# Brief Course Outline

**Course Title:**      **ECO 2210A – Mathematical Economics I**

**Course Number and Section:**

| ECONOMIC | 2210A 550 |
|---|---|

**Instructor Name(s):**      Bo Liu

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Disclaimer: Information in the brief course outline is subject to change. The syllabus posted on OWL is the official and authoritative source of information for the course.

## Course Description:

This course is designed to provide students with knowledge of the fundamental mathematical tools used in economic theory. The topics covered include multivariate calculus, with a focus on its applications in economics, as well as concavity and convexity, constrained optimization involving multiple choice variables, optimization with inequality constraints, and implicit functions with implicit differentiation. Illustrative examples are drawn from economics, but the primary purpose of the course is to teach mathematical methods rather than economic theory.

## Learning Outcomes:

- present several economic functions using graphs, including linear and non-linear functions, rational functions, exponential functions, logarithmic functions, and level curves.

- solve simultaneous linear equation systems in economics using matrix inversion and Cramer's rule.

- set up optimal timing problems and solve them using the appropriate techniques.

- understand the concepts related to the derivative of implicit functions, slopes of the level curves, homogeneous functions and Euler's theorem, concavity of functions of several variables, properties of Cobb-Douglas and CES functions including elasticity of substitution.

- formulate optimization problems in microeconomics, macroeconomics, financial economics and business economics.

- formulate constrained optimization problems with equality constraint, inequality constraints, and several constraints.

- interpret the second-order sufficient conditions for optimization techniques using the Hessian and Bordered-Hessian.

- generate comparative statics from optimization problems using various techniques.

**Textbooks and Course Materials:**

Textbook (Required)
•      Mathematics for Economists, by C. P. Simon and L. E. Blume. W. W. Norton & Company, 1994. Available at Western Bookstore

Supplementary Reference Textbook:

•      Mathematics for Economics, by M. Hoy, J. Livernois, C. McKenna, R. Rees, and T. Stengos. The MIT Press, 3rd edition, 2011.
•      Essential Mathematics for Economic Analysis, by K. Syds.ter and P. Hammond. FT Prentice Hall, 3rd edition, 2008.
•      "Fundamental Methods of Mathematical Economics", by A.C. Chiang and K.Wainwright. McGraw-Hill, 4th edition, 2004.
•      Economist's Mathematical Manual, by K. Syds.ter, P. Berck, and A. Str.m. Springer, 4th edition, 2005.

Note: Additional readings may be assigned.

**Methods Of Evaluation:**

| Assignment | Due Date mm/dd/yy | Weight - % |
| --- | --- | --- |
| 3 Assignments (10% each) | | 30% |
| Midterm Examination (Nov 7th) | | 25% |
| Final Examination | | 45% |

In solidarity with the Anishinaabe, Haudenosaunee, Lūnaapéewak, and Chonnonton peoples on whose traditional treaty and unceded territories this course is shared.

Friday, August 16, 2024