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Tools & Visualization Techniques Available to Support the Operations Manager

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ENGINEERING AND OPERATIONS MANAGEMENT LUNCH & LEARN WEBINAR SERIES

16 February 2022

College of Engineering & Industrial Engineering Programs

- Master of Science
 - Operations Management
 - Engineering Management
 - Engineering
- Graduate Certificates
 - Project Management
 - Lean Six Sigma
 - Homeland Security
 - Operations Management
 - Engineering Management



Welcome!

Moderator: Karin Hickenbotham

Please save all questions until the end of the presentation.

We ask all questions will be typed in the Chat Box at the end of the presentation.

This webinar is being recorded and will be posted on ScholarWorks@UARK
in our Operations Management collection of presentations.

THANK YOU!

LET'S GET STARTED!

Today's Presenter

- Retired Navy Surface Warfare Officer, government acquisition analyst
- Retired Lockheed Martin Fellow
- Now owns his own consulting company.
- Previous President for a national professional society MORS (Military Operations Research Society), is a current Fellow, and received the lifetime achievement award for an operations research analyst practitioner.
- Major analytical projects included determining the Navy ship force structure for the first Quadrennial Defense Review, developing Lockheed Martin's experimentation process with analytical rigor, and incorporating analysis into the government and industry affordability efforts.
- Kirk has been an instructor for the MSOM graduate program since August 2015
 - Past: Decision Models / Decision Analysis, Economic Decision Making, Project Management for Operations Managers.
 - Current: Teaching Introduction & Advanced Decision Support Tools for Operations Managers, Basic & Advanced Lean Six Sigma Green Belt.





UNIVERSITY OF
ARKANSAS®

College of Engineering
Master of Science in Operations Management

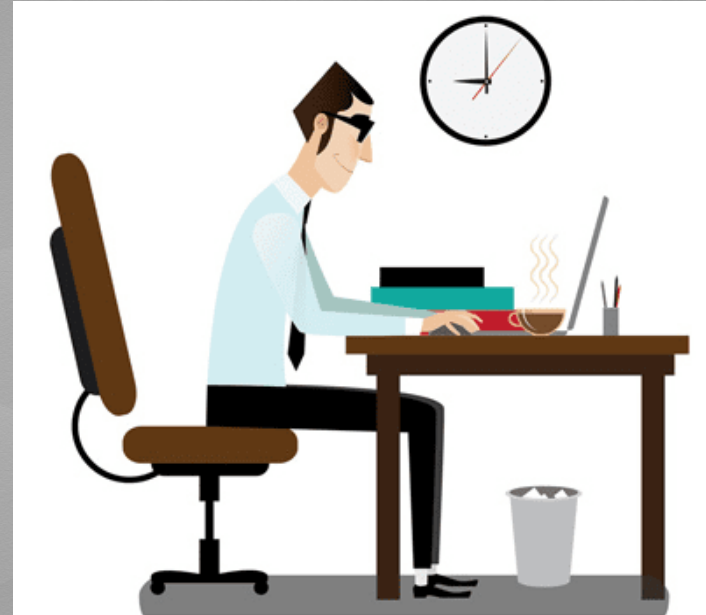
Tools & Visualization Techniques Available to Support the Operations Manager

Agenda

- Role of the Operations Manager
- MSOM Program and Excel
- Operations Manager Needs
- New Advanced Decision Support Tools & Visualization for the Operations Manager course
- Proposed Decision Models Micro Certificate

The Role of the Operations Manager

- Find data and then review the dataset
- Sort, filter, and lookup data in datasets
- Use formulas in books, reports, and articles
- Conduct basic statistical analysis
- Conduct some preliminary “what if” analysis and simulations
- Create charts to visualize the data / analysis
- Perform some basic financial analysis

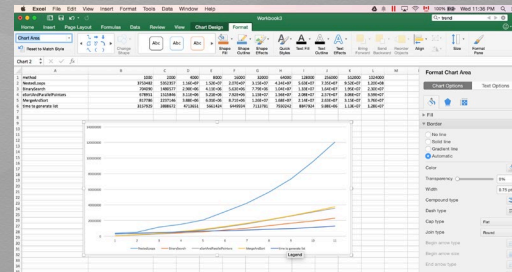


Operations Management Problems

1. You have customer data in one file and a list of zip codes affected by winter storms in another file. How can you get a visualization of which customers are most affected by the weather, and then create a prioritized list of which customer to call first?
2. You do detailed customer complaint interviews with your largest accounts. How can you capture the complaint information in a structured manner, ensuring you don't miss any questions, and then readily create a chart showing the top 3 causes of complaints?
3. You need to create something that all five locations in your company can use to quickly view sales, inventory, and issues. Emailing a spreadsheet around results in too many versions, and you need a single version of the truth.

Excel in MSOM Program

- Most organizations provide their employees the Microsoft Office Tool Suite
- The Master of Science in Operations Program has included Excel as a foundational aspect of the program
- With 8-week terms, there is not a lot of time for Excel during the courses
- Everyone must take as a prerequisite course or pass a proficiency exam



OMGT 4853 Introduction to Decision Support Tools (Excel)

- Basic Excel – functions, formatting, operator order, references
- Statistics – mean, median, mode, variance, standard deviation, range
- Charts – pie, line, bar, column, control, histogram, scatterplot, Pareto chart
- Data Query – logic, logical math, lookup, pivot tables
- Probability & Simulations – uniform, normal, monte carlo simulation
- Analysis – goal seek, solver
- Finance – time value of money functions
- Data Management – sorting, filtering, import / export

But as an Operations Manager, you Still Have Questions

- What about working with text, dates, and times?
- Are there other charts available to visualize data?
- How can I manage my time and budget?
- How can I work more efficiently for common, frequent tasks?
- Are there advanced data query capabilities?
- How can you do sensitivity analysis?
- Is there a way to provide a high-level summary of information?
- How do you ensure the work done by your team is ethical?

What tool(s) can be used to do these tasks?

NEW OMGT 5833 Advanced Decision Support Tools & Visualization for Ops Mgrs

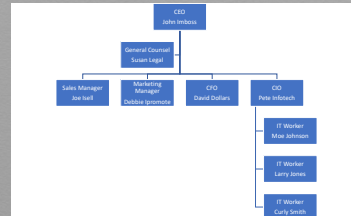
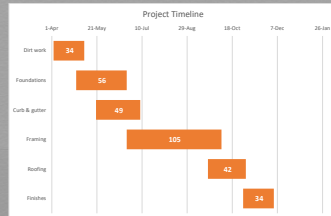
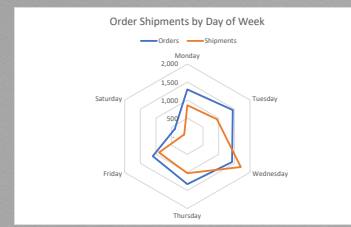
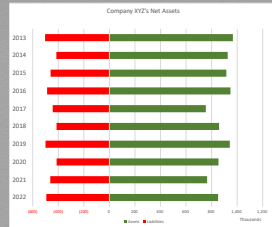
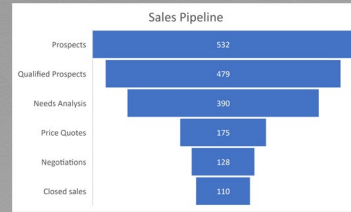
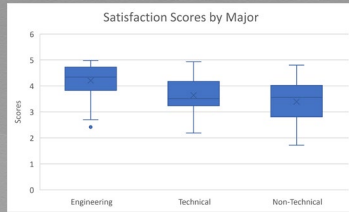
- The capabilities in Excel have improved dramatically in the last 5-10 years
- Tableau is growing as a tool organizations use for business intelligence visualization
- New OMGT 5833 Advanced Decision Support Tools & Visualization for Operations Managers course created
 - This course covers advanced decision support tools and visualization used in engineering and operations management including functions and techniques for data manipulation and error testing, charts and chart templates, data query and pivot tables, templates and forms, probability, “What If” sensitivity analysis, and dashboards.
 - The decision support tools covered are Microsoft Excel and Tableau.
 - Provides practice communicating to senior stakeholders and decision-makers.

You Need Data – What Can You Do?

- Importing and cleaning datasets
- Finding, replacing, and substituting data
- Moving, copying, and inserting data
- Joining data and separating into different columns
- Transposing the data
- Removing unwanted spaces and duplicate records
- Flash filling columnar data
- Changing the case (lower, upper, all capital letters)
- Creating lists to select data
- Checking for errors

J	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Date	Day	Shift	Time	Associate	Training Level	Call Category	Call Duration	Call Defects	Time to Answer	Call Escalated	Client Satisfaction	Region	Location
2	3-Jan	Monday	1	9:27	Susan Changer	Level 3	Hardware Issue / Request	426	DEFECT - Over	39	N	Top 2 Box	W	Denver, CO, 80235
3	3-Jan	Monday	1	9:29	John Doe	Level 2	Password Reset	121	OK - Under or =	40	N	Top 2 Box	W	Denver, CO, 80294
4	3-Jan	Monday	1	9:56	Ken Slacker	Level 1	General Info / Other	437	DEFECT - Over	60	N	Middle Box	N	Milwaukee, WI, 53207
5	3-Jan	Monday	1	10:16	George First	Level 3	General Info / Other	438	DEFECT - Over	15	N	Top 2 Box	W	Reno, NV, 89502
6	3-Jan	Monday	1	11:02	Susan Changer	Level 3	Password Reset	152	OK - Under or =	19	N	Top 2 Box	N	Milwaukee, WI, 53227
7	3-Jan	Monday	1	11:29	Ken Slacker	Level 1	General Info / Other	414	OK - Under or =	16	N	Top 2 Box	S	Northwest, AR, 72703
8	3-Jan	Monday	1	12:37	John Doe	Level 2	General Info / Other	395	OK - Under or =	12	N	Top 2 Box	E	Lexington, KY, 40508
9	3-Jan	Monday	1	13:22	George First	Level 3	Network Issue	465	DEFECT - Over	7	N	Middle Box	N	Buffalo, NY, 14213
10	3-Jan	Monday	1	15:32	Susan Changer	Level 3	General Info / Other	412	OK - Under or =	47	N	Middle Box	N	Pittsburgh, PA, 15215
11	3-Jan	Monday	2	16:40	Joyce Trying	Level 1	General Info / Other	411	OK - Under or =	32	N	Top 2 Box	N	Detroit, MI, 48226
12	3-Jan	Monday	2	18:08	Pam Working	Level 2	Network Issue	430	DEFECT - Over	43	N	Top 2 Box	N	Buffalo, NY, 14225
13	3-Jan	Monday	2	18:13	Jim Leadingthepack	Level 3	Password Reset	125	OK - Under or =	10	N	Top 2 Box	E	Cincinnati, OH, 45205
14	3-Jan	Monday	2	18:52	Joyce Trying	Level 1	Software Issue / Request	414	OK - Under or =	21	N	Top 2 Box	W	Salt Lake City, UT, 84105
15	3-Jan	Monday	2	18:53	Tom Doolbetter	Level 2	Network Issue	470	DEFECT - Over	49	N	Top 2 Box	W	Denver, CO, 80202
16	3-Jan	Monday	2	19:33	Jim Leadingthepack	Level 3	Software Issue / Request	453	DEFECT - Over	50	N	Top 2 Box	S	Northwest, AR, 72756
17	3-Jan	Monday	2	19:39	Joyce Trying	Level 1	Software Issue / Request	428	DEFECT - Over	39	Y	Bottom 2 Box	N	Milwaukee, WI, 53220
18	3-Jan	Monday	2	21:45	Tom Doolbetter	Level 2	General Info / Other	426	DEFECT - Over	35	N	Middle Box	N	Milwaukee, WI, 53128
19	3-Jan	Monday	2	23:37	Jim Leadingthepack	Level 3	Network Issue	471	DEFECT - Over	4	N	Bottom 2 Box	S	Orlando, FL, 32839
20	3-Jan	Monday	3	0:18	Benny There	Level 2	General Info / Other	424	DEFECT - Over	38	N	Top 2 Box	S	Memphis, TN, 38111
21	3-Jan	Monday	3	0:37	Grace Caller	Level 2	Password Reset	156	OK - Under or =	19	N	Middle Box	W	Albuquerque, NM, 87102
22	3-Jan	Monday	3	1:31	Nike Smith	Level 3	Password Reset	140	OK - Under or =	41	N	Middle Box	N	Cleveland, OH, 44102
23	3-Jan	Monday	3	2:39	Benny There	Level 2	Password Reset	190	OK - Under or =	16	N	Middle Box	S	Orlando, FL, 32831
24	3-Jan	Monday	3	2:43	Grace Caller	Level 2	Hardware Issue / Request	452	DEFECT - Over	19	N	Top 2 Box	W	San Jose, CA, 95133
25	3-Jan	Monday	3	2:52	Benny There	Level 2	General Info / Other	393	OK - Under or =	34	N	Middle Box	W	Denver, CO, 80215
26	3-Jan	Monday	3	6:04	Grace Caller	Level 2	General Info / Other	411	OK - Under or =	19	N	Middle Box	S	Orlando, FL, 32784
27	4-Jan	Tuesday	1	9:05	Susan Changer	Level 3	Password Reset	153	OK - Under or =	36	N	Middle Box	W	San Jose, CA, 95131
28	4-Jan	Tuesday	1	9:25	Ken Slacker	Level 1	Password Reset	159	OK - Under or =	7	Y	Middle Box	E	Indianapolis, IN, 46240

What Other Charts are Available?



- Analysis Charts

- Boxplot, Funnel Chart, Waterfall Chart, Tornado Chart, Radar / Spider Chart, Surface Plot, and Tree Map

- Project Management Charts

- Gantt Chart, "S" Curve Chart, and Organization Chart

What to do with Common, Frequent Tasks?

- Chart Templates
- Templates
- Forms

Employee Engagement Survey

We are interested in your opinions and feelings about different aspects of your job. Please take a few minutes to complete the following questionnaire. When it is completed, please return it to Human Resources. All questionnaires will remain anonymous and confidential.

Please select your Employment Status: **Part-Time**

Instructions:

PARTTIME Video provides a powerful way to help you prove your point. When you click Online Video, you can paste in the embed code for the video you want to add.

How long have you worked here?

☐ Less than 2 Years

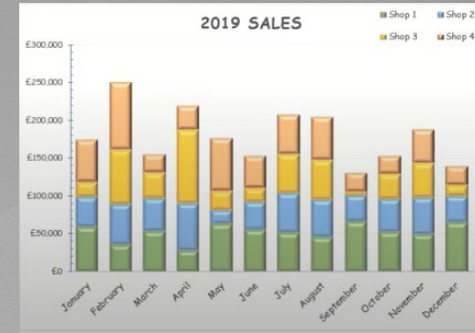
☒ 2 - 5 Years

☐ 5+ Years

Who is your Manager?

Manager Title: **Burton Guster**

Manager Department: **VP of Sales**



Employee List

Name: **Jina Pullin**

Hire Date: **4/23/2002**

Employee Number: **88478342**

Department: **Sales**

1 of 22

New

Delete

Restore

Find Prev

Find Next

Criteria

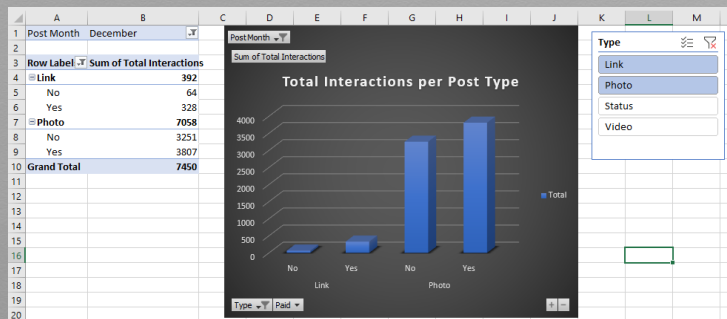
Close

What Advanced Data Query Capabilities are Available?

G	H	I
SS#	Comp.	
606-00-4453	=INDEX(A:A,MATCH(G2,C:C,0))	
156-00-1792	INDEX(array, row_num, [column_num])	
857-00-3556	INDEX(reference, row_num, [column_num], [area_num])	
490-00-1782	Locknart, Ken	
	Nicolaus, Gary	

XLOOKUP

- Includes all the capabilities of both VLOOKUP and HLOOKUP
- Exact match, not approximate match, is the default setting
- Not limited to matching data in the left column only (VLOOKUP) of a table array
- Not limited to matching data in the top row only (HLOOKUP) of a table array
- Eliminates adjusting formulas when new columns or rows are inserted into table arrays



- Advanced lookup capabilities to overcome limitations of VLOOKUP & HLOOKUP
- Ability to conduct calculations in pivot tables, create pivot tables from different sources, highlight pivot table data with slicers, and create PivotCharts

What About Data, Probability, and Analysis?

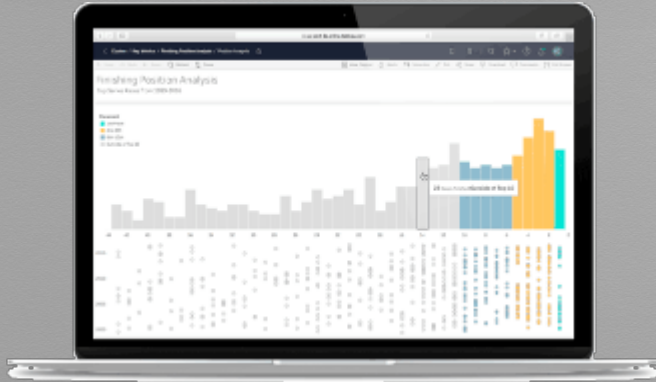
- The arithmetic and statistical analysis for the different types of data
- Poisson, exponential, and binomial distributions, plus additional information on percentiles and quartiles
- Ability to conduct analysis (maximums, minimums, averages, sums, and counts) on different combinations of data in datasets
- More “what if” analysis capabilities with data tables and scenarios

Data Type	Features
Nominal	Numbers are identifiers Arithmetic on numbers makes no sense Can work with frequencies of categories
Ordinal	Number signifies amount of a property, but not units of measure Differences among numbers don't make sense
Interval	Units of measure Differences among numbers make sense No meaningful zero-point
Ratio	All the features of interval data, plus a meaningful zero-point Statements like “twice as much as” make sense

H	I	J	K	L
Rating				
2		=averageIFS(G:G,E:E,K2,H:8,S:D:D,">9")	Full Time	
		AVERAGEIFS(average_range, criteria_range1, criteria1, [criteria_range2, criteria2], [criteria_range3, criteria3], [criteria_range4, criteria4], ...)		
1			Contract	

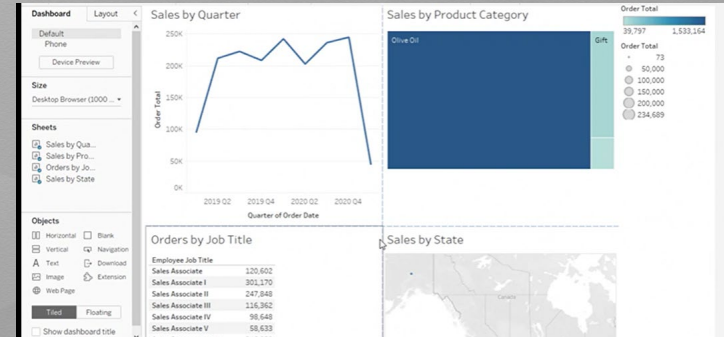
	\$67,175.94	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
2,500	\$55,047.51	\$60,743.42	\$67,175.94	\$74,445.20	\$82,664.89	\$91,963.98	\$102,488.73	\$114,404.91	\$127,900.30	\$143,187.50	
3,000	\$66,057.01	\$72,892.11	\$80,611.12	\$89,334.24	\$99,197.86	\$110,356.77	\$122,986.48	\$137,285.89	\$153,480.36	\$171,825.00	
3,500	\$77,066.51	\$85,040.79	\$94,046.31	\$104,223.28	\$115,730.84	\$128,749.57	\$143,484.22	\$160,166.88	\$179,060.42	\$200,462.50	
4,000	\$88,076.02	\$97,189.48	\$107,481.50	\$119,112.31	\$132,263.82	\$147,142.36	\$163,981.97	\$183,047.86	\$204,640.48	\$229,100.00	
4,500	\$99,085.52	\$109,338.16	\$120,916.69	\$134,001.35	\$148,796.79	\$165,535.16	\$184,479.72	\$205,926.84	\$230,220.54	\$257,737.50	
5,000	\$110,095.02	\$121,486.85	\$134,351.87	\$148,890.39	\$165,329.77	\$183,927.96	\$204,977.46	\$228,809.82	\$255,800.60	\$286,375.00	
5,500	\$121,104.52	\$133,635.53	\$147,787.06	\$163,779.43	\$181,862.75	\$202,320.75	\$225,475.21	\$251,690.80	\$281,380.66	\$315,012.50	
6,000	\$132,114.02	\$145,784.22	\$161,222.25	\$178,668.47	\$198,395.72	\$220,713.55	\$245,972.95	\$274,571.79	\$306,960.72	\$343,650.00	
6,500	\$143,123.53	\$157,932.90	\$174,657.43	\$193,557.51	\$214,928.70	\$239,106.34	\$266,470.70	\$297,452.77	\$332,540.78	\$372,287.50	
7,000	\$154,133.03	\$170,981.59	\$188,092.62	\$208,446.55	\$231,461.68	\$257,499.14	\$286,968.45	\$320,333.75	\$358,120.84	\$400,925.00	
7,500	\$165,142.53	\$182,230.27	\$201,527.81	\$223,335.59	\$247,994.66	\$275,891.93	\$307,466.19	\$343,214.73	\$383,700.90	\$429,562.50	

What is Tableau?



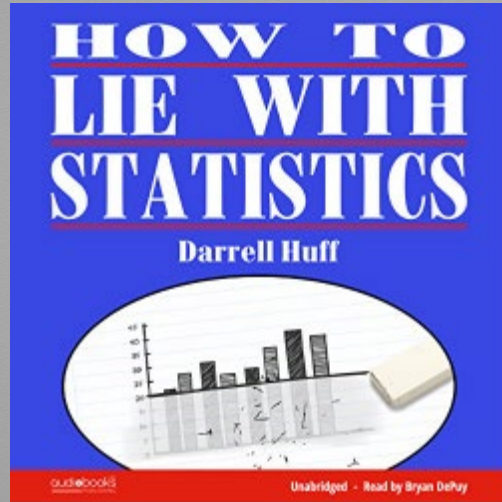
- Tableau is a **visual analytics platform** transforming the way we use data to solve problems—empowering people and organizations to make the most of their data.
- As the **market-leading choice for modern business intelligence**, Tableau analytics platform makes it easier for people to explore and manage data, and faster to discover and share insights that can change businesses and the world.
- Tableau's mission is to **help people see and understand data**, which is why their products are designed to put the user first—whether they're an analyst, data scientist, student, teacher, executive, or business user.
- From connection through collaboration, **Tableau is a powerful, secure, and flexible end-to-end analytics platform.**

- Making your data and analysis results available ***on demand*** for your managers through Excel and Tableau dashboards



Researching and Presenting Data Ethically

- Learning to understand how to research data, conduct analysis, and present results ethically



Operations Management Problems – Review

1. You have customer data in one file and a list of zip codes affected by winter storms in another file. How can you get a visualization of which customers are most affected by the weather, and then create a prioritized list of which customer to call first?
2. You do detailed customer complaint interviews with your largest accounts. How can you capture the complaint information in a structured manner, ensuring you don't miss any questions, and then readily create a chart showing the top 3 causes of complaints?
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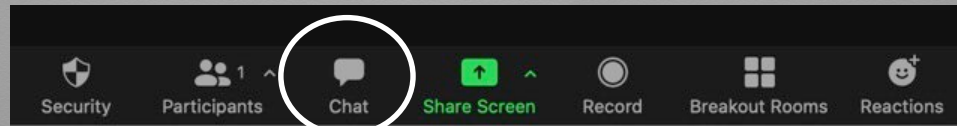
Decision Models Micro Certificate

- Gain the skills you need to ask the right questions, pull together the right data, and use data-driven optimal decision processes to solve operations complex management problems.
- Program Goals
 - Allow students to quantitatively and critically evaluate operational decisions
 - Support data-driven decision making in operations management
 - Communicate optimal decisions, supported by data analysis and visualizations, to management and other stakeholders
- Courses
 - INEG/OMGT 5443 Decision Models (existing)
 - OMGT 5833 - Advanced Decision Support Tools with Visualization for Operations Managers (new)
- Decision Models Course
 - Focus on quantitative decision models for technical and managerial problems for private and public organizations.
 - Topics include stakeholder value, Value-Focused Thinking, decision making challenges, decision traps, cognitive biases, decision processes, decision framing, influence diagrams, value hierarchy structuring, designing creative alternatives, single objective models, multi-objective additive value model, sensitivity analysis, decision trees, Monte Carlo simulation, expected value, tornado diagrams, value of information, risk preference, utility models, and communicating analysis insights.

Any Questions?

Q & A with Kirk Michealson

Type your questions in the chat section of this session.



What is Operations Management?

- ✓ Leads and manages business and government operations to effectively create and deliver products and services.
 - Includes process design, location, layout, supply chain, inventory, scheduling, production, quality, job design, maintenance, distribution and transportation.



COLLEGE OF ENGINEERING



What is Engineering Management?

- ✓ Leads technical workforce to develop new products and services to achieve strategic objectives
- ✓ Provides a bridge from engineering to managers
 - Communicates technology opportunities and challenges to managers
 - Communicates strategy and strategic objectives to engineers



Why MSOM or MSEM?

- ***Learn It Today, Use It Tomorrow!***
- 100% online
- No THESIS!
- Learn from professors with current and relevant expertise
- Flexible degree plan with only 10 graduate courses
- Earn a graduate certificate concurrently w/o taking any extra courses
- No Out-of-State Tuition = Total for a 3-hour class: from \$1,061.64 to \$1,151.64
 - \$303.88/credit hour + \$50 technology fee/credit hour (+\$30 admin fee for engineering courses)

COLLEGE OF ENGINEERING



Admission Requirements

MSOM

- Any bachelor's degree from an accredited institution
- NO GRE
- GPA 2.5 or above will be considered

MSEM

- BS in Engineering -accredited by the Engineering Commission of ABET accreditation, **AND**
- GPA ≥ 3.0 on all course work prior to the receipt of the engineering degree **OR**
- GPA ≥ 3.0 on the last 60 hours of coursework
- Conditional admission for GPA 2.90 – 2.5 possible; case-by-case basis
- No GRE

Graduate Certificates



Project Management – Learn skills to become a better project leader and manager and prepare for PMP Certification



Lean Six Sigma – Learn how to eliminate problems, remove waste and reduce variation to improve processes and create products and services



Homeland Security – Designed for industry and safety professionals to learn how to mitigate risk



Operations Management – Learn how to lead and manage business and government operations to effectively create and deliver products and services



Engineering Management – Learn how to lead a technical workforce to develop new products and services

Graduate Certificates

1. Project Management
2. Lean Six Sigma
3. Homeland Security
4. Operations Management
5. Engineering Management

- Only 4 Classes!
- Obtain as part of your Master's Degree
Classes will double count!
- Completed as stand-alone program
- 2.5 GPA
- No GRE/GMAT
- Transition to MSOM or MSEM



NEXT WEBINAR 3/9/22:

Topic: Operations Management & Engineering Management

Presented by: Dr. Greg Parnell

THANKS FOR ATTENDING!

- For information about our flexible degree program options, email msom@uark.edu or msem@uark.edu
- operations-management.uark.edu or engineering-management.uark.edu
- Registered participants will receive an email with the video link to this webinar.
We hope to see you online next month!