

**EF8100-Mathematics and Statistics Review**  
**Fall 2017, Section 011**  
**10am-12pm and 2pm-4pm Aug. 21-August 31 at TBA**

**Instructor:** Prof. Cathy Ning  
**Office Location:** JOR-226  
**Office Hours:** 1:00pm-2:00pm Mon-Fri  
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### **Course Description:**

The purpose of this course is to review the basic mathematical and statistical concepts and techniques which will be required for advanced study in economics. The course will cover univariate and multivariate calculus, linear algebra, comparative-statics, dynamic optimization, and statistics. A detail list of topics can be found below. Many materials may be recognized by students with varying degrees of familiarity. The idea of this course is to bring all of our new graduate students to a level that is well prepared for the start of the fall term courses.

The class is fast-paced and will meet five days per week for four hours per day. Quite a lot of material gets covered in a relatively short time. **Purchasing the textbook and the student solution manual is highly recommended for all students. Students will find it very helpful to read through the relevant parts before coming to each lecture and practice the relevant questions.** By the end of the course you should have acquired some enhanced mathematical fluency and this will serve you well subsequently in your degree studies and beyond.

### **Textbook**

1. Hoy, M., J. Livernois, C. McKenna and R. Rees, T. Stengos (2011), Mathematics for Economics, 3rd edition, MIT Press.
2. Hoy, M., J. Livernois, C. McKenna and R. Rees, T. Stengos (2011), Mathematics for Economics: Student's Solution Manual, 3rd edition, MIT Press: Cambridge, MA.

### **Evaluation**

**Daily practice and exercise questions will be assigned and completing them before the next class is crucial for you to grasp the material and to pass the final exam.**

**Pass/Fail Final Exam: 1:00—4:00pm Friday Sep. 1, 2017 in classroom.**

All students must attend the final exam. Students who fail the final exam can rewrite the exam **by the end of the fall term of 2017**. Students who fail the second time will be asked to withdraw from the program.

## Topics and Reading List

1. Univariate Calculus and Optimization [Chap 4-6]
  - Univariate Calculus (Functions, Continuity of Functions, Derivatives and Differentials)
  - Univariate Optimization (Unconstrained optimization, second-order conditions)
2. Linear Algebra [Chap 7-10]
  - System of Linear Equations
  - Matrix (Matrix Operation, Determinants and the Inverse Matrix)
  - Eigenvalues, Eigenvectors and Quadratic Forms
3. Multivariate Calculus [Chap 11-14 ]
  - Partial Differentiation and Total Differentiation
  - Unconstrained Optimization
  - Constrained Optimization
  - Comparative Statics
4. Integration and Dynamic methods (*Selected Topics*) [Lecture notes and selected parts from Part 5]
  - Integration
  - Difference Equations
  - First Order Differential Equations
  - Optimal Control Theory (Dynamic Optimization, Hamiltonian Function and Lagrange Multiplier)
5. Statistics Review (Lecture Notes)
  - Probability Theory
  - Probability Distributions (Normal distribution, Student's t distribution, Chi-square distribution, F distribution)
  - Testing
  - Regressions (simple linear regression and multiple linear regression)
6. Overall Review

### Note:

Every effort will be made to manage the course as stated here. However, **adjustments may be necessary for various reasons at the discretion of the professor.**

## Common Departmental Course Management Policy

Please see the Department of Economics Student Handbook

<http://www.economics.ryerson.ca/files/handbook.pdf>