

## Course Information

Course Number: MATH 651  
Course Title: Optimization I  
Section: 600  
Semester: Fall 2025  
Time: MW 4:10 – 5:25pm  
Location: BLOC 161  
Credit Hours: 3

## Instructor Details

Instructor: Simon Foucart  
Office: BLOC 502D  
E-Mail: [foucart@tamu.edu](mailto:foucart@tamu.edu)  
Office Hours: M 8:40-9:10am, T 1:00-1:30pm, W 5:30-6:00pm, and by appointment

## Course Description

Smooth unconstrained optimization; convex constrained optimization, in particular linear programming; duality theory; algorithmic methods.

## Course Prerequisites

MATH 410 or equivalent (with instructor's approval). The course is accessible to students from Mathematics, Statistics, Computer Science, and Engineering. It assumes some basic knowledge of multivariate calculus and linear algebra. Familiarity with MATLAB/Python is a plus.

## Course Learning Outcomes

Upon completion of this course, students will:

- Be able to model applied problems as optimization programs;
- Be equipped with a palette of methods to solve such optimization programs computationally;
- Have grasped the theory justifying the suitability of these methods, as well as their limitations.

## Textbook and/or Resource Materials

S. Boyd and L. Vandenberghe: *Convex Optimization*, Cambridge University Press.

## Grading Policy

- Grades will be assigned on the scale A, B, C, D, F (without + or – modifiers).
- The following minimum grade is guaranteed, given the following score:  
A:100%-90%, B:89%-80%, C:79%-65%, D:65%-50%, F: 49%-0%.
- The grade is based on the following items:
  - Homework (90%). Problems will be assigned weekly. Five (5) assignments will be graded. They will be collected on weeks 3, 6, 9, 12, 15 at the beginning of class on the due date. You are encouraged to come and see me during my office hours to obtain help on particular questions, provided you made a genuine attempt to solve them.
  - Class participation (10%). Although not recorded, regular attendance is expected—it is essential to do well in the course.

### Late Work Policy

The graded homework assignments will be collected at the beginning of class on the due date. Late assignments will not be accepted.

*Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy ([Student Rule 7](#)).*

### Course Schedule

The following topics will (tentatively) be covered:

- Week 01: Mathematical preliminaries
- Week 02: Smooth unconstrained optimization: gradient descent
- Week 03: Smooth unconstrained optimization: Newton method
- Week 04: Momentum methods
- Week 05: Nonsmooth unconstrained optimization
- Week 06: Mathematical reinforcement
- Week 07: Constrained optimization: duality
- Week 08: Constrained optimization: KKT conditions
- Week 09: Linear programming: simplex methods
- Week 10: Linear programming: primal-dual algorithms
- Week 11: Quadratic programming
- Week 12: Interior-point methods
- Week 13: Conic optimization
- Week 14: Complements I
- Week 15: Complements II

### University Policies

#### Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

#### Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor” ([Student Rule 7, Section 7.4.1](#)).

“The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence” ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

### Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

#### Texas A&M at College Station

*You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at [aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).*

### Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

#### Texas A&M at College Station

*Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit [disability.tamu.edu](http://disability.tamu.edu).*

### Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

### **Texas A&M at College Station**

Students wishing to discuss concerns related to mental and/or physical health in a confidential setting are encouraged to make an appointment with [University Health Services](#) or download the [TELUS Health Student Support app](#) for 24/7 access to professional counseling in multiple languages. Walk-in services for urgent, non-emergency needs are available during normal business hours at University Health Services locations; call 979.458.4584 for details.

*Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).*

### **Statement on Mental Health and Wellness**

Texas A&M University recognizes that mental health and wellness are critical factors influencing a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care practices by utilizing the resources and services available through [University Health Services](#). The [TELUS Health Student Support app](#) provides access to professional counseling in multiple languages anytime, anywhere by phone or chat, and the 988 Suicide & Crisis Lifeline offers 24-hour emergency support at 988 or [988lifeline.org](#).

### **Texas A&M College Station**

Students needing a listening ear can contact University Health Services (979.458.4584) 24-hour emergency help is also available through the 988 Suicide & Crisis Lifeline (988) or at [988lifeline.org](#).

### **Campus-Specific Policies**

#### **Statement on the Family Educational Rights and Privacy Act (FERPA)**

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. Currently enrolled students wishing to withhold any or all directory information items may do so by going to [howdy.tamu.edu](#) and clicking on the "Directory Hold Information" link in the Student Records channel on the MyRecord tab. The complete [FERPA Notice to Students](#) and the student records policy is available on the Office of the Registrar webpage.

Items that can never be identified as public information are a student's social security number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your

privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.

Directory items include name, UIN, local address, permanent address, email address, local telephone number, permanent telephone number, dates of attendance, program of study (college, major, campus), classification, previous institutions attended, degrees honors and awards received, participation in officially recognized activities and sports, medical residence location and medical residence specialization.