ELE 703 – Convex Optimization

Spring 2026

- **Lectures:** MonWed 12:45pm–2:05pm, 106 Huntington Hall
- **Website:** `http://ecs.syr.edu/faculty/fardad/index_ELE703.htm`
  (all course materials available here; Blackboard not used)
- **Office Hrs:** MonWed 2:15pm–3:15pm, 3-189 SciTech
- **Instructor:** Makan Fardad
  3-189 SciTech
  `makan@syr.edu`
- **Prerequisites:** Knowledge of matrix analysis and linear algebra; proficiency in MATLAB; and most importantly, *willingness to learn.*
- **Course Topics:** Linear algebra review; least-squares and least-norm problems; convex sets; convex functions; convex optimization problems (general theory and special problems – linear programming, quadratic programming, semidefinite programming); Lagrange multipliers and duality; convex approximations and relaxations; sparse optimization and compressive sensing; numerical algorithms for unconstrained and constrained optimization; optimization using MATLAB and CVX; case studies and engineering applications.
- **Course Objectives:** This course provides an extensive introduction to the field of mathematical optimization, with focus on convex optimization. Optimization techniques will be applied to a wide range of engineering disciplines. Case studies offer experience with practical applications and computer-aided design tools.
- **Texts:**
  - Primary text: Stephen Boyd and Lieven Vandenberghe, *Convex Optimization.* Cambridge University Press, 2004. Available for free download at
    `http://www.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf`
  - Supplementary text 1: Jorge Nocedal and Stephen J. Wright, *Numerical Optimization.* Springer, 2006.
  - Supplementary text 2: David G. Luenberger, *Optimization by Vector Space Methods.* Wiley, 1969.
- **Lecture Notes:** Instructor's lecture notes for the entire semester are available on the class website.
- **Grading Policy:** Your overall grade will be determined based on the following distribution.

Participation:	Class attendance and participation in discussions	15%
Homework:	Assigned approx. once every two weeks; collected electronically; graded for effort	25%
Midterm:	Wednesday, March 04, 12:45pm–2:05pm	30%
Final:	Monday, April 27, 12:45pm–2:05pm; comprehensive	30%

Your overall grade for this course will *not* depend on how well other students have done. It is possible (in fact, much desired) for every student to get an A. Numerical scores, rounded to whole numbers, will be converted to letter grades as follows:

Overall score (%)	Letter grade
91-	A
86-90	A-
81-85	B+
76-80	B
71-75	B-
66-70	C+
61-65	C
56-60	C-
00-55	F

- **Homework Collection:** Your homework should be *scanned and emailed to the instructor by 6pm* on the day that it is due. Please send your homework as *one pdf document* and include your last name, course number, and homework number in the name of the file in the format `LastName_Course#_Hw#.pdf`; for example `Fardad_ELE791_Hw1.pdf`. Homework solutions will be posted on the class website or emailed soon after the deadline and late homework will not be accepted. While discussions on homework problems are allowed, even encouraged, it is critical that assignments be completed individually and not as a team effort. *Homework copied from any source is considered plagiarism and will be reported to the Office of Academic Integrity.*

- **Academic Integrity:** Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. Syracuse University students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. Any established violation in this course may result in course failure regardless of violation level.

  All academic integrity expectations that apply to in-person quizzes and exams also apply to quizzes and exams. In this course, all work submitted for quizzes and exams must be yours alone. Discussing quiz or exam questions with anyone during the quiz or exam period violates academic integrity expectations for this course. Using websites that charge fees or require uploading of course material (e.g. Chegg, Course Hero) to obtain exam solutions or assignments completed by others and present the work as your own violates academic integrity expectations in this course.

  Zero tolerance for artificial intelligence use: All generative-AI tools are prohibited in this course because their use inhibits achievement of the course learning objectives. This policy applies to all stages of

project and writing processes including researching, brainstorming, outlining, organizing, and polishing. Do not use Generative-AI tools to create any content (i.e., images and video, audio, text, code, etc.). If you have any questions about a feature and whether it is considered Generative-AI, ask your instructor.

- **Diversity, Inclusion, and Disability-Related Accommodations:** Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process. If you would like to discuss disability-accommodations or register with CDR, please visit Center for Disability Resources `https://disabilityresources.syr.edu/`. Please call (315) 443-4498 or email `disabilityresources@syr.edu` for more detailed information. The CDR is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact CDR as soon as possible to begin this process.

- **Religious Observances Policy:** SU religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to are religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/StudentServices/Enrollment/MyReligiousObservances/AddaNotification from the first day of class until the end of the second week of class. For more information on SU's religious observance policy, see `http://supolicies.syr.edu/emp_ben/religious_observance.htm`.

- **Classroom and Lecture Etiquette:**
  - Do not be late. Late entry is distracting and disruptive for both the students and the instructor. Repeated late entry communicates a lack of respect for the class and consideration for others.
  - Please silence cell phones, as they interrupt the class. Text messaging is not permitted.
  - Do not carry on side conversations. They are distracting and disruptive. Extend the instructor and other students the courtesy of listening, just as you would have them listen when you speak.
  - If you miss class, recognize that it is your responsibility to learn about announcements and obtain handouts, assignments, etc, from your classmates or from the instructor during normal office hours.
  - At all times, students should conduct themselves as professionals, with courtesy and respect for those around them.