THOMPSON RIVERS UNIVERSITY

# Course Outline

**Department of Economics**
**School of Business and Economics**

## ECON 3200-3
## Introduction to Mathematical Economics (3,0,0)

**Calendar Description**

Students examine the mathematical methods and tools most commonly used in analyzing economic problems. Topics include a review of set theory, functions, and limits; linear models and matrix algebra; application of single and multivariable calculus; unconstrained and constrained optimization; integration and difference and differential equations; application of dynamic analysis; and linear and non-linear programing.

**Educational Objectives/Outcomes**

Upon completing this course, students will be able to:

1. Exhibit a sound understanding of mathematical technique studied.
2. Formulate economic problems in mathematical terms.
3. Construct a mathematical model given the information.
4. Demonstrate the application of linear algebra.
5. Solve constraint optimization problems.
6. Apply derivatives to solve economic problems.
7. Perform comparative statics analysis with and without optimization.
8. Compute dynamic market price using difference and differential equations.

**Prerequisites**

ECON 1900; ECON 1950; MATH 1170 or equivalent

**Co-requisites**

**Texts/Materials**

Chiang, A, C. and Wainwright, K., Fundamental Methods of Mathematical Economics, McGraw-Hill Irwin, New York, 2005.

**Student Evaluation**

| | |
|---|---|
| Participation | 0-20% |
| Assignments/quizzes | 0-20% |
| Project | 0-25% |
| Midterm(s) | 30-60% |

**Course Topics**

1. Review of Some Introductory Concepts
   - Math versus non-math economics
   - Math economics versus. econometrics
   - Real number system
   - A few aspects of logic
   - Essentials of set theory
   - Types of functions
   - Properties of functions

2. Linear Models and Matrix Algebra
   - Matrix and vector
   - Matrix operations
   - Geometric interpretation of vectors
   - Different types of matrices
   - Transpose and inverse matrix
   - Finding inverse matrix
   - Cramer's rule
   - Applications

3. Comparative Statics with Specific Function and the Derivative
   - Derivative and slope
   - The concept of limit
   - Rules of differentiation
   - Partial differentiation
   - Applications

4. Comparative Statics with General Function
   - Derivative and differentials
   - Total differentials and their rules
   - Total derivatives
   - Derivative of implicit function
   - Applications

5. Optimization with One Choice Variable
   - First derivative test
   - Second derivative test
   - Applications

- General function
- Exponential function
- Logarithmic function

6. Optimization with more than one Choice Variables
   - Necessary condition
   - Sufficient condition
   - Concavity and convexity with respect to second order condition
   - Unconstrained optimization
   - Constrained optimization
   - Applications in utility and production

7. Dynamic Analysis and Integration
   - Indefinite integrals and their rules
   - Definite integrals and their properties
   - Applications

8. First Order Difference Equations
   - Solving first order difference equations
   - Dynamic stability of equilibrium
   - Cobweb model

9. First Order Differential Equations
   - First order linear differential equations with constant coefficient and constant term
   - Dynamics of market price
   - Variable coefficient and variable term
   - Exact differential equations
   - Applications

10. Linear and Non-linear Programming
    - Duality theory
    - Economic interpretations
    - Complementary slackness
    - Kuhn-Tucker conditions

**Methods for Prior Learning Assessment and Recognition**

As per TRU policy.

**Attendance Requirements – Include if different from TRU Policy**

As per TRU policy.

**Special Course Activities – Optional**

**Use of Technology – Optional**