

Faculty of Liberal Arts & Professional Studies

Department of Economics

(Preliminary: September 6, 2022)

Course: AP/ECON 1530 Section A – Introductory Mathematical Economics I

Course Webpage: You will have e-Class access as soon as you register for this course. Please check this regularly for problems sets, answers, other course information, notes and announcements.

Term: Fall Term of Academic Year 2022-2023

Prerequisite / Co-requisite:

1. Grade 12U Advanced Functions or equivalent.
2. AP/ECON 1000 3.00 or AP/ECON 1010 3.00, or equivalent. Strongly recommended completion: high-school calculus or equivalent.

Course Credit Exclusions:

SC/MATH 1000 3.00, SC/MATH 1013 3.00, SC/MATH 1300 3.00, SC/MATH 1505 6.00, SC/MATH 1513 6.00, SC/MATH 1530 3.00, SC/MATH 1550 6.00, GL/MATH/MODR 1930 3.00.
Note: Acceptable course substitutes are available in the Calendar.

Course Instructor Contact

Name: Barry Smith
Office: 1078 Vari Hall (still under construction, no student access yet)
Phone: Not installed yet.
Office Hours: Will discuss and confirm in first class, September 7, 2022
Email: maecsta@yorku.ca

Time and Location

Lectures: M 8:30-10:30, CLH D, W 9:30-10:30 DB0016

Teaching Assistant(s)

Name: TBA

Course Description

Overview: This course introduces and develops topics in differential calculus, integral calculus, and their applications in economics. Topics will include a review of algebra, linear equations, quadratics, general functions of one variable, continuity, limits and derivatives of single-variable functions, series, exponential and logarithmic functions, single-variable optimization and

integration. Applications to topics in economics will include (but not be limited to) supply and demand functions, maximization of revenue and profits and elasticity of demand and supply.

Details: Economists are interested in microeconomic models of the behavior of agents (demanders and suppliers) in individual markets. Economists are also interested in macroeconomic models of aggregated markets and total consumption, investment and government spending as well as interest rates, exchange rates and money supply. This interest manifests itself at both a theoretical and empirical level. In all cases it is important that economists describe their areas of interest, their models and their results in a precise manner. The natural way to do this is to write models and study their properties using a language or languages that are rich and precise and which are used by most economists in the profession. These languages are mathematics and statistics. Our goal in this course is to review and develop the mathematics needed for you to be able to both understand the statement of economic models and for you to analyze and derive properties of economic models.

Learning Process: You are expected to attend lectures and to solve the problems that are assigned each week. Your understanding of the course material will become deeper and broader the more you practise. You can't simply read mathematics and expect to understand or retain ideas or solve problems.

Course Text

Knut Sydsaeter and Peter Hammond, Essential Mathematics for Economic Analysis, Fifth Edition (ISBN 9781292074719), Pearson.

Knut Sydsaeter and Peter Hammond, Essential Mathematics for Economic Analysis, Sixth Edition, Pearson, available in Bookstore and on-line via e-Class/Moodle

Weighting of Course Components

Midterm Test: During class time: Will discuss date. Likely on October 19. 20%.

Assignments: To be discussed.

Final Exam During final exam period: December 8-22, 2022. 80%.

Final exam date for this course will be set by the Registrar's Office.

Additional Information

The midterm test is optional. If you choose to write it, your midterm grade can count 20% towards your final course grade. If you write the term test and do not like your grade, you can have the weight of the test added to the final exam. A suggestion: You should write the term test. Writing the test does not guarantee that you will pass the course. However, students who do not write the test tend to fail the course. It helps to prepare you for writing exams.

The final exam will be cumulative and will cover all materials discussed in class and the assigned problems. The date of the final exam will be scheduled by the Registrar's office. There are no deferred tests or exams. Students absent from the midterm test will automatically have their final exam determine 80% of the course grade. Students absent from the final exam will have to petition for a makeup exam.

The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (e.g., A+ = 9, A = 8, B+ = 7, C+ = 5, etc.). Tests and final exam

grades will be numeric. They can be transformed to a letter grade using the following scale: A+ = 90 to 100, A = 80 to 89, B+ = 75 to 79, etc.

Organization of the Course

Topics Outline (Preliminary)

Please review Chapter 1 on your own. The topics that will be covered in class are as follows:

0. Review of Algebra, Chapter 2.

- Real Numbers, Section 2.1
- Integer Powers, Section 2.2
- Rules of Algebra, Section 2.3
- Fractions, Section 2.4
- Fractional Powers, Section 2.5
- Single and Double Inequalities, Section 2.6
- Intervals and Absolute Values, Section 2.7

1. Equations, Chapter 3.

- How to Solve Simple Equations, Section 3.1
- Equations with Parameters, Section 3.2
- Quadratic Equations, Section 3.3
- Linear Equations in Two Unknowns, Section 3.6
- Nonlinear Equations, Section 3.4

2. Functions of One Variable, Chapter 4.

- Introduction, Section 4.1
- Basic Definitions, Section 4.2
- Graphs and Functions, Sections 4.3
- Linear Functions, Sections 4.4
- Linear Models, Section 4.5
- Quadratic Functions, Section 4.6
- Power Functions and Polynomials, Sections 4.7-4.8

3. Differentiation, Chapter 6.

- Slopes of Curves, Section 6.1
- Tangents and Derivatives, Section 6.2
- Increasing and Decreasing Functions, Section 6.3
- Rates of Change, Section 6.4
- A Dash of Limits, Section 6.5
- Simple Rules for Differentiation, Section 6.6
- Sums, Products, and Quotients, Section 6.7
- Chain Rule, Section 6.8 & Chapter 5, Section 5.2 pp. 134--135
- Higher-Order Derivatives, Section 6.9

4. *Derivatives in Use, Chapter 7.*
 - Implicit Differentiation, Section 7.1
 - Economic Examples, Section 7.2
 - Differentiating the Inverse, Section 7.3 & Chapter 5 , Section 5.3
 - The Differential of a Function and Approximation Section 7.4 pp. 217--220
 - Why Economists Use Elasticities, Section 7.7
5. *Limits, Continuity, Series and L'Hopital*
 - Continuity Chapter 7, Section 7.8
 - More on Limits Chapter 7, Section 9
 - Infinite Sequences and Geometric Series Chapter 7, Section 9, Chapter 10, S 4
 - Exponential Functions, Section 6.10 & Chapter 4, Section 4.9
 - Logarithmic Functions, Section 6.11 & Chapter 4, Section 4.1
 - Present Value Chapter 10, Section 3
 - L'Hopital's Rule Chapter 7, Section 12
6. *Single-Variable Optimization, Chapter 8.*
 - Introduction, Section 8.1
 - Simple Tests for Extreme Points, Section 8.2
 - Economic Example, Section 8.3
 - The Extreme Value Theorem Section 8.4
 - Further Economic Examples, Section 8.5
 - Local Extreme Points, Section 8.6
 - Inflection Points Convexity and Concavity, Section 8.7
 - Present Value, Chapter 10, Section 10.3
7. *Integration, Chapter 9*
 - Indefinite Integrals, Section 9.1
 - Area and Definite Integrals, Section 9.2
 - Properties of Definite Integrals, Section 9.3
 - Economic Applications, Section 9.4
 - Integration by Parts, Section 9.5
 - Integration by Substitution, Section 9.6
 - Integration over Infinite Intervals 9.7

Important Course Information

Important Dates:

- September 7, 2022 Courses start
- September 20, 2022 Last day to enroll without permission of instructor
- October 4, 2022 Last day to enroll with permission of instructor
- October 8-14, 2022 Fall reading days (No classes, University is open)
- November 11, 2022 Last day to drop course without a grade
- November 12 - December 7, 2022 Voluntary drop period, grade of W on transcript
- December 6, 2022 Classes end
- December 7, 2022 Study day
- December 8-22, 2019 Fall exam period. Exams dates are set by the Registrar. Special exam dates cannot be set by the instructor. If you pre-book travel at a time that turns out to conflict with the final exam time and date, you are taking a gamble. If you win, you get lower travel costs. If you lose, a travel conflict is not recognized as grounds to petition for a makeup exam.

Other Important Information:

- *The Senate Grading Scheme and Feedback Policy stipulates that (a) the grading scheme (i.e. kinds and weights of assignments, essays, exams, etc.) be announced, and be available in writing, within the first two weeks of class, and that, (b) under normal circumstances, graded feedback worth at least 15% of the final grade for Fall, Winter or Summer Term, and 30% for 'full year' courses offered in the Fall/Winter Term be received by students in all courses prior to the final withdrawal date from a course without receiving a grade.*
- **"20% Rule"**
No examinations or tests collectively worth more than 20% of the final grade in a course will be given during the final 14 calendar days of classes in a term. The exceptions to the rule are classes which regularly meet Friday evenings or on Saturday and/or Sunday at any time, and courses offered in the compressed summer terms.
- *Final course grades may be adjusted to conform to Program or Faculty grade distribution profiles*