

# **OM 337.2: SUPPLY CHAIN MODELING AND OPTIMIZATION**

**Spring 2014**

**SYLLABUS**

**Unique No. 04380: MW 12:30 - 2:00 PM in UTC 3.112**

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## **COURSE DESCRIPTION**

Many managerial decisions—regardless of their functional orientation—are increasingly based on analysis using quantitative models from the discipline of management science. Management science tools, techniques and concepts (e.g., data, models, and software systems) have dramatically changed the way business operates in the supply chain, manufacturing, service operations, marketing and finance. This subject is designed to introduce students to the various ways of modeling, or thinking structurally about, decision problems in order to enhance decision-making skills. It is impossible to teach all there is to know about management science techniques in a one semester course; rather, the goal is to enable students to become intelligent users of techniques broadly categorized as optimization and simulation. Emphasis will be placed on how, what, and why these techniques are useful in managerial practice.

## **COURSE OBJECTIVES**

The main objectives of this course are:

- To enable the students to find some structured ways of dealing with complex managerial decision problems.
- To introduce students to simple decision models and management science ideas that provide powerful and (often surprising) qualitative insights about a large spectrum of managerial problems.
- To provide students with tools for deciding when and which decision models to use for the specific problems.
- To give the students a feel for the kinds of problems that can be tackled using spreadsheet modeling and decision analysis.
- To provide the students with more powerful ways of using spreadsheets, this will be a ubiquitous tool in their managerial careers.

Co-requisites: OM335 or OM335H.

## **COURSE MATERIALS**

This course is a mixture of lectures and case-discussions. The readings for the class come from the following sources:

1. Winston, Wayne L. and S. Christian Albright. 2012. *Practical Management Science*, 4<sup>th</sup> Edition. Mason, OH: South-Western Cengage Learning. (This is the required course textbook and will be referred to as the “Textbook 1” throughout the rest of this document. Note: this is available at the Coop Book Store in a “bundle”: BNDL: PRCTICAL MGMT SCI + STDT BND IN CARD with ISBN 9781133073406. More information on the book (including known errata) is available at [http://www.kelley.iu.edu/albright/PMS\\_Home.htm](http://www.kelley.iu.edu/albright/PMS_Home.htm).)
2. Kelton, W. D., J. S. Smith, D. T. Sturrock. 2014. *Simio and Simulation: Modeling, Analysis, and Applications*, 3<sup>rd</sup> Edition, Sewickley, PA: Simio LLC. (This book is also required for the course and will be referred to as “Textbook 2.” It is available in electronic form at <http://www.simio.com/publications/SSTextbook/index.php> for \$29. After you have purchased the book, additional resources and known errata are available at <http://www.simio.com/publications/SASMAA/students/>.)
3. Handouts from the Professor.

The course schedule at the end of this document lists, for every class session, the topic, readings, cases, assignments, and anything else of importance. Please read this schedule carefully before every session. If the schedule changes, I will provide updates. Because class time is our most precious and inelastic resource, **please come to every class prepared. Essential preparation includes reading the assigned readings and cases, doing the assignments, and bringing these resources and materials to each class.**

I will provide electronic copies of the PowerPoint slides (and other materials available in electronic format) at Blackboard before each class session.

### **PERFORMANCE EVALUATION**

The performance criteria are weighted as follows:

Test 1 (see course schedule for the date)	15%
Test 2 (see course schedule for the date)	15%
Final Exam (Registrar Schedule: Friday, May 9, 2:00-5:00 pm)	25%
Individual Homework Assignments (see course schedule for due dates)	25%
Group Homework Assignments (see course schedule for due dates)	12%
Essay	3%
Class Participation	5%

Homework assignment, tests, and exam grades will be posted at Blackboard shortly after they are graded. Please check your grades repeatedly throughout the semester and report any discrepancies to me immediately.

Final letter grades in this course will be assigned according to the following final numeric grades:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
≥93.3	≥90.0	≥86.6	≥83.3	≥80.0	≥76.6	≥73.3	≥70.0	≥66.6	≥63.3	≥60.0	<60.0

**Tests and Final Exams:** The exams will require both quantitative and qualitative responses. The split will, however, be weighed more to the quantitative due to the emphasis in this class and on the homework assignments. For the tests, you will be allowed to bring in *one* (1) sheet of 8 ½”x11” paper (double sided) with your formulas and notes and your calculator. For the final exam, you will be allowed to bring in *three* (3) sheets of 8 ½”x11” paper (double sided) with your formulas and notes and your calculator. Any

probability distribution or other tables will be provided with the exam, so you needn't waste your sheets on these details.

The final exam will be a comprehensive exam covering materials from the class notes, readings, and assignments although more emphasis will be given to material not covered on previous tests. I will make a statement about this in advance of the final exam.

**Homework Assignments:** Homework assignments will be downloadable off Blackboard. Each homework assignment will be posted on the web about one to two weeks in advance of the due date (see the course schedule at the end of this document for assignment due dates). Each question on an homework assignment will be graded as a 10 (perfect), 9 (minor errors), 8 (good attempt), 6.5 (attempt) and 0 (otherwise). All assignments are due at the *beginning* of class on the date listed in the course schedule at the end of this syllabus. No late assignments will be accepted.

Homeworks are designed to promote class preparedness, provide learning reinforcement, and extend the knowledge you have gained in class and from your readings. You will find that the homeworks provide excellent learning feedback and are a confidence-building tool. The assignments will also help with your preparation for the tests and exams.

There are two types of homework assignments: individual and group. **Individual homework assignments** are skill building exercises. As the name suggests, you will turn in your homework as individuals. For these assignments, you are permitted to work with other students in the course because an important element of this course is teamwork. However, the solution that you turn in must be your own. At the end of the semester, your lowest individual homework assignment grade will be dropped. Each individual homework will weigh equally into your final individual homework grade.

**Group homework assignments** are more substantial case exercises completed in self-selected groups of four or five people. Teamwork on these assignments is not only beneficial but essential. Each group will work as a team to answer the assignment questions and submit a single group solution set. The group homework needs to be typed doubled-spaced in 12pt font. Please form your groups and email this information to the TA, Patrick Kriebel ([Patrick.Kriebel@phd.mcombs.utexas.edu](mailto:Patrick.Kriebel@phd.mcombs.utexas.edu)). Since the first group homework report is due on 02/12/14, your groups should be formed as soon as possible. Each group homework will weigh equally into your final group homework grade.

Note, I will not add an assignment beyond what is already listed in the course schedule but I may choose to shift an assignment later in the schedule or eliminate it altogether, if necessary.

**Essay:** This is an individual exercise in which you are to identify and research a current business problem that is related to this course. In the essay, you must describe a problem, discuss its importance, justify that it is a significant supply chain modeling and optimization (analytics) issue, and discuss how it might be addressed. Please limit yourself to three typed pages with 1.5 line spacing and 12pt font. The essay will be graded on content, persuasiveness, and style. I would encourage you to discuss your proposed topic with me.

**Class Participation:** Sixty percent of your class participation grade will be based on attendance at certain critical class sessions during the semester (case discussions and industry guest lectures – see course schedule for class sessions with an “\*”). The remaining 40 percent will be used to encourage a productive learning environment. It is important that everyone come to class prepared and willing to contribute to discussion. Ideally, you will make concise, insightful, and eloquent comments in every class. However, I also recognize the importance of making smaller contributions, including asking good questions. I believe that the learning environment is best when the discussion is not dominated by a few, but moved along incrementally by all of us. Do not be afraid to make points that you may regard as minor, ask clarifying questions, or otherwise contribute in small ways. Lastly, at the beginning of most classes, we

will start with a discussion of what is going on in the news related to supply chain and logistics. *This a great way to contribute to class discussions and earn your participation grade.*

**Regrade Requests:** If you would like a regrade of any homework assignment, test, or exam, please appeal it within SEVEN (7) CALENDAR DAYS of:

- a) For the tests and homework assignments, the date that I attempt to return it to you in class.
- b) For the final exam, the first class day of the semester immediately following your course.

**After these seven days, I will consider all grades final** unless they have been appealed.

Please realize that there are standard policies for point deductions for each problem with any exam or assignment, so unless the grader has misapprehended your intent or misread your work, any partial credit is unlikely to change.

### **OTHER IMPORTANT INFORMATION:**

**Feedback:** You and I will work together to create the best learning environment possible. Your informal feedback is very important to me. Please let me know throughout the semester if there is anything I can do to make this class better for you.

**Logistics:** Attendance at each class session is expected unless otherwise noted. If you are unable to attend a class on a given day, please check with your classmates to find out whether any in-class announcements were made. Please use e-mail for questions wherever feasible versus the telephone.

**Blackboard:** Password-protected class sites will be available for all accredited courses taught at The University. Syllabi, handouts, assignments and other resources are types of information that may be available within these sites. Site activities could include exchanging e-mail, engaging in class discussions and chats, and exchanging files. In addition, class e-mail rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1. For information on restricting directory information see: <http://www.utexas.edu/student/registrar/catalogs/gi02-03/app/appc09.html>.

**Honor Code:** The McCombs School of Business has no tolerance for acts of scholastic dishonesty. The responsibilities of both students and faculty with regard to scholastic dishonesty are described in detail in the BBA Program's Statement on Scholastic Dishonesty at <http://www.mcombs.utexas.edu/BBA/Code-of-Ethics.aspx>. By teaching this course, I have agreed to observe all faculty responsibilities described in that document. By enrolling in this class, you have agreed to observe all student responsibilities described in that document. If the application of the Statement on Scholastic Dishonesty to this class or its assignments is unclear in any way, it is your responsibility to ask me for clarification. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since dishonesty harms the individual, all students, the integrity of the University, and the value of our academic brand, policies on scholastic dishonesty will be strictly enforced. You should refer to the Student Judicial Services website at <http://deanofstudents.utexas.edu/sjs/> to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

**McCombs Classroom Professionalism Policy:** The highest professional standards are expected of members of the McCombs community. The collective class reputation and the value of the McCombs experience hinges on this.

Faculty are expected to be professional and prepared to deliver value for each and every class session. Students are expected to be professional in all respects. Classroom expectations of students include:

- Students will arrive on time.

- Students will be fully prepared for each class.
- Students will attend the class section to which they are registered.
- Students will respect the views and opinions of their colleagues. Disagreement and debate are encouraged. Intolerance for the views of others is unacceptable.
- Phones and wireless devices are turned off unless otherwise instructed by the professor.

**Academic Accommodations:** The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>. Additionally, accommodation for observance of religious holidays is also possible. Following UT Austin policy, please notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

**Campus Safety:** Please note the following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety/>:

- Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.
- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- Students requiring assistance in evacuation should inform their instructor in writing during the first week of class.
- In the event of an evacuation, follow the instruction of faculty or class instructors.
- Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.
- Behavior Concerns Advice Line (BCAL): 512-232-5050
- Further information regarding emergency evacuation routes and emergency procedures can be found at: [www.utexas.edu/emergency](http://www.utexas.edu/emergency).”

**Miscellaneous Information:** On February 13-14 and May 10-12, 2014, I may have a professional commitments off-site. On these dates, it is likely that I will have an email connection but it may be limited.

## OM 337.2: Tentative Schedule

<b>Date*</b>	<b>Topic</b>	<b>Readings</b>	<b>Hwk. Due</b>
1/13	Course Introduction	Textbook 1, Chapter 1	
1/15	Introduction to Modeling	Textbook 1, Chapter 1	
1/22	Spreadsheet Modeling Basics (Part I)	Textbook 1, Chapter 2 (Section 2.1-2.5)	Individual Homework 1
1/27	Spreadsheet Modeling Basics (Part II)	Textbook 1, Chapter 2 (Sections 2.6-2.8)	Individual Homework 2
1/29	Introduction to Optimization and Linear Programming Models (Part I)	Textbook 1, Chapter 3 (Section 3.1-3.3)	
2/3	Introduction to Optimization Linear Programming Models (Part II)	Textbook 1, Chapter 3 (Sections 3.4-3.6)	Individual Homework 3
2/5	Additional Examples of Linear Programming Models in Supply Chain Management (Part I)	Textbook 1, Chapter 3(Sections 3.7-3.11); Textbook 1, Chapter 4 (Sections 4.3-4.6)	
2/10	Additional Examples of Linear Programming Models in Supply Chain Management (Part II)	Textbook 1, Chapter 3(Sections 3.7-3.11); Textbook 1, Chapter 4 (Sections 4.3-4.6)	Individual Homework 4
2/12*	Discussion of Case Study 1; Review for Test 1	Case Study 1	Group Homework 1: Case Study 1 Report
2/17	Test 1		
2/19	Logistic Network Models (Part I)	Textbook 1, Chapter 5 (Sections 5.1, 5.2, 5.4)	
2/24	Logistics Network Models (Part II)	Textbook 1, Chapter 5 (Sections 5.3, 5.5)	Individual Homework 5
2/26	Location-Assignment Problems with Integer Variables (Part I)	Textbook 1, Chapter 6 (Sections 6.1, 6.2, 6.5)	
3/3	Location-Assignment Problems with Integer Variables (Part II)	Textbook 1, Chapter 6 (Section 6.5)	Individual Homework 6
3/5	Introduction to Nonlinear Optimization	Textbook 1, Chapter 7 (Section 7.1-7.3)	
3/17	Nonlinear Optimization and Pricing Models	Textbook 1, Chapter 7 (Section 7.3)	Individual Homework 7
3/19*	Discussion of Case Study 2; Review for Test 2	Case Study 2	Group Homework 2: Case Study 2 Report
<b>3/24*</b>	<b><i>Guest Speaker: Terry Behrens (AMD)</i></b>		
3/26	Test 2		
3/31	Introduction to Simulation	Textbook 2, Chapter 1; Textbook 2, Chapter 3 (pages 39-43)	
4/2	Modeling Randomness (Part I)	Textbook 1, Chapter 10 (Section 10.1-10.2)	Essay
4/7	Modeling Randomness (Part II)	Textbook 1, Chapter 10 (Section 10.1-10.2)	
4/9	Basics of Queueing Theory (Part I)	Textbook 2, Chapter 2	Individual Homework 8
4/14	Basics of Queueing Theory (Part II)	Textbook 2, Chapter 2	
4/16	Process Simulation with Simio (Part I)	Textbook 2, Chapter 4	Individual Homework 9

4/21	Process Simulation with Simio (Part II)	Textbook 2, Chapter 4	
4/23	Process Simulation with Simio (Part III)	Textbook 2, Chapter 4	Individual Homework 10
4/28	Process Simulation with Simio (Part IV)	Textbook 2, Chapter 4	
4/30*	Discussion of Case Study 3; Course Evaluations; Course Wrap-up and Review for Final	Case Study 3 (Handout)	Group Homework 3: Case Study 3 Report
5/2	No class	No reading	Individual Homework 11 (by 5pm in CBA 5.202 - Morrice mailbox

\* Attendance will be counted as class participation.