Math Camp for Incoming PhD (Econ) Students AY2017/18

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: TBA**

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: Liu Yanbo**

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 7, 2017 to Aug 22, 2017
Part 2 dates to be announced.

A detailed (and confirmed) schedule of the math camp classes, and other pre-enrolment events, will be sent to you later in the summer.

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.