

Math Camp for Incoming PhD (Econ) Students AY2016/17

This is a short graduate-student led course for incoming PhD (Econ) students, covering some of the mathematics required for the first year program. Parts 1A and 1B cover mathematical prerequisites for Microeconomics 1 and 2, and Econometrics 1. Parts 2A and 2B cover material required for Macroeconomics 1 and 2, and Econometrics 2. The coverage of the topics in Parts 2A and 2B are at a very introductory level.

Math Camp is not compulsory, but highly recommended. Depending on your background you might be ok skipping parts of Parts 1A and 1B. However, Parts 2A and 2B are essential for Macro 1 and 2.

Part 1A (Linear Algebra, Probability Theory)

Instructor: Liu Xiaobin

Session 1 Matrix algebra part I

Session 2 Matrix algebra part II

Session 3 Basics of probability theory

Session 4 Univariate and multivariate distributions

Session 5 Estimation strategies, and convergence concepts

Part 1B (Elementary Real Analysis, Optimization)

Instructor: Liu Peng

Session 1 Preliminaries and some important results in elementary real analysis (Intermediate Value Theorem, Implicit Function Theorem, Weierstrass' Extreme Value Theorem)

Session 2 Separation Theorems and Unconstrained optimization

Session 3 Constrained optimization with equality constraints (the Lagrange Multiplier method)

Session 4 Constrained optimization with inequality constraints (the Kuhn-Tucker method)

Session 5 Fixed Point Theorems

Part 2A (Advanced Calculus)

Instructor: TBA

Session 1 Difference Equations

Session 2 Ordinary Differential Equations

Session 3 Partial Differential Equations

Session 4 Discrete and Continuous Time Stochastic Processes

Session 5 Stochastic Calculus

Part 2B (Dynamic Programming)

Instructor: Zeng Ming

Session 1 Introductory macro examples, some mathematical preliminaries

Session 2 Theory of Dynamic Programming under Certainty

Session 3 Deterministic Dynamics and Stability

Session 4 Stochastic dynamic programming

Session 5 Search and Matching

Notes for Math Camp

Lecture notes and slides for last year's math camp can be found on the PhD (Econ) program description page <http://economics.smu.edu.sg/phd-economics/programme-description-idp>. These notes will be updated sometime in the summer.

Dates and venue

Part 1 will be held Aug 1, 2016 to Aug 13, 2016

Part 2 will be held Dec 27, 2016 to Jan 7, 2017

For detailed dates, see the Schedule of Events.

Reference Textbooks

- [1] Curtis, C. (2012), "Linear Algebra: An Introductory Approach", Springer Science & Business Media.
- [2] Greene, W. (2012), "Econometric Analysis", 7th edition, Pearson. (Appendices A to D). Older editions are fine.
- [3] Lucas, R. E. and N.L. Stokey (1989), "Recursive Methods in Economic Dynamics", Harvard.
- [4] Magnus, J. R. and Neudecker, H. (2002), "Matrix Differential Calculus with Applications in Statistics and Econometrics", Wiley, Chichester.
- [5] Ok, E. A. (2007), "Real Analysis with Economic Applications", Princeton University Press.
- [6] Sydsaeter K., P. Hammond, A. Seierstad, and A. Strom (2005), "Further Mathematics for Economic Analysis", FT-Prentice Hall.
- [7] Sundaram, R. (1996), "A First Course on Optimization Theory", Cambridge.