

## SIE 340: Deterministic Operations Research Fall 2016

### Time and Location

MoWeFr 2:00PM-2:50PM, C E Chavez Bldg, Rm 111

### Description of Course

(3 units) Linear programming models, solution techniques, sensitivity analysis and duality. The objective of SIE 340 is the development of a working knowledge of deterministic operations research techniques, primarily linear programming.

### Course Prerequisites

SIE 265 - Engineering Management, and SIE 270 - Mathematical Foundations of Systems and Industrial Engineering, or equivalent. Knowledge of linear algebra (systems of linear equations, matrix methods for systems of linear equations).

### Instructor and Contact Information

Dr. Neng Fan, Assistant Professor  
Office: ENGR 312  
Office Hours: WeFr 3:00PM-4:00PM (or appointment by email)  
Email: [nfan@email.arizona.edu](mailto:nfan@email.arizona.edu)  
Phone: 520 621 6557

Teaching Assistant: Ms. Ou Sun  
Office: ENGR 306  
Office Hours: MoWe 3:00PM-4:30PM (or appointment by email)  
Email: [suno@email.arizona.edu](mailto:suno@email.arizona.edu)

Course website: <https://d2l.arizona.edu> All class materials, including lecture notes, homework assignments, project instructions, supplemental readings, grades, etc., will be distributed through D2L. You must check the announcements in D2L at least once per day.

### Course Format and Teaching Methods

Lectures, group projects, in-class discussion

### Course Objectives and Expected Learning Outcomes

The objective of SIE 340 is the development of a working knowledge of deterministic operations research techniques, primarily linear programming. Students are expected to

- Develop an appropriate linear programming model from a verbal description of a problem,
- Choose an appropriate solution technique and
- Extract relevant information from the model and solution.

### Absence and Class Participation Policy

Participating in course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their healthcare provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/2015-16/policies/classatten.htm>. The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>. Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <http://uhap.web.arizona.edu/policy/appointed-personnel/7.04.02>

### Required Texts or Readings

#### Textbook:

Wayne L. Winston, Operations Research: Applications and Algorithms, ISBN-10: 0534380581, Cengage Learning; 4 edition, 2003. *or*

Winston, W. L. and Venkataramanan, M., Introduction to Mathematical Programming, ISBN: 0-534-35964-7, Edition: 4, Publisher: ITP EDUC/THOMSON LEARNING.

**References:**

Bradley, S.P., A.C. Hax, and T.L. Magnanti, Applied Mathematical Programming.  
Hillier, F.S. and G.J. Lieberman, Introduction to Operations Research.  
Taha, H. Operations Research.

**Assignments, Examinations and Grade Policies**

Homework: 8 sets, 20% (Late homework will not be accepted.)  
Quiz: 5 times, 10% (Random choice of time.)  
Exam: Midterm exam 1 (Oct 3; 15%), Midterm exam 2 (Nov 14; 15%), Final exam (Dec 14; 25%)  
Class project: 15% (Teams (1-3 students) can be formed for the final project. Each team submits a one-page progress report and one final project with at least 10 pages. The objective of the final project is to apply optimization techniques and software to study a research topic selected by the team. More details will be given in class.)

The final letter grade will be distributed as follows: A: 90-100; B: 80-89.9; C: 70-79.9; D: 60-69.9; E:  $\leq 59.9$ . Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies which are available at <http://catalog.arizona.edu/2015-16/policies/grade.htm#I> and <http://catalog.arizona.edu/2015-16/policies/grade.htm#W> respectively.

For questions on grades, you have to talk to teaching assistant or the instructor within one week of grades posted. Students registered this course for honors credits should email me to set up an appointment to discuss the additional requirements.

**Scheduled Topics**

Introduction to Mathematical Modeling (5 lectures)  
Review of Linear Algebra (3 lectures)  
Solving Linear Programming Problems  
    Graphical solutions of LP problems (2 lectures)  
    Simplex algorithm (12 lectures)  
Sensitivity Analysis and Duality (9 lectures)  
Transportation, Assignment, and Network Flow Problems (3 lectures)  
Introduction to Integer Programming/Nonlinear Programming (2 lectures)

**Classroom Behavior Policy**

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

**Threatening Behavior Policy**

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

**Accessibility and Accommodations**

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit <http://drc.arizona.edu/>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

### **Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism available at:

<http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

*Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent.* Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

### **UA Nondiscrimination and Anti-harassment Policy**

The University is committed to creating and maintaining an environment free of discrimination,

<http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Name and pronoun usage statement. This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect.

Inclusive Excellence is a fundamental part of the University of Arizona's strategic plan and culture. As part of this initiative, the institution embraces and practices diversity and inclusiveness. These values are expected, respected and welcomed in this course.

### **Additional Resources for Students**

UA Academic policies and procedures are available at:

<http://catalog.arizona.edu/2015-16/policies/aaindex.html>

Student Assistance and Advocacy information is available at:

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Office of Diversity (<http://diversity.arizona.edu>)

<http://www.health.arizona.edu/counseling-and-psych-services>

[http://oasis.health.arizona.edu/hpps\\_oasis\\_program.htm](http://oasis.health.arizona.edu/hpps_oasis_program.htm)

### **Subject to Change Statement**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.