ECO2010 H1F

Mathematics and Statistics for PhD Students
Department of Economics, University of Toronto

Summer 2021

Course Dates: August 17 – September 3
Instructor: Prof. Martin Burda
Office: Economics Department, room 234
Contact: martin.burda@utoronto.ca; phone 416-978-4479

TA: Duc Nguyen
Contact: ducm.nguyen@mail.utoronto.ca

Course Description

The course provides an intensive introduction to rigorous mathematical and statistical analysis at the graduate level. Statistical software of students' choice will be used in class assignments. All PhD students are required to take the course.

Course Materials

Course materials consist of lecture notes that will be posted on Quercus. There is no textbook for the course.

Evaluation

At the end of the course students will obtain either the grade "CR" (i.e. Credit) or "NCR" (i.e. No Credit). The grade does not affect GPA at U of T in any way. However, obtaining CR is a requirement for completing the Economics PhD program. The grade is based on the following:

Task	Date
Term Test 1	August 26, 2021 (online)
Term Test 2	September 3, 2021 (online)

Credit for the course is earned by scoring at least 50% on Term Test 1, and at least 50% on Term Test 2. In exceptional circumstances the instructor may require a written assignment that will enter the final grade. There are no make-up tests or any additional tests after Term Test 2. No percentage or numerical grade will be given.

ECO2010, Summer 2021

Day	Date	Reading from Lecture Notes	Problem Sets discussed
Tuesday	Aug 17	1. Methods of Proofs 2. Set Theory	
Wednesday	Aug 18	3. Metric Spaces 4. Analysis in Metric Spaces	PS 1
Thursday	Aug 19	5. Vector Spaces 6. Linear Algebra in Vector Spaces	PS 2
Friday	Aug 20	7. Correspondences 8. Continuity	PS 3
Monday	Aug 23	9. Constrained Optimization 10. Dynamic Optimization 11. Dynamic Programming	PS 4
Tuesday	Aug 24	12. DP Application - Optimal Economic Growth 13. DP Application - Labor Supply 14. Dynamic Optimization in Continuous Time	PS 5
Wednesday	Aug 25	15. Numerical Analysis 16. Numerical Optimization	PS 6
Thursday	Aug 26	*Term Test 1*	
Friday	Aug 27	17. Introduction to Probability 18. Measure-Theoretic Probability 19. Random Variables and Distributions	
Monday	Aug 30	20. Statistical Properties of Estimators 21. Statistical Properties of Estimators 22. Stochastic Orders and Delta Method	PS 7
Tuesday	Aug 31	23. Regression with Matrix Algebra 24. Maximum Likelihood 25. GMM	PS 8
Wednesday	Sep 1	26. Testing of Nonlinear Hypotheses 27. Bootstrap Methods 28. Elements of Bayesian Analysis	PS 9
Thursday	Sep 2	29. MCMC	
Friday	Sep 3	*Term Test 2*	