

MGT 879 – HEALTHCARE OPERATIONS

COURSE SYLLABUS

CONTACT INFO

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CLASS INFO

January 14 – February 25, 2013
Mondays, Wednesdays 10:10am – 11:30am
SOM, 135 Prospect Street, Room A30

OVERVIEW

With healthcare spending in the United States exceeding 17% of GDP and the demand for health services continuing to increase, improvements in the quality and efficiency of healthcare delivery are urgently needed. This course explores opportunities for improvement in the design and management of healthcare operations. The course utilizes operations tools such as optimization with Excel solver, scheduling, queuing theory, economic analysis, decision analysis, and Monte Carlo simulation.

COURSE OBJECTIVES

This course aims to discuss applications of operations management in the healthcare industry. Specifically, the course objectives are to:

- Identify key operational challenges facing healthcare managers.
- Discuss techniques for improving efficiency in a variety of settings (hospitals, primary care, and private sector), and the associated trade-offs.
- Develop an understanding of how quantitative tools and analyses can improve decision-making in the healthcare industry.

GRADING POLICY

The class will include a combination of lectures, case discussions, and in-class exercises. Students are expected to attend each class and bring laptops for in-class demonstrations.

Required reading assignments are outlined below, with the textbook chapters serving as supplementary (optional) reading. The discussion questions are intended to help students prepare for class discussion. The final grade will be based on:

- Homework (50%)
- Merck case study (30%)
- Class participation (20%)

CASE STUDY

Groups of 3-4 students will analyze Merck's decision to license a new drug, and submit a deliverable of an 8-10 page executive summary. The case requires building a decision tree and Monte Carlo simulation model in Excel.

- "Merck & Co: Product KL-798", *University of Virginia Darden Case*
- "Risk Analysis for Merck & Co: Product KL-798", *University of Virginia Darden Case*

COURSE MATERIAL

- Recommended textbook: Winston and Albright (W&A), "Practical Management Science, 3rd edition" (ISBN 978-0534465124, new copies starting at \$38 at Amazon.com) although earlier or later editions are also acceptable.
- Software:
 - Excel Solver (free Excel add-in) or Premium Solver (not-free, but which we will only use for class demos).
 - DecisionTools Suite, including PrecisionTree and @Risk, which are Excel add-ins included in the textbook "Practical Management Science". A student copy may also be purchased for \$50, and there is a 15-day free trial available. Note, this software is NOT compatible with Macs. Also available in the basement SOM computer lab.
http://www.palisade.com/decisiontools_suite/
- Any additional cases/readings will be posted on ClassesV2.

HONOR CODE

Students are expected to follow SOM's Honor Code when submitting an assignment or group project. Please contact me if you have questions regarding this policy.

<http://writing.yalecollege.yale.edu/understanding-and-avoiding-plagiarism>

MANAGING HOSPITAL OPERATIONS

- (1) Jan 14 **Resource allocation and linear programming**
- (Optional) Winston and Albright – Chapter 3: Introduction to Optimization Modeling
- (2) Jan 16 **Hospital staff scheduling**
- (3) Jan 18 **Physician/patient appointment scheduling**
- Murray and Berwick (2003) “Advanced access: reducing waiting and delays in primary care”, *JAMA*
- Discussion questions:**
What are advantages and disadvantages of advanced access? What are some possible objectives at a primary care clinic? What uncertainties should be considered when scheduling patients? What decisions need to be made when designing an appointment system?
- (4) Jan 23 **Emergency department queuing**
- Little and Graves (2008) “Chapter 5: Little’s Law” in Chhajed and Lowe (eds.) *Building Intuition: Insights From Basic Operations Management Models and Principles*
 - (Optional) Winston and Albright – Chapter 14: Queuing Models
- (5) Jan 28 **Intensive care unit (ICU) patient flow**

DECISION MAKING UNDER UNCERTAINTY

- (6) Jan 30 **Decision trees**
- (Optional) Winston and Albright – Chapter 10: Decision Making Under Uncertainty
- (7) Feb 4 **Monte Carlo simulation**
- (Optional) Winston and Albright – Chapter 11: Introduction to Simulation Modeling
- (8) Feb 6 **Monte Carlo simulation part 2**
- (9) Feb 11 **Case study: Freemark Abbey Winery**
- Krasker (1980) “Freemark Abbey Winery”, *HBS Case*
- Discussion questions:**
Build a decision tree using PrecisionTree software that shows the sequence of

decisions and uncertain events that Freemark Abbey faces. What is the winery's optimal decision? What is their expected revenue?

HEALTH INSURANCE APPLICATIONS

(10) Feb 13 **Health insurance markets**

- (Optional) Rothschild and Stiglitz (1976) "Equilibrium in Competitive Insurance Markets", *Quarterly Journal of Economics*

VALUING MEDICAL INTERVENTIONS

(11) Feb 18 **Cost effectiveness analysis (CEA) of medical technology**

Read **one** of the following articles (to be assigned later):

- Pignone et al (2006) "Aspirin, statins or both drugs for the primary prevention of coronary heart disease events in men: a cost-utility analysis", *Annals of Internal Medicine*
- Kim and Goldie (2008) "Health and economic implications of HPV vaccination in the United States", *NEJM*
- Mueller et al (2008) "Cost-effectiveness analysis of insecticide-treated net distribution as part of the Togo Integrated Child Health Campaign", *Malaria Journal*
- Smith and Roberts (2000) "The cost-effectiveness of sildenafil (Viagra)", *Annals of Internal Medicine*
- Rosenfeld (2011) "Bevacizumab versus ranibizumab for AMD", *NEJM*
Raftery et al (2007) "Ranibizumab (Lucentis) versus bevacizumab (Avastin): modeling cost effectiveness", *British Journal of Ophthalmology*
Haddrill (2005) "Lucentis vs Avastin: a macular degeneration treatment controversy"
- Hoerger et al (2004) "Screening for type 2 diabetes mellitus: a cost-effectiveness analysis", *Annals of Internal Medicine*

Discussion questions:

Assuming the perspective of Medicare/insurer, make a recommendation about whether to cover the particular treatment for a hypothetical patient, using evidence from the article below.

(12) Feb 20 **CEA part 2**

- Gillick (2004) "Medicare coverage for technological innovations – time for new criteria?", *NEJM*
- Garber (2008) "A menu without prices", *Annals of Internal Medicine*
- Neumann et al (2005) "Medicare and cost-effectiveness analysis", *NEJM*

- Tunis (2004) “Why Medicare has not established criteria for coverage decisions”, *NEJM*

Discussion questions:

How does Medicare make coverage decisions? What are the benefits of cost-effectiveness analysis? What are the limitations?

PUBLIC HEALTH APPLICATIONS

(13) Feb 25 **HIV and influenza modeling**

- Khazeni et al (2009) “Effectiveness and cost-effectiveness of expanded antiviral prophylaxis and adjuvanted vaccination strategies for an Influenza A (H5N1) Pandemic”, *Annals of Internal Medicine*

COURSE SUMMARY

Class	Date	Topic	Due in class
1	Mon, Jan 14	Resource allocation and linear programming	
2	Wed, Jan 16	Hospital staff scheduling	
3	Fri, Jan 18	Physician/patient appointment scheduling	
	Mon, Jan 21	** NO CLASS – MLK Holiday **	
4	Wed, Jan 23	Emergency department queuing	Homework 1
5	Mon, Jan 28	ICU patient flow	
6	Wed, Jan 30	Decision trees	
7	Mon, Feb 4	Monte Carlo simulation	Homework 2
8	Wed, Feb 6	Monte Carlo simulation part 2	
9	Mon, Feb 11	Case study (Freemark Abbey Winery)	Homework 3
10	Wed, Feb 13	Health insurance markets	
11	Mon, Feb 18	Cost-effectiveness analysis (CEA) of medical technology	Homework 4
12	Wed, Feb 20	CEA part 2	
13	Mon, Feb 25	HIV and influenza modeling	