

Syllabus for MA 466/566
Scientific Programming – Spring 2022
Instructor: Dr. Shannon Starr
Class Times: Tuesday, Thursday 12:30pm – 1:45pm
Class Room: Heritage Hall Building, Room 221

Optimization is important in many decision making problems in various areas like engineering, economics and machine learning. Optimization theory deals with finding the best solution(s) or variables of a given objective function. Recently, the area of optimization has received much attention due to the development of highly efficient computational methods for data analysis. The scope of this course covers linear algebra, unconstrained optimization, linear programming, and nonlinear constrained optimization. The course will also introduce optimization algorithms and codes via Python and Matlab.

Objectives of the course are:

- (1) develop and implement algorithms for a given optimization problem;
- (2) implement optimization methods to solve decision making problems;
- (3) learn the basic principles of optimization theory;
- (4) integrate real data sets in to theoretical algorithms.

Instructor email: slstarr@uab.edu

Typical responses are 24 hours later on weekdays.

Office hours: Tuesdays and Thursdays, 11-11:50am in University Hall 4008, and by appointment. You may also attend via Zoom, on the Zoom link that I will put on the UAB canvas page, if you prefer that. During my office hours, I will have Zoom turned on. Priority will frequently be given to in-person students. But you make an appointment (for in-person or Zoom meeting) to insure a time.

Required textbook:

(1) *An Introduction to Optimization 4th Ed.*, by E. Chong and S. Zak.

Supplementary textbook:

(2) *Foundation and Analysis of Linear Programs*, by B. Van Roy and K. Mason, SIAM, 2016.

Grades:

$$\text{HW}(25\%) + \text{Midterm}(15\%) + \text{Projects}(40\%) + \text{Final}(20\%) = 100\%$$

Homework: Regular homeworks assigned on Canvas. You turn in your solutions as files on Canvas. Late responses to HW will not be accepted, but the lowest 1 score will be dropped. Students in MA 560 will be assigned extra HW problems

Projects: There will be six projects. Students in MA 560 will do extra problems in projects.

Take-home final: This will be 25% of the grade.

$$A = 88-100, \quad B = 75-87, \quad C = 62-74, \quad D = 50-61.$$

There will be a group project or activity in this course. Please make sure to check the group project instructions page to locate your group and your group space in Canvas. In this group project activity, you will collaborate with other students to submit a report/video/ presentation. As a team, you will work together to break the project up into separate tasks and decide on the tasks or sub-tasks each member is responsible for. Be sure to leave enough time to put all the pieces together before the group assignment is due and to make sure nothing has been forgotten. At the end of the project, you will be required to fill out a group self-evaluation form to evaluate other team members contributions to the project. This peer evaluation score is worth 15% of your group project grade.

Homework problems will be posted on Canvas

<http://www.uab.edu/online/canvas>

All other materials, such as class announcements, codes, grades, etc., will be posted in Canvas. (Students should log in to Canvas every day.) Homework assignments, projects and the take-home final will only be collected on Canvas.

By working steadily and regularly, you will increase your chances to succeed in this course!

UAB Policies and Resources

Misconduct

The University of Alabama at Birmingham expects all members of its academic community to function according to the highest ethical and professional standards. Students, faculty, and the administration of the institution must be involved to ensure this quality of academic conduct. Review the Academic Integrity Code linked below.

Academic misconduct undermines the purpose of education. Such behavior is a serious violation of the trust that must exist among faculty and students for a university to nurture intellectual growth and development. Academic dishonesty and misconduct includes, but is not limited to, acts of abetting, cheating, plagiarism, fabrication, and misrepresentation. Candidates are expected to honor the UAB Academic Honor Code as detailed in the most current UAB Student Catalog. Please consult this resource for additional information regarding the specific procedures to be undertaken when a student violates the UAB Academic Honor Code.

<https://www.uab.edu/one-stop/policies/academic-integrity-code>

DSS Accessibility Statement

Accessible Learning: UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact DSS to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call

(205) 934-4205 (voice) (205) 934-4205 (TDD) (205) 934-8170 (Fax)

or consult their webpage

<https://www.uab.edu/students/disability/>

or visit their office located in Hill Student Center Suite 409, 1400 University Blvd., Birmingham, AL.

Non-harassment, Hostile Work/Class Environment

The UAB College of Arts and Sciences expects students to treat fellow students, their Course Instructors, other UAB faculty members and staff as adults and with respect. No form of hostile environment or harassment will be tolerated by any student or employee.

Course Netiquette

There are course expectations concerning etiquette on how we should treat each other online. It is very important that we consider the following values during online discussions and email: **respect, confidentiality, format** and **relevance**. Every person's opinion is valued. During online discussions, be sure to state opposing views diplomatically. Do not insult people or their ideas, nor use negative, inappropriate language. When discussing topics, be sure to be discreet about how you discuss children, teachers and colleagues. Do not use names of people or facilities. When posting online messages use proper grammar, spelling and complete sentences. Avoid using all capitals (which signifies yelling). Avoid shortcuts and abbreviations such as "cu l8r." Instead say, "See you later." Think before you type. Keep posts relevant to the online discussion topic.