OM 352: Management Science

Spring 2015 Course Syllabus

Section 001 (CRN 12532)

Dr. Harvey Singer

Office   Enterprise Hall (ENT), Room 144.
Office Hours  Monday, Tuesday, and Thursday from 1:00 to 3:00 PM; or by appointment. (Schedule subject to change)
Phone    (703) 993-1798.
Fax      (703) 993-1809.
E-mail   h singer@gmu.edu
Website  https://mymasonportal.gmu.edu

Class Session  Thursday from 7:20 to 10:00 PM in Enterprise Hall room 277 (ENT 277).

Description
This is a course in applied operations research for business management. Business situations are represented by analytical mathematical models solved by the effective application of the methods mathematical programming and probabilistic process analysis. Emphasis is placed on the proper association of a specific methodology with a particular type of business problem. Specific topics include linear programming, integer programming, transportation problems, goal programming, network flow models, decision analysis, waiting line models, and Monte Carlo simulation. Emphasis is also placed on the effective written communication of technical data and results. Extensive use is made of computer software in problem solving.

Prerequisites
1. OM 301, Operations Management, with a grade of C or higher and degree status.
2. Prerequisites are solely and strictly enforced by the Office of Academic and Career Advising without input from me. Students not meeting the prerequisites will be dropped without input from me.
3. Essential and expected knowledge: Proficiency in elementary algebra and geometry. Familiarity with recent versions of MS Word and PowerPoint; proficiency with Excel. Deficiencies should be self-remediated.

Required Text
The 11th Edition supersedes and replaces all previous editions. I will not support any edition of the textbook other than that stated above.

Available from the Mason bookstore in a three-hole punch version. (This is an exact reproduction of the hardcover version.)

It is not necessary to purchase the access code. Any data files required for textbook problems will be posted on the Blackboard course website.

2. The text is supplemental reading and is not a substitute or replacement for classroom instruction.

Undergraduate Program Learning Goals (Goals addressed in this course are in **bold**)

1. Our students will be competent in their discipline.
2. **Our students will be aware of the uses of technology in business.**
3. Our students will be effective communicators.
4. **Our students will have an interdisciplinary perspective.**
5. **Our students will be knowledgeable about global business and trade.**
6. Our students will recognize the importance of ethical decisions.
7. Our students will be knowledgeable about the legal environment of business.
8. **Our students will be knowledgeable about team dynamics and the characteristics of effective teams.**
9. Our students will understand the value of diversity and the importance of managing diversity in the context of business.
10. **Our students will be critical thinkers.**

ISOM Major Learning Goals (Goals addressed in this course are in **bold**)

1. **Apply knowledge of information technology and business functions to understand its application in assessing, designing and improving business processes.**
2. Develop data organization, storage and processing solutions to support organizational needs for information management. They will also have the option of developing skills in the area of supporting decision making through business intelligence solutions.
3. Use knowledge of computer networks as part of the IT solutions for improving business processes. They will also have option of developing more advanced skills in the areas of network and security.
4. **Effectively manage information technology projects.**
5. Understand the overall systems development life cycle and be able to recommend IT system solutions accordingly. They will also have option of learning appropriate development tools to develop prototype of IT solutions for business management.

Specific Course Objectives

1. To master the essentials of the concepts and methodologies of the tools of management science and to apply those methodologies to solve practical technical business problems.
2. To provide a sound basis in management science for the student’s future academic and professional careers.
3. To foster critical thinking and independent problem solving skills. Specifically, to gain the ability to independently analyze business data and to model business situations, and to understand and learn from the data.
4. To foster the clear communication and presentation of technical model results.
5. To raise awareness of ethics in the practice of management science.
**Approach**
1. Geared for the future business professional engaged in decision support and/or decision making. The emphasis is on practical business applications rather than on technical rigor. The format will be lectures, but discussions and questions are highly encouraged.
2. As the instructor, I am responsible for teaching the best course possible, including providing the best possible resources which promote learning. Students are individually and solely responsible for their own learning, including the application of the information presented, as demonstrated by performance on the graded homework, quizzes, and exams. I will use my office hours to meet with students individually to work with them on a one-to-one basis to help their understanding and mastery of the material.

**Disability**
All academic accommodations due to disability must be arranged by the student with the Office of Disability Services (ODS); contact ODS at 703-993-2474. I will cooperate with ODS to the greatest extent possible to accommodate a student’s special needs.

**Honor Code**
1. Students are obligated to strict adherence to the University honor system and code as stated in the 2014-2015 University Catalog (online at [http://catalog.gmu.edu](http://catalog.gmu.edu)). Honor code expectations are stated explicitly in the School of Management Honor Code Pledge posted on the Blackboard OM 352 course website. Your enrollment in this course is taken to be your implied affirmation of this pledge.
2. Specifically:
   - All work submitted for a grade, including exams, quizzes, and homework assignments, are to be completed individually, on your own, and alone.
   - Copying quiz or exam answers from another student and/or allowing your answers to be copied by another student are strictly and absolutely forbidden.
   - Communication and collaboration, or suspicion thereof, of any kind between students during exams and quizzes is strictly and absolutely forbidden.
   - Using an impermissible aid on any quiz or exam such as unauthorized notes or electronic devices with communication and Internet connectivity is strictly and absolutely forbidden.
   - Any evidence or suspicion of collaboration on graded homework will be construed as an honor code violation.
   - Removing an exam from the classroom and sharing information about exams with other students is strictly and absolutely forbidden.
3. Any violations of the honor code will result in an immediate filing of formal charges with the University Honor Committee which will be aggressively pursued with great vigor.
4. Registration in this course is taken as your implied compliance with the honor code policy in general and the specific terms cited in item 2 above.

**Connectivity**
1. It is the student’s responsibility to have reliable and adequate Internet connectivity and access (including GMU computers available on campus).
2. For technical assistance, visit the ITU Support Center at http://itusupport.gmu.edu/ or call 703-993-8870 or send e-mail to support@gmu.edu. However, it is solely the student’s responsibility to determine and resolve connectivity and other problems.

E-mail Contact
1. I communicate remotely with students only by GMU e-mail. I will not reply to voice mail messages left on my GMU office telephone.
2. For security and confidentiality, I will only reply to GMU e-mail addresses. E-mail from yahoo or gmail or any other non-Mason account will be deleted without reply.
3. I will only reply to student e-mail that is signed with your full name and that states your course and section. E-mails without this information will not receive a reply.
4. I check and respond to e-mail during my posted office hours. I do not check or respond to e-mail at night after business hours or on the weekends.
5. Expect a response to an inquiry within 1 to 2 days after I read the e-mail.

Class Etiquette
Be courteous to and respectful of others in class. Please refer to the document “Lecture Etiquette” posted under the link “Getting Started.”

Class Participation
1. Performance is highly associated with class attendance and participation.
2. Students are expected to attend all scheduled classes.
3. Class participation consists of active engagement in the presentation of material and through questions and discussions.
4. The student is solely responsible for all assignments and material presented in class even if missed due to absence.

Course Website on Blackboard
1. Login to https://mymasonportal.gmu.edu and click on the “Courses” tab for the link to your OM 352 section. (Note: This is a new website specific to this semester and section and is currently under construction.)
2. My Blackboard OM 352 course website consists of separate pages and links containing this syllabus, announcements and assignments, PowerPoint presentations, supplemental notes, solutions to some textbook and homework problems, and student grades. There is an intuitive architecture to the organization of the course website; the student should become familiar with navigating through it.
3. You should navigate the folders on the “Course Content” page often, perhaps several times a week. The website is continually being maintained. Course documents are continually created, edited, revised, expanded, and posted. The student is solely responsible for staying current with the course.
4. As a convenience to the student to alleviate the burden of taking notes in class and to give their full attention to the discussion, downloadable versions of the lecture presentations are posted on my Blackboard OM 352 course website. These slide sets are located on the “Course Content” page in the “Topical Course Coverage” folder, which is itself organized by topic (and corresponding textbook chapter). These are condensed and abridged versions
(with shortened coverage and content) of the corresponding presentations delivered in lecture.

- It is strongly recommended that students download the pertinent slide sets to be presented before class. Also, students should have a pen in hand during class to augment the downloaded versions with their own notes.

5. The coverage planned for the next lecture and recitation will be announced in class and posted in the “Next Class” folder on the Course Content page. Students will be informed beforehand of the pertinent documents to be presented in the next class.

6. Important course announcements, including dates and descriptions of exams and quizzes, will be posted in the “Announcements” folder on the Course Content page. The student is solely responsible for the information contained these announcements.

7. Homework assignments and their due dates are specified in documents located in the “Homework Assignments” folder on the Course Content page. The student is solely responsible for submitting all course deliverables on their due date.

8. It is strongly recommended that students download the pertinent course documents well before assignment due dates and exams (e.g., sample problems and sample exams).

9. All course related documents posted to the OM 352 course website constitute permanent attachments to this syllabus once they are promulgated in this fashion.

10. The course website is an electronic medium to facilitate the transfer and dissemination of the course content. Specifically, it is provided as a repository of course content and information so as to augment classroom presentations. The website is not a substitute or replacement for attending class. On-line is not on vacation!

Grading Metrics

1. The course is scored and graded on a point system; the value of the course is 1250 points.

2. The metrics used for determining the final course grade are the scores earned on:
   - all three (3) exams (1000 points max),
   - all three (3) technical quizzes (120 points max),
   - all three (3) participation quizzes (30 points max)
   - all ten (10) submitted and graded problem sets/case studies (100 points max).

3. Each of the aforementioned grading instruments is described in the paragraphs below.

4. A numerical final course total score is calculated as the sum of scores earned on all exams, quizzes, homeworks, and project (out of a maximum possible score of 1250 points).

5. The final course letter grade is assigned objectively and strictly according to the numerical final course total score. (See “Course Grade” below.)
   - There is no “extra credit” of any kind, for any reason.
   - Final total point scores are NOT “bumped” or rounded up to the next higher letter grade.

Homework

1. Mastery of the subject matter is measured by skill and proficiency in problem solving. Proficiency is gained by practice. The assigned homework should be considered the minimum amount of practice. (It is also a diagnostic tool by which the student may assess his or her understanding and performance.)

2. Ten (10) problem sets or case studies from the textbook chapters will be assigned as homework and will be collected and graded, as announced. Any homework problems/case
studies to be submitted should be regarded as required deliverables of the course. The problems/case studies to be submitted will be announced before the assignment is due.

3. Up to ten (10) points will be assigned to each homework assignment submitted on time. Altogether, the graded homeworks count for up to 100 points of the final course score.

4. Documents containing the homework assignments will be posted on my OM 352 course website.
   a. These documents constitute permanent attachments to this syllabus once they are promulgated in this fashion.
   b. Follow the specific instructions given in each homework assignment to be submitted.
   c. Each homework assignment for a topic will consist of problems or cases selected from the corresponding chapter or chapters of the textbook.

5. Homework assignments, including their solution and submission, are the sole responsibility of the student.

6. The submitted homework is an individual effort. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.

7. Solutions to some of the homework problems may be posted on my OM 352 course website after the assignment is due for submission.

8. Late homework will not be accepted under any circumstances.

9. Missing homework will be assigned a score of zero; zero homework scores will be counted in the total final course score. (No exceptions, regardless of reason, including [but not limited to] medical, family, work, and transportation emergencies.)

**Exams**

1. Three mandatory, non-cumulative, exams will be given, as announced. The exams will be comprehensive of the topics they cover.

2. Specific topic coverage, tentative dates, and valuation of the exams are as follows:
   - Exam 1: Basics of linear programming
     - Exam date is tentatively set for Thursday, March 5, 2015.
     - Date subject to change.
     - Maximum point value = 250 points.
     - Exam date is tentatively set for Thursday, April 16, 2015.
     - Date subject to change.
     - Maximum point value = 250 points.
   - Final Exam: Multicriteria decision making, decision analysis, queuing analysis, and simulation.
     - Exam date is Thursday, May 7, 2015 from 7:30 to 10:15 PM.
     - Date NOT subject to change except by order of the University Registrar.
     - Maximum point value = 500 points.

3. Altogether, the exams count for up to 1000 points towards the final course score. Each individual exam contributes the points scored to the final total course score.

4. Exams will test concepts, technical skill, and critical thinking through word problems; each problem may itself contain several parts. Partial credit for word problem solutions may be awarded, as appropriate.
5. Exams are based upon the class presentation and discussion of the material as presented in class. Moreover, the exams will be comprehensive of the material as covered in class.
6. Exams will always be announced well in advance of their dates. Advance notice of the date and specific coverage of each exam will be announced in class.
   a. A written document announcing each exam will always be posted on my OM 352 course website well in advance of the exam. This document will describe the exam by specifying its coverage, format, honor code, conditions, and other pertinent information. Once promulgated in this fashion, each and every document becomes a permanent attachment to this syllabus.
   b. The student is solely responsible for reading and understanding the exam announcement document. This document should be used as a guide in studying and preparing for each exam.
7. All exams are an individual effort. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.
8. All exams given in class are closed book. Use of the textbook, class notes, etc., is prohibited unless otherwise stated by me.
9. MISSED EXAMS.
   ➢ A missed exam will be assigned a score of zero.
   ➢ A missed exam may be made up only under extreme circumstances, WITH supporting documentation, AND at the sole discretion of the lecture instructor. One only one make-up exam is allowed. (See the “Make-ups” paragraph below).

Technical Quizzes
1. Three mandatory technical quizzes will be given in class.
2. Each individual technical quiz contributes the points scored (out of 40 points) to the final course score. Altogether, the technical quizzes count for up to 120 points towards the final course score.
3. A technical quiz may consist of a single word problem that may be based on the coverage in the previous lecture.
4. All technical quizzes are individual efforts. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.
5. All technical quizzes given in class are closed book. Use of the textbook, class notes, etc., is prohibited unless otherwise stated by me.
6. MISSED TECHNICAL QUIZZES.
   ➢ A missed technical quiz will be assigned a score of zero.
   ➢ A missed technical quiz may be made up only under extreme circumstances, WITH supporting documentation, AND at the sole discretion of the lecture instructor. One only one make-up technical quiz is allowed. (See the “Make-ups” paragraph below).

Participation Quizzes
1. Three mandatory “participation” quizzes will be given in class (at any time during the class).
2. Some of these in-class quizzes will be unannounced, unscheduled, “pop” quizzes.
3. Each individual participation quiz contributes the points scored (out of 10 points) to the final course score. Altogether, the participation quizzes count for up to 30 points towards the final course score.
4. A participation quiz may consist of a single word problem that may be based on the coverage in the previous lecture.

5. All participation quizzes are individual efforts. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.

6. A missed participation quiz will be assigned a score of zero and CANNOT BE MADE UP UNDER ANY CIRCUMSTANCES. (No exceptions, regardless of the reason, including [but not limited to] medical, family, work, and transportation emergencies.)

Make-ups
1. One and only one (1) make-up is allowed (for either Exam 1 or 2 or a technical quiz). Note that the Final Exam cannot be made-up under any circumstances.

2. Taking a make-up is not automatic. You must qualify and register for any make-up with the lecture instructor (ONLY) prior to registration deadline. (You must provide a valid and bona fide reason for missing the exam or recitation quiz when it was originally scheduled, supported and verified by documentation. All decisions are final; there is no appeal.)

3. Re-testing to replace scores already earned on an exam or quiz is strictly prohibited and will not be allowed under any circumstances.

4. A document stating the make-up policies and procedures will be posted on the OM 352 course website under “Announcements.”

5. Make-ups will be of a different format and level of difficulty than the original exam or recitation quiz which it is meant to replace.

6. A missed exam or quiz will be assigned a score of zero until it is made-up. After the make-up, the grade on the make-up will replace the zero and will be added into the final total course score.

7. The exam/quiz make-up day is tentatively set for Wednesday, April 29, 2015 (date subject to change); exam room and time is TBA.

Course Grade
1. Final course grades are assigned rationally, objectively, and strictly on the sole basis of a student’s performance in the class as measured by the numerical total point score which is the sum of the scores earned by the student on all exams, quizzes, and graded homework assignments.

   ▶ Outside influences and obligations will not be factored into the course grade.

2. Students must be officially registered in this section to receive a grade. It is the sole responsibility of the student to verify their own registration status.

3. Final course grades will be assigned as whole letters, WITH plus and minus.

4. There is no “extra credit” of any kind, for any reason.

5. Final course letter grade assignments on the 1250 point system are given in the table below.

6. The chart below will be adhered to strictly and without deviation or compromise.

7. Final total point scores are NOT “bumped” or rounded up to the next higher letter grade. Specifically, a final total point score of 899 will be assigned a course grade of C- and not C. (Note that a grade of C- is unsatisfactory in SOM; a grade of C or better is required.)
<table>
<thead>
<tr>
<th>COURSE TOTAL SCORE *</th>
<th>FROM</th>
<th>UP TO</th>
<th>COURSE GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1225</td>
<td>1250</td>
<td></td>
<td>A+</td>
</tr>
<tr>
<td>1163</td>
<td>1224</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1125</td>
<td>1162</td>
<td></td>
<td>A-</td>
</tr>
<tr>
<td>1100</td>
<td>1124</td>
<td></td>
<td>B+</td>
</tr>
<tr>
<td>1038</td>
<td>1099</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>1000</td>
<td>1037</td>
<td></td>
<td>B-</td>
</tr>
<tr>
<td>975</td>
<td>999</td>
<td></td>
<td>C+</td>
</tr>
<tr>
<td>900</td>
<td>974</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>875</td>
<td>899</td>
<td></td>
<td>C-</td>
</tr>
<tr>
<td>750</td>
<td>874</td>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>749</td>
<td></td>
<td>F</td>
</tr>
</tbody>
</table>

*Point ranges are inclusive.

Incompletes
An incomplete will only be given to a student who has completed a majority of the work for the semester, has a course grade of C or better in the work completed at the time of the request, and has a documented excusable reason such as a serious illness or unanticipated family emergency for being unable to complete the remainder of the work as scheduled. Poor time management or failure to deal with a situation earlier in the semester will not be accepted as reasons for an incomplete.

Schedule
2. The schedules for all “deliverables” will be announced during the semester. Advance notice of the dates and specific coverage will be announced in class and posted on my OM 352 course website.
3. Tentative dates for Exams 1 and 2 are March 5 and April 16, 2015, respectively; these tentative dates are subject to change.
4. There is no lecture on Thursday, March 12, because of Spring Break.
5. The exam make-up day is tentatively set for Wednesday, April 29, 2015. Time and location are TBA.
6. The last class is on Thursday, April 30, 2015.
8. Conflicts in the Final Exam schedule can only be resolved through the Office of Academic and Career Services (and not me) at least one week prior to the date of the final, with the appropriate paperwork. Requests not meeting any part of this condition will be automatically denied.
Topics
The tentative list of topics is given below. The list follows the basic order and coverage of topics in the required text. The list is subject to change during the semester.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Introduction and Course Overview</td>
<td>1</td>
</tr>
<tr>
<td>2 Linear Programming: Model Formulation and Graphical Solution</td>
<td>2</td>
</tr>
<tr>
<td>3 Linear Programming: Sensitivity Analysis (Graphical)</td>
<td>2</td>
</tr>
<tr>
<td>4 Linear Programming: Computer Solution and Sensitivity Analysis</td>
<td>3</td>
</tr>
<tr>
<td>5 Linear Programming: Modeling Examples</td>
<td>4</td>
</tr>
<tr>
<td>5 Integer Programming</td>
<td>5</td>
</tr>
<tr>
<td>6 Transportation, Transhipment, and Assignment Problems</td>
<td>6</td>
</tr>
<tr>
<td>7 Network Flow Models</td>
<td>7</td>
</tr>
<tr>
<td>8 Multicriteria Decision Making</td>
<td>9</td>
</tr>
<tr>
<td>9 Decision Analysis</td>
<td>12</td>
</tr>
<tr>
<td>10 Queuing Analysis</td>
<td>13</td>
</tr>
<tr>
<td>11 Simulation</td>
<td>14</td>
</tr>
</tbody>
</table>