# IOE 419 - Service Operations Management

## Course Outline

### Winter, 2014

### TENTATIVE COURSE OUTLINE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
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</thead>
<tbody>
<tr>
<td>8-Jan</td>
<td>Introduction, course overview, importance of services in economy</td>
<td>Chapter 1, Review Ch 2, especially section 2.9</td>
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<tr>
<td>13-Jan</td>
<td>Taxonomy of location models and continuous location model</td>
<td>Ch. 4, sections 4.1, 4.2, Appendix B pages 29-32</td>
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<tr>
<td>15-Jan</td>
<td>Set covering model</td>
<td>Ch. 4, section 4.3</td>
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<tr>
<td>20-Jan</td>
<td><strong>NO CLASS -- MARTIN LUTHER KING DAY</strong></td>
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<tr>
<td>22-Jan</td>
<td>Maximum covering model</td>
<td>Ch. 4, section 4.3, 4.4</td>
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<tr>
<td>27-Jan</td>
<td>Median and fixed charge location models</td>
<td>Ch. 4, section 4.4, 4.5</td>
</tr>
<tr>
<td>29-Jan</td>
<td>Multiobjective optimization</td>
<td>Ch. 2, section 2.8, Ch. 4, section 4.5</td>
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<tr>
<td>3-Feb</td>
<td>Multiobjective location models</td>
<td>Ch. 4, section 4.5</td>
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<tr>
<td>5-Feb</td>
<td>Deterministic inventory issues in services</td>
<td>Ch. 5, sections 5.1-5.4</td>
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<tr>
<td>10-Feb</td>
<td>Stochastic inventory issues in services</td>
<td>Ch. 5, sections 5.5, 5.6</td>
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<tr>
<td>12-Feb</td>
<td>Resource Allocation issues in services</td>
<td>Ch. 6, sections 6.1-6.5</td>
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<tr>
<td>17-Feb</td>
<td>Short term workforce scheduling</td>
<td>Ch. 7, sections 7.1-7.3</td>
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<tr>
<td>19-Feb</td>
<td>Short term workforce scheduling</td>
<td>Ch. 7, section 7.4</td>
</tr>
<tr>
<td>24-Feb</td>
<td>Review for quiz</td>
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<tr>
<td>26-Feb</td>
<td><strong>QUIZ -- IN CLASS</strong></td>
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<tr>
<td>3-Mar</td>
<td>SPRING BREAK</td>
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<tr>
<td>5-Mar</td>
<td>SPRING BREAK</td>
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<tr>
<td>10-Mar</td>
<td>Queueing theory -- Basic principles. Kendall’s notation, Memoryless Property of Exponential, CK Equations</td>
<td>Ch. 3, up to 3.4.2.2</td>
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<tr>
<td>12-Mar</td>
<td>Fundamental Markovian Steady State Equation (M/M/1, M/M/s)</td>
<td>Ch. 3, from 3.4.2.2 through 3.6</td>
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<tr>
<td>17-Mar</td>
<td>Finite population, finite queue, M/G/1 and Time dependent queueing</td>
<td>Ch. 3, section 3.7</td>
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<tr>
<td>19-Mar</td>
<td>Linking performance to scheduling</td>
<td>Ch. 7, sections 7.5-7.7</td>
</tr>
<tr>
<td>24-Mar</td>
<td>Priority queueing</td>
<td>Ch. 9, sections 8.1-9.2</td>
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<tr>
<td>26-Mar</td>
<td><strong>Call center design and heavy traffic approximations</strong></td>
<td>Ch. 9, section 9.3</td>
</tr>
<tr>
<td>31-Mar</td>
<td>Customer scheduling</td>
<td>Ch. 9, section 9.4</td>
</tr>
<tr>
<td>2-Apr</td>
<td>Long term workforce scheduling</td>
<td>Ch. 8, sections 8.1-8.4</td>
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<tr>
<td>7-Apr</td>
<td>Long term workforce scheduling and the newsvendor problem</td>
<td>Ch. 8, sections 8.5-8.7</td>
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<tr>
<td>9-Apr</td>
<td>Vehicle Routing - arc routing</td>
<td>Ch. 10, 10.1-10.3</td>
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<tr>
<td>14-Apr</td>
<td>Vehicle Routing - node routing</td>
<td>Ch. 10, 10.4-10.5</td>
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<tr>
<td>16-Apr</td>
<td><strong>NO CLASS</strong></td>
<td></td>
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<tr>
<td>21-Apr</td>
<td>Vehicle Routing and Review for Final</td>
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<tr>
<td>23-Apr</td>
<td><strong>FINAL EXAM</strong></td>
<td>Tuesday 4/29 1:30-3:30 pm</td>
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BRIEF COURSE DESCRIPTION:

The service industry accounts for about 75% of the US employment and almost 60% of all personal consumption. This course will explore the service industries in the US (e.g., transportation, health care, retailing, restaurants, education, emergency services) with a view toward developing models that allow planners to reduce costs and enhance customer service. Topics to be covered include facility location planning for services (e.g., ambulances, fire stations, repair facilities, cell phone facilities), resource allocation problems, inventory management issues in the service sector, workforce planning and scheduling, yield and demand management, queueing analysis and design of service systems, call center management, and vehicle routing in the service industries.

In addition to learning about the service industry, the course has a secondary objective of introducing students to the non-textbook literature. Some of the course will be based on case studies that were documented in Interfaces, a journal published by INFORMS, the Institute for Operations Research and the Management Sciences. This journal is designed to be accessible to a broad range of readers including undergraduate and graduate students, working engineers and managers. Students will be exposed to a number of papers in the literature spanning a variety of problems in the service sector and a number of different industries. Students will learn to read such papers critically.

COURSE REQUIREMENTS:

Students will be graded on the following:

- Homework assignments (approximately one per week) 35% total
- One midterm exam 25% total
- Written summary of one paper in the literature 10% total
- Final exam 30% total

The midterm exam will be on February 26. The FINAL exam will be during the regularly scheduled time, as per the university guidelines for final exams. This time is Tuesday, April 29, 2013, from 1:30-3:30 pm.

Students are expected to come to all classes (unless they notify me in advance that they will not be able to attend a particular class). Students are expected to have read the assigned readings from the text (and any other material) and to be prepared to discuss the readings in class. Some readings will also form the basis for homework assignments.

Students may work together on homeworks, but each student is to hand in his/her own work.

Students should have access to a portable computer with Excel and the Excel Solver installed. The computer should be brought to class every day as there will be in-class assignments almost every day.
INSTRUCTOR and IA:

INSTRUCTOR:  Mark S. Daskin  
Industrial and Operations Engineering Department  
IOE 1877A  
Phone: 734-764-9410 (email is strongly preferred. See note below about email.)  
Email:  msdaskin@umich.edu

IA: Ariella Rose  
Email: akrose@umich.edu

Because of the large volume of emails that I receive, please send all emails with the following text at the beginning of the subject line: IOE 419. This will help me respond in a timely manner. Also, be sure to send emails from your UMICH account; emails from other accounts may go to SPAM.

OFFICE HOURS:
Daskin:  Monday and Friday 1-4 in IOE 2717. Due to travel, I may have to miss some office hours. In that case, alternate office hours will be identified, if possible. Also, you can make an appointment with me for times other than my office hours by emailing me.

Rose:  Tuesday 12-2. Location to be announced.

REQUIRED TEXT:
Almost all readings and most problem assignments will be taken from the following text:


Note that the entire text is available FREE to UMICH students in PDF format at

http://mirlyn.lib.umich.edu/Record/011201266

or go to http://onlinelibrary.wiley.com.proxy.lib.umich.edu/advanced/search and type in Daskin as the Author and Service Science as the Publication Title and hit Search.

The website for the book is:

http://www-personal.umich.edu/~msdaskin/servicescience/

This site includes many examples relevant to the book and the course as well as some stand-alone software that may be useful to you.

In addition students will be given papers from journals such as Interfaces which will be required reading.
OTHER TEXTS: (not required!!)


UNIVERSITY OF MICHIGAN DISABILITY STATEMENT:

The University of Michigan is committed to providing equal opportunity for participation in all programs, services and activities. Request for accommodations by persons with disabilities may be made by contacting the Services for Students with Disabilities (SSD) Office located at G 664 Haven Hall. The SSD phone number is 734-763-3000. Once your eligibility for an accommodation has been determined you will be issued a verified individual services accommodation (VISA) form. Please present this form to me at the start of the term or at least two weeks prior to the accommodation date (test, project, etc...)

ADDITIONAL POTENTIAL READINGS:

The course will also be based on readings from the literature (mostly from the journal *Interfaces*). Links to these papers will be posted on C-Tools as we encounter them in the course. These readings are listed below. Not all of them will be used in this course and there may be others that are added as the course progresses.

Sports:


**Location Modeling:**


**Resource Allocation:**


**Yield Management and Demand Management:**


Vehicle Routing


Workforce Management:


Call Centers:

34. Whitt, W., 2007, "What you should know about queueing systems to set staffing requirements in service systems," Naval Research Logistics, 54:5, 476-484.


Airline Scheduling:


Auctions:


**Districting:**


**Other Topics:**


