Course Syllabus

ECE 509: Convex Optimization for Engineering Applications
Spring 2025

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1 Instructional Staff

Instructor

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Means of Communication

Canvas: `https://rutgers.instructure.com/courses/336821` — **Overall course management**
Piazza: `https://piazza.com/rutgers/spring2025/ece509sp25` — **All non-personal questions**
Emails to the Instructional Staff: **ONLY for questions of personal nature**

2 Lecture Timings and Office Hours

Lectures

Timings: Tuesdays and Fridays, 10:20 – 11:40 AM
Location: T. Alexander Pond Science & Engineering Resource Center, SEC 207

Instructor Office Hours

Timings: Tuesdays, 12:00 – 1:00 PM
Location: Computing Research & Education Building, CoRE 723

3 Course Prerequisites

This course does not require a specific major or background in engineering. However, it does require prior completion of undergraduate-level **advanced calculus** and **linear algebra**. Additionally, a background in **computational programming**, preferably in Python, is essential. This foundation is critical for effectively engaging with the course's optimization concepts.

4 Learning Outcomes

- Comprehensive understanding of fundamental concepts and terminology in convex optimization, grounded in mathematical theory.

- Proficiency in identifying and applying key algorithms used in convex optimization to solve practical problems.

- Deep mathematical insight into the workings and derivations of essential convex optimization algorithms.

- Capability to design and implement effective convex optimization solutions in various application scenarios.

- Awareness of common challenges and limitations in the practical application of convex optimization techniques.

5 Required Text

The primary material for this course is based on the following required text:

- *Convex Optimization*
  S. Boyd and L. Vandenberghe
  Cambridge University Press, 2004
  Available online:
  `https://web.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf`

This textbook is a key resource, covering foundational elements of convex optimization. Reading assignments from the textbook will be given after most classes. Additionally, material from other sources will also be used throughout the course. This supplementary material will be provided as needed, to ensure comprehensive coverage of the subject matter. Students should also take detailed notes during lectures and review the provided materials thoroughly to reinforce their understanding of the course content.

6 Grading Policy

The final course grade will be based upon:

1. Homework (7.5%)

2. Midterm exam (32.5%)

3. Final exam (45%)

4. Term project (15%)

Grades will be assigned on a relative basis. The relative scale though will vary based upon the performance of the overall class. In an ideal setting, students above class average will get B+ and higher and students at or below class average will get B and lower, respectively. If the class performs really well, however, then the B+ will turn into a A. Similarly, if the class performs really bad then the B+ will turn into a B (or even C+).

7 Late Submission Policy

Every student gets an automatic submission grace period of up to 3 days for a maximum of two homework assignments. Utilization of the first grace period for a homework is without any penalty. Utilization of the second grace period comes with a 20% penalty. No late submissions will be accepted from a student who has utilized both these grace periods, regardless of the emergency or unique circumstances. It is therefore advised that students avail themselves of these grace periods in true emergencies.

8 Academic Integrity Policy

It is important that students enrolled in this course familiarize themselves with the Rutgers Academic Integrity Policy (`http://nbacademicintegrity.rutgers.edu/home/academic-integrity-policy`) and the definition of plagiarism (`http://nbacademicintegrity.rutgers.edu/home/for-students`), which includes code plagiarism. It is also important for the students to realize that pseudo-tutoring from platforms such as *Chegg* and *Course Hero* that results in solutions to homework assignments, exams, etc., is serious academic misconduct. Note that all cases of academic misconduct in the course, whether minor or major, will not only be reported to the Office of Student Conduct, but will, in most cases, also result in loss of one or more letter grades.

Use of AI Chatbots in Academics: With the rise of advanced AI-driven chatbots such as ChatGPT, Claude, and Gemini, students now have access to a new layer of academic resources. These tools can significantly aid in understanding complex topics, but their use must be governed by clear guidelines to maintain academic integrity:

- Utilizing chatbots to clarify concepts, explore ideas, or gain additional insights is encouraged, provided that the student engages critically with the information.

- Directly copying and pasting responses or solutions from these chatbots without genuine comprehension is a serious violation of academic integrity.

- If you use chatbots to assist in your work, you must explicitly acknowledge this assistance in your submission, detailing the extent and nature of the help received.

Failure to comply with these guidelines, like any other form of academic misconduct, will be met with strict consequences as outlined above.