

ECE 490 *Introduction to Optimization* Spring 2025

Exam I Information

The first midterm exam will be held *in class*

3081 ECE Bldg *Thu, Feb 20, 11:00 a.m. – 12:20 p.m.*

The exam is closed-book, no calculators allowed (and you will not need one). You are allowed to bring two two-sided sheets of notes. The exam will cover Chapters 1, 2, and 3 (except Sections 3.3, 3.6, 3.8).

In particular, I expect you to understand perfectly the following concepts:

1. Taylor's theorem in integral form and in mean-value form.
2. Necessary and sufficient conditions for local and global minima.
3. Definition and examples of convex sets and functions.
4. Definition and examples of smooth, convex, and strongly convex functions, and their properties.
5. Characterization of smoothness, convexity, and strong convexity in terms of first- and second-order derivatives.
6. Definition and characterization of directions of descent.
7. Analysis of convergence of the gradient method in various settings (smooth functions; smooth and convex functions; smooth and strongly convex functions).
8. Basic ideas underlying line search (both direction and steplength).