**SYE 3400 Engineering Optimization I Spring 2015**

**INSTRUCTOR**

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**COURSE INFORMATION**

Class Room: Q 311

Class Hours: Tuesday and Thursday, 10:30 AM – 11:45 AM

Class Material: GeorgiaVIEW Desire2Learn <https://spsu.view.usg.edu/>

**COURSE DESCRIPTION**

This course provides formulation and solution of deterministic models of operations research including linear, integer, dynamic, and nonlinear programming, transportation, assignment, shortest route, and minimum spanning tree problems to address different types of applications in the areas of engineering design, production planning and scheduling, inventory control, transportation and logistics.

**LEARNING OBJECTIVES**

By the end of the semester, students should be able to

* determine when a particular operations research model is appropriate based on a problem description,
* identify the stakeholders, decision makers, objectives, variables and constraints of a practical engineering problem,
* formulate a valid operations research model, solve the model with a computerized optimization package, and interpret the results of the model, and
* make recommendations to improve system operations based on an operations research analysis and communicate those recommendations in reports and/or presentations.

**REQUIRED TEXT**

*Introduction to Operations Research*, 10th edition by Hillier, F. S., and Lieberman, G. J.

Publisher: McGraw-Hill Publishing Company, New York, 2010

ISBN-10: 0073523453, ISBN-13: 978-0073523453

**COURSE POLICIES**

* **Exams:** All exams will be open book/open notes and are not cumulative.
* **Homework Assignments:** Sets of practice problems will be provided. These will be graded and are intended to help you prepare for the exams and the project.
* **Mini-case:** In preparation for the project, each group will complete a mini-case from the text book and write the problem and solution in a formal technical support. Project reports are due on **TBD**.
* **Project:** A course project is required for successful completion of this course that can be completed in teams of 2 students. Generally, successful projects involve application of deterministic operations research principles to some type of “real-world” problems. Your project will be graded on the basis of readability of the report and technical accuracy. These reports should be written as a formal technical report to include executive summary, section headings, proper table and figure headings, references, appropriate appendices, etc; totaling up to 12 pages (see “Technical Report Template” posted on Blackboard). Project reports are due on **Monday, April 13 by 5:00 PM**.

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| **Grand Total** | **Grade** |
| 90-100 | A |
| 80-89.9 | B |
| 70-79.9 | C |
| 60-69.9 | D |
| 59.9 and below | F |

**GRADING SCHEME**

EXAM I 20%

EXAM II 20%

FINAL EXAM 20%

HOMEWORK & QUIZZES 15%

MINI-CASE & PROJECT 25%

**Grand Total 100%**

**STUDENTS WITH DISABILITIES**

If you need accommodations because of a disability, or if you have emergency medical information to share with the instructor, or if you need special arrangements in case the building must be evacuated, please contact the instructor after the first class meeting or make an appointment to discuss your needs as soon as possible. These students are also encouraged to contact the counselor working with disabilities at [678-915-7244](callto:+1678-915-7244) to better insure that such accommodations are implemented in a timely fashion.

**TRUST AND COLLABORATION**

A note about our relationship throughout this semester and beyond; first, it is built on trust. You must trust that I have put serious thought into course content, structure and presentation of lectures, notes, homeworks and exams. In turn, I trust that the homeworks and exams which you submit are your own and that they are done individually. For example, receiving help during an examination or copying homework solutions from another student and submitting it as your own is not allowed. Students agree that by taking this course all submitted projects/reports may be subject to submission for textual similarity review to [www.turnitin.com](http://www.turnitin.com) or any other software/website for the detection of plagiarism.

SPSU has an Honor Code and a procedure for handling cases when academic misconduct is alleged. All students should be aware of them. Information about the Honor Code and the misconduct procedure may be found at <http://www.spsu.edu/honorcode/>.

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| **Date** | **TOPICS** | |
| 1/6 | 1. Chapter 1&2 - Introduction & Overview of the  Operations Research Modeling Approach |  |
| 1/8 | 1. Chapter 3-1 - Introduction to Linear Programming |  |
| 1/13 | 1. Chapter 3-2 - Introduction to Linear Programming | HW 1 – Article Summary |
| 1/15 | 1. Chapter 3-3 - Introduction to Linear Programming |  |
| 1/20 | 1. Chapter 3-4 – Graphical Solution Method |  |
| 1/22 | 1. Chapter 4-1 - Solving Linear Programming Problems: The Simplex Method |  |
| 1/27 | 1. Chapter 4-2 - Solving Linear Programming Problems: The Simplex Method |  |
| 1/29 | 1. Chapter 4-3 - The Simplex Method for Non-standard Problems &Computer Implementation | HW 2 – Ch 3 (3.1-7a-e, 3.2-2, 3.2-3, 3.2-5, 3.2-6) |
| 2/3 | 1. Chapter 4-4 - Solving Linear Programming Problems with Lingo and Excel Solver | HW 3 – Ch 3 (3.3-1)  Ch 4 (4.1-2, 4.3-4, 4.6-1) |
|  | **EXAM I: Thursday, February 5, 10:30 AM – 11:45 AM** | |
| 2/10 | 1. Chapter 6-1 - Duality Theory |  |
| 2/12 | 1. Chapter 6-2 - Duality Theory & Sensitivity Analysis | HW 4 – Ch 4 TBD |
| 2/17 | 1. Chapter 7-1 - Sensitivity Analysis |  |
| 2/19 | 1. Chapter 7-2 – Robust Optimization | HW 5 – Ch 6 |
| 2/24 | No Class – work on project |  |
| 2/26 | 1. Chapter 9-1 Transportation Problem | Project Proposals Due |
|  | **Spring Break: March 2 – March 6** | |
| 3/10 | 1. Chapter 9-2 - Transshipment Problem |  |
| 3/12 | 1. Chapter 9-3 – Assignment Problem | HW 6 – Ch 7 |
| 3/17 | 1. Chapter 10-1 Shortest Path Problem | Mini-case Due |
| 3/19 | 1. Chapter 10-2 Minimal Spanning Tree |  |
| 3/24 | Review and Catch up | HW 7 – Ch 9 |
|  | **EXAM II: Thursday, March 26, 10:30 AM – 11:45 AM** | |
| 3/31 | 1. Chapter 10-3 – Maximal Flow Problem |  |
| 4/2 | 1. Chapter 10-4 – Minimum Cost Flow Problem |  |
| 4/7 | 1. Chapter 11 - Dynamic Programming | HW 8 – Ch 10 |
| 4/9 | 1. Chapter 11 - Dynamic Programming |  |
| 4/14 | 1. Chapter 11 - Dynamic Programming | Project Due |
| 4/16 | 1. Chapter 12 - Integer Programming | HW 9 - Ch 11 |
| 4/21 | 1. Chapter 12 - Integer Programming |  |
| 4/23 | 1. Chapter 12 - Integer Programming | HW 10 – Ch 12 |
|  | **FINAL EXAM: TBA on Banner Web by the Registrar Office** | |

Version 1.2 on 1/27/2015: All updates will be announced in class and posted to D2L.