MATH 9880 Selected Topics in Operations Research: Conic Programming
Spring 2020

Instructor: Boshi Yang (boshiy@clemson.edu)

Class Times: TTh 3:30 - 4:45
Classroom: Martin M-103
Office Hours: TTh 8:30 - 10:00
Office: Martin O-204
Office Phone: (864) 656-5198

Prerequisites: MATH 8100 (Mathematical Programming) or MATH 4400 (Linear Programming) or equivalent. MATH 8110 (Nonlinear Programming) is recommended but not required.


Objectives: Conic optimization has become an important component in the optimization society in recent decades. This course covers fundamental concepts in conic optimization, including conic duality, second-order cone programming, semidefinite programming, copositive programming, and their applications. Upon successful completion of the course, students are expected to be able to formulate conic programming problems, understand conic duality theory, and solve moderate-scale conic programs using available software. Students should also be comfortable to apply conic programming techniques to nonconvex optimization problems such as quadratically constrained quadratic programs and mixed integer programs.

Materials covered: The course will cover most of the theoretical work in the first 4 chapters of the textbook. A selection of research articles will be provided to supplement the textbook. A tentative list of topics is as follows.

- Convex cones and geometry
- Conic programming duality
- Second-order cone representability
- Semidefinite representability
- Copositive programming and relaxation
- Solvers for conic programming
- Conic relaxations for combinatorial problems
- Conic relaxations for quadratically constrained quadratic programs

Course evaluation: Homework will be assigned throughout the semester. Students will be required to give presentations to the class on selected topics. A computational project involving using solvers for conic programs will be due at the end of the semester.

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<th>Homework</th>
<th>Presentations</th>
<th>Final Project</th>
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<tr>
<td>Points</td>
<td>30</td>
<td>40</td>
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Class cancellation: The class will be dismissed in the case when the instructor or the invited lecturer is not present within 15 minutes of the scheduled start time.

Final grade:

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<th>Grade</th>
<th>Over 85</th>
<th>70-84</th>
<th>60-69</th>
<th>Below 60</th>
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Accommodation: It is university policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students with disabilities requesting accommodations should make an appointment with Accessibility Services (656-6848), to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Accessibility Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Clemson University Title IX (Sexual Harassment) statement: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. The policy is located at http://www.clemson.edu/campus-life/campus-services/access/nondiscrimination-policy.html. Alesia Smith serves as Clemson’s Title IX Coordinator and may be reached at alesias@clemson.edu or (864) 656-3181.

Academic integrity statement: As members of the Clemson University community, we have inherited Thomas Green Clemson’s vision of this institution as a ‘high seminary of learning’. Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity.