Instructor:
Fei Gao
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Timetable:
9 Lectures are given on Mondays, Wednesdays and Fridays from August 1 through August 19, 2016. Our first class will meet on Monday, August 1.
Time: 10am-11:30am (90-minute lecture time)
Room: JMHH F55 (expect for Aug 17, which is at SHDH 109)

Office Hours:
By appointments.

Final Exam:
Wednesday, August 24, 2016
Time: 10am-11:30am
Room: SHDH 109

Required Textbook:
Sundaram, R., A First Course in Optimization Theory, Cambridge University Press, 1996

Course Description:
Wharton’s Summer Math Camp covers the basic principles of mathematical analysis, optimization theory and probability theory. The course is meant to introduce the necessary mathematical tools that are needed for a successful completion of the core courses in economics, operations and statistics. The course will cover the first four chapters (plus some materials in the Appendix) in Sundaram’s book as well as materials on probability theory from handouts. The course is also the first part of a two-course sequence. The second part, OPIM 912, will be offered as a regular mini-course during the first quarter of the Fall semester.

Prerequisites:
Students are assumed to be familiar with univariate and multivariate calculus. Experience with proofs in mathematics is highly recommended. Exposure to linear algebra is useful yet not required.
Course Topics:
- Elements of Analysis
  - Real Number System
  - Metric Spaces
  - Numerical Sequences in $\mathbb{R}^n$
  - Basic Topology
  - Continuity and Differentiation
  - Gradients and Higher Order Derivatives
  - Separation Theorems
  - Intermediate and Mean Value Theorems
  - Inverse Function Theorem
  - Envelope and Implicit Function Theorems
- Elements of linear algebra
  - Matrices
  - Quadratic Forms
- Optimization Problems in $\mathbb{R}^n$ and their Formulation
- Weierstrass Theorem
- Unconstrained Optimization: First and Second-Order Conditions
- Elements of Probability Theory
  - Random Variables
  - Expected Values
  - Conditional Expectation

Grade Policies:
Course grade is calculated based on the final exam. Students will not receive a letter grade and the course record will not appear on their transcripts. However, individual scores will be notified to each student and to his/her Ph.D. Program Coordinator.

Exam Date:
- There will be one in-class final exam on Wednesday, August 24, 2016. The exam will be closed books and closed notes. It will cover everything that is discussed in class (definitions, theorems, proofs,...).