

## Syllabus: Stochastic Combinatorial Optimization

ORI 397

You can find handouts, notes, and the class calendar on the course home page:

<http://neddimitrov.org/index.php?page=200901SCO>

*Instructor:* Ned Dimitrov [ned.dimitrov@gmail.com](mailto:ned.dimitrov@gmail.com)

*Lectures:* 2pm Monday, Wednesday in ETC 5.132

### *Course Objectives:*

- 1) To broaden our perspective on optimization by comparing the OR and CS approaches to several classic optimization problems.
- 2) To learn the fundamentals of doing research.

### *Course Content:*

Lectures: The lectures in the course will be used to achieve the first objective. You will not be tested on any of the lecture material, it is solely for your enrichment and is meant to expose you to various stochastic combinatorial optimization topics you may not have seen before. The lecture material will include details of stochastic combinatorial optimization techniques, as well as an overview of the area. Topics that may be covered include: approximation algorithms, online algorithms, online optimization, Markov decision processes, and others. Two helpful texts from which some, but not all, of the class lectures are derived are "Approximation Algorithms" by Vijay V. Vazirani and "Online Computation and Competitive Analysis", by Allan Borodin, Ran El-Yaniv.

Assignment: To achieve the second objective, you will be assigned a single class-long research project. The project's purpose is help you build expertise in an area related to stochastic combinatorial optimization to the point of being able to contribute original research. The area of your project will be chosen by you, with instructor guidance.

The project has four main goals: 1) to build your background knowledge by having you read 6 papers in your chosen area 2) to learn writing skills/techniques by writing a summary of the 6 papers 3) to learn speaking skills/techniques by presenting your area to the class 4) to push you to think about original contributions to the area by working on extensions of the material you learn.

### **Project Details:**

#### *Overview:*

- The project will be done in groups of 2. Pick a partner you can work with, because you will spend a lot of time together throughout the semester. It is expected for you to work together for at least 10 hours per week.
- Your group will have a weekly meeting with the instructor.
- You will select the area of your project, subject to instructor approval and guidance.
- You will read 6 research papers in the area. At most 1 reference book can be counted as a “paper.” The papers you select are also subject to instructor approval and guidance.
- Each member of the group will give a 1-hour long presentation to the class on your selected area.
- The group will write a single 30 page summary of the 6 papers (at least 30 pages, at most 32, using LaTeX and in a style provided by the instructor).
- The last 3 to 5 pages of your “summary” will be suggestions for original research contributions/extensions of the material you read. These suggestions can range from “clearly doable” to “seems impossible,” however, the group must show significant thought/work on at least one suggested extension. The extension with significant thought/work is subject to instructor approval and guidance.

#### *Evaluation:*

- There are 12 due dates, each worth 5% for a total of 60% of your grade. Your individual in-class talk is worth 20% your grade. Your group's summary is worth the final 20% of your grade. Extra credit may be given at instructor discretion.

### *Due Dates Overview:*

The purpose of the due dates is to push you to work on the project throughout the semester instead of leaving everything to the last minute. Generally, there are three types of due dates:

Reading/Discussion Due Dates: You must discuss the material with the instructor in your group meeting prior to the due date. You are expected to demonstrate that you have read the required material/done the required work.

Writing Due Dates: You must turn in the required written material at the start of lecture on the due date.

Practice Talk Due Dates: You must give a full 1-hour practice talk to the instructor in your group meeting prior to the due date. All your talk slides should be prepared before the group meeting.

Mon Jan 26: Due: Fix Partners, Fix meeting time

Mon Feb 2: Due: 1st paper (5%)

Mon Feb 9: Due: Topic; 1st, 2nd paper (5%)

Mon Feb 16: Due: 5 pages; 3rd, 4th paper (5%)

Mon Feb 23: Due: 3rd, 4th paper (5%)

Mon Mar 2: Due: 12 pages; 5th, 6th paper (5%)

Mon Mar 9: Due: 5th, 6th paper (5%)

Spring Break

Wed Mar 25: Due: 20 pages (5%)

Wed Apr 1: Due: 27 pages (5%)

Wed Apr 8: Due: Talk preparation (5%)

Wed Apr 15: Due: Practice talk (5%)

Wed Apr 22: Due: Talks in class; Extension work (5%)

Wed Apr 29: Due: Talks in class; Extension work (5%)

Wed May 6: Due: Summary final edits

Fri May 8: Last day of classes

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4241 TTY or the School of Engineering Director of Students with Disabilities at 471-4382.

An engineering student must have the dean's approval to add or drop a course after the fourth class day of the semester or after the second class day of a summer term. Adds and drops are not approved after the fourth class day except for good cause. ``Good cause" is interpreted to be documented evidence of an extenuating nonacademic circumstance (such as health or person problems) that did not exist on or before the fourth class day.

A Course-Instructor Survey from UT's Measurement and Evaluation Center will be administered near the end of the semester.