Course Syllabus and Schedule*
MEM 412 Operations Excellence, MEM Program, Spring Quarter 2016

Time/Room: Thur nights, 6:30 to 9:30; First class on March 31, 2016
Office Hours: By appointment
Main Texts: 1. *Factory Physics: Foundations of Manufacturing Management*. Wallace J. Hopp and Mark L. Spearman. Irwin, 2008 (3rd Edition).
2. Book: *Operations Rules: Delivering Customer Value through Flexible Operations*. David Simchi-Levi. MIT Press. 2010
3. Book: *The Goal* (*Second Revised Edition, 1992 or Third Revised Edition, 2004*-- only the appendix is different between the two). Eliyahu M. Goldratt and Jeff Cox.
4. (DON'T PURCHASE THIS YET, I MAY DROP IT): Book: *Supply Chain Network Design*. Michael Watson, Sara Lewis, Peter Cacioppi, and Jay Jayaraman. FT Press 2012.
5. Other material posted on the Course Management System.

Course Description:

This advanced operations course covers four recent and important topics:

- *Lean, Theory of Constraints, and Flexibility*. Lean techniques, pioneered at Toyota, have spread throughout the world of manufacturing and into other types of businesses. Closely related, the Theory of Constraints provides some interesting insight and background ideas. This area has continued to evolve by considering the impact of flexibility.
- *The Impact of Variability*. Related to Lean techniques, this topic also stands by itself and has powerful insights into the operations of a firm.
- *Operations Outside of Manufacturing*. Managers in services, construction, and healthcare industries have started to successfully apply advanced operations techniques and lean principles.
- *Advanced Analytics Techniques for Operations*. We will cover some advanced and recently developed topics such as analytics, robotics, Internet of Things (IoT), and advanced supply chain techniques.

Firms with deep operational capability run their businesses better and provide superior customer service. These firms reap the rewards of larger market share, higher profits, and better returns.

For a career in engineering management, you need a deep understanding of operations. As you advance towards and get to the executive suite, the strategic value of operations is too important to ignore. This is true if you run the factory, manage a supply chain, manage customer facing operations, deliver services, or run the entire firm.

I will use a mix of technical and non-technical material to help us move beyond the buzzwords to really understand a topic, understand how it works in practice, understand the latest thinking about the topic, and how it fits into the strategic mission of the firm. To ensure rigor, we will cover some of the theory behind the models (queuing, scheduling optimization, inventory theory, etc), but I assume most students have some grasp of basics. To ensure practicality, we will put the theory to test by showing how it works in practice. My goal is for you to understand why something worked so you can better apply it to the situations you will encounter.

In addition to the long term career benefits I hope you get from this course, I also want you to take away concepts you can immediately apply. One student took the ideas from class and helped his firm avoid purchasing $700,000 of machinery and another that created a more efficient software development team.

Teaching Method: Classes will be a mix of lecture, group discussion, and interactive computer exercises. The concepts will be reinforced with the text, case studies, additional readings, and homework assignments.

Prerequisites: You will need a strong working knowledge of Excel and PC's in general. You should have access to Excel for the homework assignments and case studies. Also, you will need a basic understanding of probability and statistics at the level of IE 201.

Evaluation: Grades will be based on homework and case study write-ups (75%), a final exam (15%), and class participation (10%).

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Date	Topics Covered	Reading Prior to Class and In-Class Exercises	Home-work Due
3/31	Operations in historical context; Inventory Models including EOQ, Newsvendor, and Base Stock	Factor Physics (FP), Chapters 1 (you don't have to carefully read the chapter) and 2 (skip 2.3.3-2.3.5, read the intro to 2.4 and you can skim the details)	
4/7	MRP, ERP, Toyota Production System (Lean), and Kanban. The applicability to Lean to other types of organizations	FP Chapters 3 (read the intro, you can skim the details and re-read later) and 4	HW#1
4/14	Basic factory dynamics, variability basics, queueing models, using queuing to model operations	FP Chapters 7 (read up to 7.3 prior to class, after class read 7.3. Skip 7.4 and beyond) and 8 (read before or after class. Skip 8.7 and beyond)	HW#2
4/21	Wrap-Up of Lean; Corrupting influence of variability—how to think about the impact of variability in operations.	FP Chapter 9 (skip 9.4)	HW#3
4/28	Theory of Constraints and The Goal	Reading: *The Goal*	HW#5 (The Goal)
5/5	Moving outside the facility and modeling the entire supply chain.	Reading: *Supply Chain Network Design*; In class exercise will include commercial supply chain planning tool	HW#4
5/12	Advanced topics in supply chain design: impact of oil prices, risk, multi-objective optimization and the efficient frontier ; Sales and Operations Planning (S&OP);	Reading: *Supply Chain Network Design (*read 1-3, Chpt 5, Chpt 7-8, and 11—you can skip math formulations. Optional read Chapter 12);	
5/19	Matching products, markets and strategies; Advanced inventory optimization topics; Applying analytics to operations—Internet of Things (IoT); new techniques for analyzing operations (like in quality); Robotics and Drones, Artificial Intelligence	Reading: *Operations Rules Chapters 1-4 (Chapter 5 gives another view of risk management that we covered; Chapter 10 gives another view of Oil impacts)*;	HW#6
5/26	Revenue Management	In class exercise	HW #7
6/2	Mass customization (including 3-D printing), focused factory; Scaling up Excellence—how to roll out operational improvements to the organization ; Flexibility; Supply Contracts; (optional: scheduling and lead-time quoting) ;Wrap-up and Summary	Reading: *Operations Rules Chapters 7,8,9*	HW #8
6/9	Take Home Final Exam Due: We are NOT meeting in class this night. You will submit your Final Exam via email.		

The readings listed for each week should be completed prior to the class. The homework assignments are due at the beginning of the class. No homework assignments or case study write-ups will be accepted late.

The homework assignments will be a mix of problems, case studies, and write-ups. The point total (and therefore their relative importance) will vary from week to week. More details will be available closer to the course start date and due date of the homework.

- Last Updated on Feb 6, 2016 and subject to change.
- The most recent syllabus will be posted on the class web site