

Econ 401

Mathematical Methods

Fall 2016

Instructor: Natalya Naumenko
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Time and Location: Lectures: 9am – 12pm daily except Wednesdays; Discussion Sessions: 1pm – 2pm daily and 9am – 12pm Wednesdays; Andersen Hall, Room 3245

Teaching Assistants: Arjada Bardhi and Egor Starkov,
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Course Overview

This course is a refresher of mathematical tools essential for the graduate Economics program. Since incoming PhD students all have different backgrounds, this class aims to put everyone on the same level. The course covers topics in real analysis, optimization, topology, linear algebra and probability theory.

Lectures will be held 9am – 12pm Mon, Tue, Thu, and Fri. Discussion sessions will be held daily 1pm – 2pm and additionally on Wednesdays 9am – 12pm. There will be non-graded practice problem sets. In the end of the course there will be an exam.

I will distribute lecture notes. In addition, Sundaram (1994) “A First Course in Optimization Theory” covers many topics discussed in the course. Those looking for more detailed exposition of analysis may look at Stein and Shakarchi (2005) “Real Analysis” and Tao (2010) “An Introduction to Measure Theory”. Durrett (2010) “Probability: Theory and Examples” and Dudley (2002) “Real Analysis and Probability Theory” cover the basics of probability theory discussed in class and much more. Finally, Aliprantis and Border (2006) “Infinite Dimensional Analysis: A Hitchhikers Guide” is an excellent reference book.

Course Topics (Tentative)

- Topology: open sets, metrics, sequences, functions, continuity, compactness
- Linear Algebra: basic concepts

- Real Analysis: differentiation, unconstrained and constrained optimization, convexity
- Probability Theory: basic concepts
- Dynamic programming
- Optimal Control Theory: Pontryagin's Maximum Principle
- Monotone Comparative Statics