

ENMA 603: Operations Research

Fall 2017 – Tuesday 7:10 pm – 9:50 pm
Room: Gornto 221

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Instructor Web Site:	http://www.ghaithrabadi.com
Class Web Site:	http://blackboard.odu.edu/ See the Blackboard section in this syllabus
WebEx Web Site:	http://dl.odu.edu/video/online-class >> Class Launch Pages >> ENMA603
Teaching Assistant:	Email: ENMA603@odu.edu

COURSE OBJECTIVES

The objective of this course is to introduce the students to the area of Operations Research (or Management Science) and present the most common problems and solution approaches. The course starts with problem definition and analysis, then modeling problems mathematically, and using the computer to solve them. The students will learn how to implement computer models and solve them to find optimal or near-optimal solutions. The course will cover both modeling methods and solution methods for variety of optimization problems.

TEXTBOOK

Introduction to Management Science, By Bernard W. Taylor, Prentice Hall. The latest edition of the textbook (12th edition) is preferable, but the 11th or 10th editions are also acceptable (new or used copies of any of these editions are acceptable).

CLASS MATERIAL AND FORMAT

- This class will follow “inverted classroom” model in which students are expected to review the topic material (chapters, slides, videos, exercises, etc) before coming to class. The live sessions will be shorter but interactive and class time will be spent on discussing the topics further, solving additional problems, and engaging students in questions and answers. In essence, students will review the one-way lectures on their own and use the class time for discussions that deepen their understanding of the subject via two way interaction of ideas beyond the basic material in the videos. It is very important to review the material provided to you asynchronously before the live lecture as the prerecorded material will not be covered again in the live class. Discussion and exercises on the pre-recorded topic will be presented in the live lecture and if you come to class without having reviewed and studied the material before class, it is unlikely that you can follow the discussion.
- The class material is readily available on Blackboard for the whole semester where each week’s material (slides and Excel files) is stored under a separate folder for each week. The videos for the whole course are available on YouTube as a Playlist. The link to these videos

is available on Blackboard. The video modules required for each week are listed in the schedule provided at the end of this syllabus.

- Since you will be spending time on your own reviewing videos and material, the live sessions will be shorter than the allotted time and in some cases there will be no live session to allow enough time to finish reviewing the material. The schedule at the end of the syllabus includes the dates on which there is no live session, and if we deviate from schedule, announcements will be made to let everyone know.
- While the class approach should give you tremendous flexibility when and where to view the lectures, you can easily fall behind schedule if you do not stay on schedule. Therefore it is highly recommended that you follow the schedule at the end of the syllabus and do the exercises and homework assignments.
- The class involves math, equations, graphs, etc. and it will be difficult to prepare slides for everything we do in class. Therefore, in addition to the posted slides, it is recommended that you take notes when viewing the videos and during the live sessions.

CLASS ATTENDANCE

- This class will be conducted face-to-face on campus and online at ODU's WebEx web site listed above. Students are expected to attend at the sections they enrolled in. However, they can attend online via WebEx occasionally. For those who are registered online but rather sometimes attend the face-to-face section at ODU, please check with me first to make sure there are seats available.
- Everybody is encouraged to test the WebEx website as all of us may sometimes attend online (see the WebEx instructions later in this syllabus)
- Lectures will be recorded and will be made available to all students 24 hours after each lecture in case they miss class. The links to all recorded lectures will be posted on the same WebEx web site listed above (but you click on the Archives link instead of the live class link).
- Class attendance is "expected" and if for some reason a student should miss a class, it is the *student's responsibility* to review the WebEx recorded session to inform themselves of what transpired during the live session. Neither the TA nor I will repeat a session if a student happens to miss one.

WebEx

WebEx is an On-line interactive environment to attend live classes and meetings online. Students can interact via chat, voice and video. It is preferred that you use voice via a microphone or a headset to ask questions and participate in class. You need to log in using your ODU MIDAS login and password. If you have any problems, please contact ITS at 1-877-348-6503 or itshelp@odu.edu. Please read the following carefully before the first class:

- The link to access class is:
<http://dl.odu.edu/video/online-class> >> Click on Class Launch Pages >> Select ENMA603

The same link can be used to visit the class recording (Archives) in case you miss class.

- I strongly urge you to test your computer and connection before the first day of class using http://dl.odu.edu/bin/wc_test/. Once you've tested it, follow the instructions above to access your class at its scheduled time.
- Some additional information about using WebEx is available at: <https://online.odu.edu/get-started-in-webex>
- If you don't have a high-speed internet connection or other needed equipment, various services are available at our partner locations. To see which location is closest to you, use the zip code finder here: <http://dl.odu.edu/locations>. Services vary by location; please contact staff at the location for details.
- If you have questions, please see <http://dl.odu.edu/transition>
- Please mute your microphone from the WebEx interface unless you want to speak to the class and students.
- The classroom camera and microphone **are always on**. It will turn on 10-15 minutes before class and remain on until the end of your class period. Everyone in the classroom should be careful about what is said before and after class, it is recorded!
- For all technical support, please contact ITS at 1-877-348-6503 or itshelp@odu.edu.

SOFTWARE AND COMPUTER SKILLS

- Good knowledge of MS-Excel is expected and MS-Excel *Solver* will be used extensively. Therefore, make sure you have access to Excel 2010 or higher and learn how to use it.
- Students must have the knowledge and access to the following software to submit homework assignments and exams:
 - Word Processing program such as MS-Word
 - Email
 - Blackboard
 - Scanning or taking good digital pictures of hand written material, and saving them to PDF or putting them in MS-Word files
- The textbook uses a software called QM, but we will use Excel instead to learn how to set up and solve problems. Feel free to use QM on your own if you wish, but QM does not replace Excel in this course.

HOMEWORK:

- Homework assignments and suggested problems are based on problems from the textbook's 12th edition. Since it is acceptable to have 10th or 11th edition, a scanned copy

of the problems from the 12th edition are made available on Blackboard under the Assignment tab.

- To ensure that students do not fall behind, weekly homework is assigned throughout the semester. Please plan on doing the homework every week as **there will be no deadline extension**. All homework assignment and their due dates are listed on the schedule at the end of this syllabus.
- Practice problems are suggested according to the schedule at the end of the syllabus. Furthermore, students are encouraged to do additional problems from the textbook especially the odd-numbered problems for which answers are listed at the end of the textbook. Some of these suggested problems will be solved in the live sessions.
- It is important to do the assigned and suggested problems to gain good understanding of the topics covered. Also the exams' *level of difficulty* will be similar to these problems, but that does *not* mean that the exams will be the same or very similar to the homework problems.
- Answers key to the homework assignments is available on Blackboard. Answers to the odd-numbered problems are available at the end of the textbook.
- For some homework problems I will provide step-by-step solutions but not for all homework problems so that you seriously try to solve the problems and arrive to the final answer.
- After seriously trying to do homework problems, if you still have questions about the homework assignments, please send your questions to ENMA603@odu.edu. Both the TA and I have access to this email which we will check regularly

EXAMINATIONS:

- There will be two take-home exams assigned according to the schedule at the end of this syllabus.
- The exams are not cumulative and the material included in each one is listed on the schedule at the end of the syllabus.
- **I will *not* give any additional assignments for grade improvement. Therefore, prepare and do well on the exams and make sure you do your homework**

GRADES

Midterm	35%
Final	35%
Homework	30%

GRADING SCALE:

90-93	A-	94-100	A		
80-83	B-	84-86	B	87-89	B+
70-73	C-	74-76	C	77-79	C+
< 70	F				

ACADEMIC INTEGRITY

The Old Dominion honor system is in effect for all student work submitted during the course. In effect, this stipulates that lying, cheating or plagiarism are violations of the honor system and will be subject to disciplinary action. Violation of the honor code will not be tolerated. The punishment ranges from getting “F” in the course to being expelled.

EMAIL

I will be communicating with all students using both Blackboard announcements and ODU email addresses. So, you need to activate your ODU email login and password. If you have not activated your student e-mail account, go to ODU’s ITS web page at <https://www.odu.edu/its>. If you send me an email from an address other than your ODU email account, I will reply to it. However, whenever I initiate an email message, I will use your ODU email address.

USING BLACKBOARD:

1. Access Blackboard at: <https://www.blackboard.odu.edu>
2. It is a requirement of all Blackboard courses that you have an Old Dominion University Student MIDAS account to access Blackboard. If you do not have a Midas account, you can request one at <https://midas.odu.edu>. Be prepared to complete the security profile in the event you lose or forget your password in the future. *It may take several hours for the information about a new account or password to become active in Blackboard, Therefore, please allow up to 24 hours before reporting any login problems to Customer Service.*
3. To upload your exam, a link becomes active after the exam is posted. Homework assignments links are already active.
4. If you never used Blackboard before, visit and read the student help page which could be found at:

<http://www.odu.edu> > Current Students > Blackboard

FALL 2017 ACADEMIC CALENDAR

<http://www.odu.edu/academics/calendar/fall>

- August 29 is our first class
- August 28 fall tuition deadline
- September 4 Labor Day Holiday (no classes)
- September 5 Drop/Add Deadline
- October 7-10 Fall Holiday (no classes)
- November 7 Last day to withdraw from classes
- November 22-26 Thanksgiving Holiday
- December 8 Classes end
- December 9-15 Final exams
- Fall Commencement, December 16

TENTATIVE CLASS SCHEDULE (Subject to change)

Date	Week	Topics	Chapters and suggested problems (12 th ed)	Video Module	Assignments / due date
Aug 29	1	Introduction to Operations Research Model Formulation and Break-even Analysis	Chapter 1 1, 2, 3, 4, 5, 6, 8, 9, 15, 19, 23, 28	1-1, 1-2, 1-3	HW1: 7, 21, 27, 29 Due on 9/6
Sept 5	2	Linear Programming – Graphical Solution	Chapter 2 2, 5, 9, 22, 29	2-1, 2-2, 2-3, 2-4, 2-5	HW2: 6, 11, 12, 27,53,61 Due on 9/13
Sept 12	3	Linear Programming Solutions and Sensitivity Analysis	Chapter 3 7, 8, 9, 27, 28, 29, 30, 52, 53	3 and 3-1	HW3: 16, 17, 18, 25, 26, 56, 57, 58 Due on 9/20
Sept 19	4	Linear Programming – Modeling Examples	Chapter 4 1, 2, 3, 4, 5, 10, 12	4-1, 4-2, 4-3, 4-4, 4-5	HW4: 7, 8, 13, 19 Due on 9/27
Sept 26	5	Linear Programming – Modeling Examples	Chapter 4 6, 16, 17, 24, 29, 33, 43, 48, 49, 51, 59	4-6,4-7,5,5-1	HW5: 15, 40, 64 Due on 10/4
Oct 3	6	Integer Programming	Chapter 5 1, 3, 6, 7, 11, 14, 16, 20, 24	6, 6-1, 6-2, 6-3,	HW6: 4, 15, 25 Due on 10/11
Oct 10	7	Fall Break – No Class	Fall Break – No Class	No Class	No Class
Oct 17	8	Integer Programs –Modeling Examples	Chapter 5 13, 18, 28, 35, 36, 43	6-4, 6-5	HW7: 37, 45 Due on 10/25
Oct 24	9	Transportation, Transshipment and Assignment Discussion Midterm exam Available	Chapter 6 1, 5, 8, 13, 14, 16, 17, 19, 25, 30, 37, 38, 42,43, 44, 50, 67 Exam Chapters: 1, 2, 3, 4, 5	7-1, 7-2, 7-3	HW8: 7, 15, 39, 53,57 HW 8 Due on 11/8 Midterm Due on 11/1
Oct 31	10	Network Flow Models	Chapter 7 2, 3, 17, 18, 25, 30, 31, 37, 38	8, 8-1, 8-2, 8-3	HW9: 4, 10, 21, 34 Due on 11/15

Nov 7	11	Multi-Criteria Decision Making: Goal Programming	Chapter 9 1, 2, 3, 5, 7,11	Goal Programming sections in the book	
Nov 14	12	Goal Programming Discussion	Sample problems from Chapter 9		HW10: 4, 10 Due on 11/22
Nov 21	13	Non-Linear Programming	Chapter 10 1, 3, 5, 7, 9, 15, 16, 17	9, 9-1, 9-2, 9-3	HW11:8, 12, 13, 18 Due on 11/29
Nov 28	14	Non-Linear Programming Discussion	Sample problems from Chapter 10 Final Exam Chapters: 6, 7, 9, 10		Final Due on 12/6
Dec 5	15	Review and course wrap up	Review and course wrap up		
Dec 6		Final Exam Due	Final Exam Due	Final Due on 12/6	Final Due on 12/6