Math 124a: Convex Optimization

Prof. John Wilmes
wilmes@brandeis.edu
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Prerequisites
According to the course catalog, the prerequisites for this course are “MATH 15a or MATH 22a, MATH 20a or MATH 22b, and COSI 21a or MATH 23b.” In order to succeed in this course, you will need a solid foundation of linear algebra and multivariate calculus and the ability to write proofs.

Learning Goals
Students will learn to
- recognize and formulate tractable optimization problems, and reformulate problems in standard form,
- solve unconstrained and constrained convex optimization problems using a variety of algorithms,
- understand tradeoffs between various approaches to optimization and select methods appropriate to a given optimization task,
- prove correctness and convergence guarantees for optimization algorithms,
- reason about convex sets and functions and optimality conditions,
- and apply their understanding of optimization in a variety of domains.

Course Site
All materials for this course will be accessible from the LATTE webpage, which can be reached from [http://latte.brandeis.edu](http://latte.brandeis.edu). Contact me immediately if you cannot access the page.

Text
Both *Linear and Nonlinear Programming* by David G. Luenberger and Yinyu Ye and *Convex Optimization* by Stephen Boyd and Lieven Vandenberghe are recommended for this course.

Office hours
My office is Goldsmith 313. Office hours during the first week will be 11am-noon on Thursday, Jan 17. Office hours in subsequent weeks will be determined by a poll accessible from the LATTE webpage.

Grade policy
There are three components to your final grade, each worth an equal portion.

1. **Homework** There will be roughly 10 equally weighted assignments. No late homework will be accepted, without exception, but your three lowest homework grades will be dropped. You are encouraged to discuss homework problems with your classmates. However, you must write up your solutions independently. All homework must be submitted electronically via LATTE.
2. **Group project** Students will complete a small-group project, including a presentation. This project might involve understanding and explaining an advanced theoretical topic, applying the tools of this course to real-world problems, or implementing some of the algorithms with attention to numerical issues. The details of these projects and the compositions of the groups will be discussed during Week 5. Presentations will take place during the last week of classes.

3. **Final exam** The three-hour final exam will take place at the time and location determined by the registrar.

**Four-Credit Course (with three hours of class time each week)**

Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc).

**Students with disabilities**

If you are a student who needs academic accommodations because of a documented disability you should contact me and present your letter of accommodation as soon as possible. If you have questions about documenting a disability or requesting academic accommodations you should contact Beth Rodgers-Kay in the Office of Academic Services at 63470 or at brodgers@brandeis.edu. Letters of accommodations should be presented at the start of the semester to ensure provision of accommodations. Accommodations cannot be granted retroactively.

**Academic Integrity**

You are expected to follow the University’s policy on academic integrity, which is distributed annually as Section 4 of the Rights and Responsibilities Handbook (see [http://www.brandeis.edu/studentaffairs/srcs/rr/index.html](http://www.brandeis.edu/studentaffairs/srcs/rr/index.html)). Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in this course, please ask.