utilizing state-of-art technologies, are tested and implemented by the research team.

Current research focus areas include "logistics supply chain management" and "shop floor" logistics. Performance evaluation and costing, planning and design, and transportation systems represent the research thrusts. Research tools range from optimization and simulation to software development and ergonomics. For more information, contact TLI by phone (501) 575-2124, fax (501) 575-8431, or World Wide Web http://tli.engr.uark.edu.

MACK-BLACKWELL NATIONAL RURAL TRANSPORTATION STUDY CENTER

The Mack-Blackwell National Rural Transportation Study Center (MBTC) was established by a grant from the U.S. Department of Transportation to provide educational opportunities and conduct research in the area of rural transportation. Additional support is received from the Arkansas Highway and Transportation Department.

The broad objective of the center is to improve the quality of life in rural areas through transportation. The educational objective is to provide graduates qualified to enter the transportation-related professions with the diversity of backgrounds needed to lead transportation development into the 21st century. Although housed within the department of civil engineering, MBTC's activities are not limited to engineering. All disciplines related to or impacted by transportation participate in MBTC research and educational activities.

OAK RIDGE ASSOCIATED UNIVERSITIES

Since 1948, students and faculty of the University of Arkansas have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 102 colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education, the DOE facility that ORAU manages, undergraduates, graduates, postgraduates, as well as faculty enjoy access to a multitude of opportunities for study and research. Students may participate in programs covering a wide variety of disciplines including business, earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry, and mathematics. Appointment and program length range from one month to four years. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science- and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits may be found in the resource guide, which is available on the World Wide Web at http://www.orau.gov/orise/resgd/htm, or by calling either of the contacts below.

ORAU's Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU's members, private industry, and major federal facilities. Activities include faculty development programs, such as the junior faculty enhancement awards and the visiting industrial scientist program, and various services to chief research officers.

For more information about ORAU and its programs, contact Collis R. Geren, ORAU Council member, at 501-575-5901; contact Monnie E. Champion, ORAU corporate secretary, at 423-576-3306; or the ORAU web site: <http://www.orau.gov>http://www.orau.gov.

SMALL BUSINESS DEVELOPMENT CENTER

The Small Business Development Center (SBDC) provides small business consulting and technical assistance to the business community of northwest Arkansas. The SBDC serves as the focal point for linking together resources of the federal, state and local governments with resources of the University, the Sam M. Walton College of Business Administration and the private sector. These resources are utilized to counsel and train small businesses in resolving organizational, financial, marketing, technical and other problems they might encounter. The SBDC offers free consulting services to small business clients. Seminars for small businesses are offered on a wide range of topics. Small Business Administration publications, other relevant small business publications, and internet access is available for small business owners in the SBDC resource center.

SUPPLY CHAIN MANAGEMENT RESEARCH CENTER

The Supply Chain Management Research Center (SCMRC) at the UA Sam M. Walton College of Business sponsors and promotes supply chain, logistics, and transportation research and education. We view the supply chain as the channel that integrates business processes from suppliers through end users. This channel provides value-added products, services, and information up and down the pipeline. Supply chain management incorporates both interand intra company logistics, transportation and management systems.

We undertake training and research in all aspects of the supply chain. We have trained salespersons and developed MRP systems. We have simulated supply chains for logistics executives and sponsored research on VMI. The SCMRC has a broad range of interests and talents and has close ties to and cooperative programs with The Logistics Institute in the UA College of Engineering. The SCMRC at Arkansas is unique in that our capabilities span the technical and managerial arenas of supply chain management and logistics.

Firms who assign members to our board of directors include American Freightways, Federal Express, Hewlett Packard, J.B. Hunt Transport, Unilever HPC, and Wal-Mart. These and other firms meet with us at least annually to discuss the state of the art in supply chain management. Notable supply chain professionals from business and academia join in the discussions. Board members additionally provide guidance in research direction.

For additional information about the Supply Chain Management Research Center at the Sam M. Walton College of Business contact the center's director, Dr. Larry K. Yarbrough at (501) 575-6107 or FAX (501) 575-8407, e-mail: lyarbrou@comp.uark.edu.

SURVEY RESEARCH CENTER

The Survey Research Center promotes faculty social science research in varied fields including those in agriculture, arts and sciences, education and athletics. By conducting surveys, the center can enhance administrative decision-making. Furthermore, the Survey Research Center provides technical consultation. With University responsibilities, the center reports to the associate vice chancellor for research. The level of service ranges from consultation on proposals through total research design. Included are survey development, sample design and sampling, data collection, data coding, text entry and verification, analysis, report writing and presentation of results. The center conducts a variety of types of surveys including but not limited to computer-assisted telephone, mail, e-mail, and person-to-person as well as focus groups. Bringing together interdisciplinary teams of researchers for collaborative work is an aim. Students employed part-time in the center receive instruction in survey methods and microcomputer applications. The center operates on a fee-for-service basis.

UNIVERSITY OF ARKANSAS COMMUNITY DESIGN CENTER

The School of Architecture provides community service opportunities to students through the University of Arkansas Community Design Center (UACDC). The center is also a participant in the University's doctoral program in public policy. The center was founded in 1995 with the support of the Harvey and Bernice Jones Charitable Trust; its operations are now supported by a special appropriation from the State of Arkansas.

Through the center's fall and spring studio workshops, UA undergraduates in architecture and landscape architecture, graduate students in public policy, and faculty and professional staff provide technical assistance to towns and communities throughout Arkansas in such areas as town and environmental planning, low and moderate income housing, and community and policy development. In addition to providing design leadership, the center's work gives students the opportunity to work directly with state and local leaders to solve real problems in the context of actual situations and conditions.

Architecture and landscape architecture students also have the opportunity to live in an Arkansas town and work closely with townspeople for five to eight weeks over the summer to devise community improvements during an intensive design workshop. Towns selected for summer workshops have included Paris, Warren, Arkadelphia, Camden, Mansfield and Huntington, Cotter, Piggott, and Prescott.

Past work of the center has led to long-range plans for improving entire towns and town centers and has enabled a number of Arkansas towns and cities to obtain major funding to carry out the plans. Recent funding is enabling Warren to improve its main arteries and downtown center; Hot Springs to build a major multi-use structure for parking, hillside stabilization, and entry to the National Park; and Fayetteville to improve its downtown-Dickson artery, the main connection between the downtown square and the University campus.

For further information, visit the Web at: http://www.uark.edu/depts/uacdc/

The Graduate Faculty

Ackerson, Michael D., Ph.D. (University of Arkansas), Associate Professor, Chemical Engineering

Adams, Charles H., Ph.D. (University of Virginia), Associate Professor, English

Adams, Douglas J., Ph.D. (University of Arizona), Assistant Professor, Sociology, Social Work, and Criminal Justice

Adler, Jacob, Ph.D. (Harvard University), Associate Professor, Philosophy

Ahlers, Glen-Peter, J.D. (Washburn University), M.A. (University of South Florida), Associate Professor, School of Law

Ahrendsen, Bruce L., Ph.D. (North Carolina State University), Associate Professor, Agricultural Economics and Agribusiness

Aiken, Glen E., Ph.D. (University of Florida), Adjunct Assistant Professor, Crop, Soil, and Environmental Sciences

Akeroyd, John R., Ph.D. (Indiana University), Professor, Mathematical Sciences

Allen, Charles T., Ph.D. (Louisiana State University), Adjunct Associate Professor, Entomology

Allen, Myria W., Ph.D. (University of Kentucky), Associate Professor, Communication

Allison, Neil T., Ph.D. (University of Florida), Associate Professor, Chemistry and Biochemistry

Aloysius, John A., Ph.D. (Temple University), Assistant Professor, Computer Information Systems and Quantitative Analysis

Amason, Patricia, Ph.D. (Purdue University). Associate Professor, Communication

Anand, Vikas, Ph.D. (Arizona State University), Assistant Professor, Management

Andersen, Craig R., Ph.D. (University of Minnesota), Assistant Professor, Horticulture

Anderson, Glenn B., Ph.D. (New York University), Professor, Rehabilitation Education and Research

Andrew, Jason D., Ph.D. (University of Iowa), Associate Professor, Rehabilitation Education and Research

Andrews, David L., Ph.D. (Syracuse University), Associate Professor, Computer Science and Computer Engineering

Ang, Simon S., Ph.D. (Southern Methodist University), Professor, Electrical Engineering

Anthony, Nicholas B., Ph.D. (Virginia Polytechnic Institute and State University), Professor, Poultry Science

Apon, Amy W., Ph.D. (Vanderbilt University), Assistant Professor, Computer Science and Computer Engineering

Apple, Jason K., Ph.D. (Kansas State University), Assistant Professor, Animal Science

Arenberg, Nancy M., Ph.D. (University of Arizona), Assistant Professor, Foreign Languages

Armstrong, Edward P., Ph.D. (Pennsylvania State University), Assistant Professor, English

Arnold, Mark E., Ph.D. (Northern Illinois University), Associate Professor, Mathematical Sciences

Arthur, Nolan L., Ed.D. (Oklahoma State University), Associate Professor, Agricultural and Extension Education

Asfahl, C. Ray, Ph.D. (Arizona State University), Professor, Industrial Engineering

Ashlock, Lanny O., Ph.D. (Oklahoma State University), Extension Specialist IV, Crop, Soil, and Environmental Sciences

Ashton, Dub, Ph.D. (University of Georgia), Associate Professor, Marketing and Transportation

Aslin, Larry W., M.A., (University of Missouri-Columbia), Research Associate, Rehabilitation Education and Research

Atkinson, Richard B., J.D. (Yale University), Associate Professor, Law

Austen, Lizabeth A., Ph.D. (University of Florida), Assistant Professor, Accounting

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Appendix A

Student Residence Status for Tuition and Fee Purposes

WAIVER OF REGISTRATION FEE AND TUITION FOR GRADUATE ASSISTANTS

Registration Fee. Any graduate student appointed to the position of Graduate Assistant whose appointment is equal to or greater than fifty percent may be granted registration fees in addition to the stipend.

Non-resident Tuition. Any graduate student appointed to the position of Graduate Assistant whose percent appointment is equal to or greater than twenty-five percent shall, in addition to any stipend, be treated as an in-state student for tuition and fee purposes for the semester that they are on appointment.

THE ACADEMIC COMMON MARKET

The Academic Common Market is an interstate agreement among southern states for sharing academic uncommon programs. Participating states are able to make arrangements for their residents who qualify for admission to enroll as an in-state student for fee purposes.

The Common Market concept recognizes that it is impractical for every state to attempt development of programs in every field of knowledge. Each southern state has programs which are not offered in some of the other states and which can accommodate additional students. Through the sharing of such programs, the market assists in eliminating unnecessary duplication and in increasing access to programs which meet the educational needs of the citizens of the South.

To enroll as an Academic Common Market student, you must:

1. Be accepted for admission into a program to which your state has obtained access for its residents through the Academic Common Market. Applications for admission should be made directly to the institution offering the program.
2. Obtain certification of residency from the Common Market coordinator for certification information.

The opportunities presently available at the University of Arkansas, Fayetteville, at in-state rates to residents of southern states through the Academic Common Market are listed below:

Academic Common Market Programs at the University of Arkansas

Available at In-State Student Rates for Residents of States Indicated

Program	Master's	Ph.D.	Ed.D.
Animal Science		South Carolina	
Anthropology	South Carolina West Virginia		
Business Administration (Accounting)		Kentucky West Virginia	
Comparative Literature		Tennessee West Virginia	
Creative Writing	Tennessee		
Education (Adult)			Louisiana
Health Science		Oklahoma	
Kinesiology	Oklahoma	Oklahoma	
Philosophy		Alabama Mississippi	
Poultry Science		South Carolina	
Translation	Alabama South Carolina Tennessee Virginia		

STUDENT RESIDENCE STATUS FOR TUITION AND FEE PURPOSES

Board Policy 520.8
(Revised January 18, 1985)

The full text of the University of Arkansas Board of Trustees policy statement 520.8, *Student Resident Status for Tuition and Fee Purposes*, is provided below followed by a statement on implementing the policy at the University of Arkansas, Fayetteville.

Determination of Residence Status

I. Purpose

The purpose of these regulations is to enable the administrative officers of the University of Arkansas to classify students for the purpose of paying student fees, as either "in-state'' or "out-of-state,'' so as to accord fairness and equity to the students of the University and to the public which provides support for the educational services provided by the University.

II. Initial Classifications

A. A student shall be admitted to the University in an "in-state" or "out-of-state" status for university fee purposes, as established under these regulations.

Except as otherwise provided under these regulations, a student classified as "in-state'' for university fee purposes at the time of admission must have established a bona fide domicile in Arkansas and must have resided continuously in this state in that bona fide domiciliary status for at least six consecutive months prior to the beginning of the term or semester for which fees are paid.

B. A bona fide domicile is a home of apparent true, fixed, and permanent nature, a place of actual residing for all purposes of living that may be distinguished from a temporary sojourn in this state as a student. The person claiming domicile in Arkansas must provide evidence of permanent connection with the

State of Arkansas and demonstrate the expectation of remaining in this state beyond graduation. For purposes of implementing these policies, the Administration is directed to articulate standards which will be applied in making the determination of residence.

C. Except as otherwise provided under these regulations, the domicile of an adult (18 years of age or older) or emancipated minor student shall be determined on the basis of his or her own domicile.

D. Except as otherwise provided under these regulations, the domicile and residence of an unemancipated minor student (less than 18 years of age) or an unmarried dependent who has not attained the age of 23 is legally that of the parents or surviving parent; or such other person legally standing in the place of a parent to the student and with whom the student in fact makes his or her home and who has been making substantial contributions to the support of the student for at least six consecutive months prior to the term or semester for which the fees are paid.

E. A student who cannot satisfy the criteria for Arkansas domicile and residence will be classified as an "out-of-state'' student and will pay fees and tuition accordingly. The student on a temporary visa will be classified as a foreign student and will pay non-resident tuition and fees. A student who has been granted a permanent visa and has been domiciled in Arkansas for six consecutive months following receipt of the permanent visa shall be classified as an Arkansas resident for fee purposes.

F. The responsibility for registering under a proper classification for student fee purposes is placed upon the student. It is the duty of each student at each time of registration to call any question about residency classification status to the attention of the campus classification review officer in a timely fashion in order that the question may be settled (see IV Procedures).

G. The six-month period required in paragraph A of these regulations may be waived for persons, their spouses, and their unmarried children (who have not yet attained the age of 23) who move to Arkansas[9] with attendance at the University only a by-product of the primary purpose of establishing domicile in this state.

H. An unmarried student who has not reached the age of 23 years having one parent residing in Arkansas (for at least six consecutive months immediately prior to the beginning of the term or semester in which the fees are to be paid) may be considered an "in-state" student for fee purposes, even if that student resided outside the state with the other parent before coming to Arkansas to attend the University.

I. Marriage is recognized as emancipation for both females and males.

J. The spouse of a person continuously domiciled in Arkansas (for at least six consecutive months immediately prior to the beginning of the term or semester in which the fees are to be paid) upon request shall be classified as "in-state" for fee purposes.

III. Reclassifications

A. The initial classification of a student will not prejudice a different classification for following terms or semesters. However, a student's prior domicile is assumed to continue until he or she clearly establishes a new domicile in Arkansas (see IV Procedures).

B. A student previously classified as "out-of-state" may be reclassified as "in-state" for fee purposes if he or she has established a bona fide domicile in Arkansas and has resided continuously in this state in that bona fide domiciliary status for at least six consecutive months prior to his or her reclassification by the University. In order for an adult or an emancipated minor to establish a bona fide domicile in Arkansas for fee purposes, he or she must have left the parental home, must have established in this state a home of a permanent character as manifested objectively by good faith acts, and must have the expectation of remaining in this state beyond graduation. The single fact of presence in Arkansas for at least six months of attendance as a student enrolled in the University of Arkansas, or any other educational institution, neither constitutes nor necessarily precludes reclassification as one domiciled in Arkansas, but will be a factor to be considered.

IV. Procedures

A. A student shall have the burden of establishing any claim that he or she is entitled to be treated as "in-state" for fee purposes. Persuasive evidence to that effect must be presented in writing and verified under oath by the student. Mere claims of local domicile and duration of stay are of little weight. A student who knowingly gives erroneous information in an attempt to evade the payment of "out-of-state" fees may be subject to dismissal from the University.

B. All disputed classifications for student fee purposes, whether at initial enrollment or subsequent enrollments, and all disputed reclassifications will be decided initially on each campus by a classification review officer designated by each Chancellor.

C. The Chancellor of each campus will designate a campus classification appeal officer to receive petitions from decisions made by the campus classification review officer. Each campus classification appeal officer may, in his or her discretion, make investigations, receive evidence, and conduct informal hearings. After considering the case, the campus classification appeal officer will render a decision and notify the affected student of the decision in writing. Any decision of the campus classification appeal officer may be appealed to the Vice President for Academic Affairs of the University of Arkansas System, who shall recommend final disposition to the President of the University.

D. Written notice of the appeals procedure will be provided to each student raising a question about his or her status with the campus residency classification review officer.

E. Determination of domicile will be based on a review of all pertinent facts, evidence, and circumstances which collectively show, in an objective and clear manner, the actual domicile of the student.

NOTE: In implementing these policies, it is presumed that dependent students who are classified as non-residents based upon parental/guardian domicile outside of Arkansas do not acquire Arkansas residency under Board of Trustees Policy 520.8 unless and until their parent(s)/guardian(s) have established a domicile in Arkansas, or the student has left the parental home and established a domicile in Arkansas evidenced by proof that he or she has established a home of a permanent character as manifested objectively by good faith acts, resided in Arkansas in bona fide domiciliary status for at least six consecutive months prior to his or her reclassification as an Arkansas resident, and demonstrates the expectation of remaining in this state beyond graduation.

RECLASSIFICATION DEADLINES

Students who have established a bona fide domicile in Arkansas following initial classification as a non-resident must request reclassification if they want their status recognized for fee purposes. Applications and appropriate documentation must be received by the Office of the Registrar no later than the fifth class day (second class day of a summer session) of the term for which in-state fee assessment is requested. Applications received after the

deadline will be considered for the next term. All fees are to be paid by published due dates. Students who receive a favorable decision after payment will be provided a refund of out-of-state fees paid. Please direct questions about residence classification review procedures to the Registrar, 146 Silas H. Hunt Hall.

RESIDENCE STATUS OF MEMBERS OF THE ARMED FORCES AND THEIR DEPENDENTS

Board Policy 520.7, "Fees for Members of Armed Forces and Dependents"
(Revised January 18, 1985)

Effective January 1, 1975, members of the Armed Forces who are stationed in the State of Arkansas pursuant to military orders, and their unemancipated dependents, shall be entitled to classification as in-state students for fee paying purposes (per Arkansas Stat. Ann. 80-3366).

Persons continuously domiciled in Arkansas for at least twelve consecutive months who enter active military service from this state and who maintain Arkansas as the permanent home of record while on active military duty, and their dependents,[2] shall be entitled to classification as in-state students for fee paying purposes. This provision is forfeited if the military person does not return to Arkansas within twelve months after separation, discharge, or retirement from active duty.

Persons serving in active military service who demonstrate a change of bona fide domicile from another state to Arkansas at least twelve consecutive months prior to separation, discharge, or retirement from active military duty, and the dependents, shall be entitled to classification as in-state students for fee paying purposes. This provision is forfeited if the military person does not return to Arkansas within twelve months after separation, discharge, or retirement from active duty.

RESIDENCE STATUS OF STUDENTS FROM TEXARKANA, TEXAS, AND BOWIE COUNTY, TEXAS

Board Policy 520.10
(Adopted November 16, 1984)

In accordance with the reciprocity agreement described in H.C.R. 32, signed by the Governor of Arkansas on February 12, 1965, residents of Texarkana, Texas, and Bowie County, Texas, will be classified as in-state students for university fee purposes at the University of Arkansas.

RESIDENCE STATUS OF NATIVE AMERICANS

Board Policy 520.1, "Waiver of Non-Resident Tuition for Native Americans"
(Revised January 29, 1989)

Native American people in other states belonging to tribes which formerly lived in Arkansas before relocation, and whose names are on the rolls in tribal headquarters, shall be classified as in-state students of Arkansas for tuition and fee purposes, on all campuses of the University of Arkansas. Tribes so identified include the Caddo, Cherokee, Chickasaw, Choctaw, Creek, Delaware, Kickapoo, Osage, Peoria, Quapaw, Shawnee, and Tunica.

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