

## IEE 376: Deterministic Operations Research Syllabus

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Textbook: *Introduction to Operations Research*, 10<sup>th</sup> Edition. Hillier & Lieberman  
ISBN: 978-0-07-352345-3  
***Refer to Canvas before purchasing the textbook***

### **Course Description**

Introduction to industrial systems applications with deterministic operations research techniques, including resource allocation, product mix, production, transportation, and networks.

### **Course Learning Outcomes**

At the end of the course, students will:

- Have an understanding of and appreciation for the role of operations research analysis in industrial, service, and network applications.
- Recognize, formulate, and solve linear programs by hand using the Simplex Method and AMPL.
- Apply sensitivity analysis to solutions for “what if” management scenarios.
- Recognize, formulate, and solve network operations research problems such as the shortest path problem, the minimum spanning tree problem, and the maximal flow problem.
- Recognize, formulate, and solve integer programming problems using branch-and-bound techniques.

### **Grading (Scaled to 1000 points)**

AMPL Project	60 points
LearnSmart Assignments	100 points
Homework	240 points
Quizzes	250 points
Final Exam	350 points

### **Schedule**

The course schedule is posted to Canvas, and can be updated as we move through the semester. You are expected to check the schedule and be responsible for the reading and assignments detailed therein. It is your responsibility to attend class and keep track of what is due and when.

### **In-Class Expectations**

It is expected that you will:

- Arrive on time.
- Be using computers for class purposes only, if necessary. Please save e-mail, Facebook, and games for the time before class begins or for after class is over.
- Refrain from text messaging until the class is over.
- Engage in the conversation and discussion.

### **Outside-of-Class Expectation**

It is expected that you will spend approximately 18 hours per week reviewing course slides, doing the homework, and reading the text as you prepare for lectures and quizzes. Work with others in the class; possibly form a study group to work on the homework and prepare for exams.

### **Software**

AMPL will be used and taught in this class. A student version of AMPL can be found at <http://ampl.com/products/ampl/ampl-for-students/>. Details on writing models and data files, as well as using the AMPL solvers will be given throughout the semester.

### **Final Exams**

There is only a final exam in this class. There are no midterms.

- The exam will be closed book, closed notes.
- You will be permitted to bring two 8.5" x 11" sheets of notes to the exam, both sides; anything can go on the sheet.
- Calculators will be required.

### **Homework**

Homework will be assigned via the textbook's interactive website. Instructions for signing up and accessing the website can be found on Canvas. There will be a total of 9 homework assignments, with the lowest homework score dropped. Each homework assignment is worth 30 points, for a total of 240 points. This represents 24% of your final grade.

### **Quizzes**

Quizzes will be given at the end of every week, except for the first week. They will take approximately 30 minutes, and will focus on any previously covered material, with an emphasis on the most recent material. There will be a total of 5 quizzes. The lowest quiz grade will **not** be dropped. Each quiz is worth 50 points, for a total of 250 points. This represents 25% of your final grade.

### **LearnSmart Assignments**

These assignments will also be distributed via the textbook's website. In the event you score below an 85% on a quiz, you will be required to complete the LearnSmart assignment for that quiz. If you score an 85% or higher on a quiz, you will automatically earn a 100% on the LearnSmart assignment for that quiz, and will not have to complete it. Since there will be a total of 5 quizzes, there will also be a total of 5 LearnSmart assignments. Each LearnSmart assignment is worth 20 points, for a total of 100 points. This represents 10% of your final grade.

## **AMPL Project**

You will be coding and solving a linear program in AMPL this semester. This project will be broken up into three phases to support the modeling, coding, and writing portions of the project, each worth 20 points, 60 points total, which equates to 6% of the final grade. You may complete this project in groups of no more than 3 students. It is not advisable to complete this project on your own, given the pace of the class.

### **Phase I**

The first phase will focus on model development. You will be given an operations research problem and asked to formulate a complete mathematical model to solve the problem. The problem definition and any relevant information will be posted on Canvas. The due date for this portion of the project will be 7/15/2019.

### **Phase II**

The second phase of this project will focus on AMPL implementation of your model. Given the model developed in Phase I, you will code a *.mod* and a *.dat* file that successfully solves the problem. The model and data files should include comments to explain each file, as well as comments explaining the implementation of your model in AMPL. The due date for this portion of the project will be 7/29/2019.

### **Phase III**

The third phase of this project will focus on technical writing and formulating answers to the original problem. A series of operations-based questions pertaining to the problem will be posed and you will have to answer them based on your model and results from Phase II. This phase also includes a professional report, and will be graded based on the following sections.

- Summary of the problem
- Mathematical formulation
- Details on AMPL implementation
- Responses to questions

The due date for this portion of the project will be 8/12/2019.

## **Guaranteed Grade Breakdown**

Generally, there is no curve in this class. You are guaranteed a final grade per below (final point total is X):

<i>Final Average</i>	<i>Course grade</i>
$X \geq 900$	A
$800 \leq X < 899$	B
$700 \leq X < 799$	C
$600 \leq X < 699$	D
$X < 600$	E

## Academic Integrity

Cheating, in any form, absolutely, positively will not be tolerated. If you cheat, I will report you to the Dean's Office with a recommendation that you receive an "E" in this class. I do not expect cheating, but I personally review each of your quizzes and exams and meticulously compare them. ASU has very severe penalties for academic integrity violations. Cheating in this course has a very real potential outcome of your being **suspended** or **expelled**. It is expected that you have read and understand ASU's *Student Obligations to Academic Integrity* (below).

### **Student Obligations to Academic Integrity**

Each student must act with honesty and integrity, and must respect the rights of others in carrying out all academic assignments. A student may be found to have engaged in academic dishonesty if, in connection with any Academic Evaluation or academic or research assignment (including a paid research position), he or she:

- A. Engages in any form of academic deceit;
- B. Refers to materials or sources or uses devices (e.g., computer disks, audio recorders, camera phones, text messages, crib sheets, calculators, solution manuals, materials from previous classes, or commercial research services) not authorized by the instructor for use during the Academic Evaluation or assignment;
- C. Possesses, reviews, buys, sells, obtains, or uses, without appropriate authorization, any materials intended to be used for an Academic Evaluation or assignment in advance of its administration;
- D. Acts as a substitute for another person in any Academic Evaluation or assignment;
- E. Uses a substitute in any Academic Evaluation or assignment;
- F. Depends on the aid of others, including other students or tutors, in connection with any Academic Evaluation or assignment to the extent that the work is not representative of the student's abilities;
- G. Provides inappropriate aid to another person in connection with any Academic Evaluation or assignment, including the unauthorized use of camera phones, text messages, photocopies, notes or other means to copy or photograph materials used or intended for Academic Evaluation;
- H. Engages in Plagiarism;
- I. Uses materials from the Internet or any other source without full and appropriate attribution;
- J. Permits his or her work to be submitted by another person in connection with any Academic Evaluation or assignment, without authorization;
- K. Claims credit for or submits work done by another;
- L. Signs an attendance sheet for another student, allows another student to sign on the student's behalf, or otherwise participates in gaining credit for attendance for oneself or another without actually attending;
- M. Falsifying or misrepresenting hours or activities in relationship to an internship, externship, field experience, clinical activity or similar activity; or
- N. Attempts to influence or change any Academic Evaluation, assignment or academic record for reasons having no relevance to academic achievement.

### **Disability Accommodations**

Suitable accommodations will be made for students having disabilities and students should notify the instructor as early as possible if they will require same. Such students must be registered with the Disability Resource Center and provide documentation to that effect.

### **Sexual Discrimination**

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://coas.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.

### **Notices:**

- Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.
- All contents of these lectures, including written materials distributed to the class, are under copyright protection. Notes based on these materials may not be sold or commercialized without the express permission of the instructor.