Faculty of Liberal Arts & Professional Studies

Department of Economics

(Preliminary: January 2, 2020)

Course: AP/ECON 1530 O – Introductory Mathematical Economics I

Course Webpage: https://moodle.yorku.ca/moodle/course/view.php?id=159745
Please check this site regularly for important announcements, lecture notes, assignments and solutions.

Term: Winter term of Academic Year 2019-2020

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:	VH 1078
Phone:	647 454-2231
Office Hours:	Mondays, 11:00-1:00 and by appointment Wednesdays, by appointment, with Professor Sudeshna Maitra in VH 1110.
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Time and Location

Lectures: M 2:30-5:30 pm, CLH C

Teaching Assistant(s)

Name: TBA
Office:
Email:
Office hours:

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

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 an 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.

Weighting of Course Components

Midterm Test (25%): Wednesday February 24, 2020 (during class time)
Classwork (10%): Assigned during lecture hours in every lecture. Best 5 scores count.
Homework (10%): Two homework assignments due on February 17, 2020 and March 30, 2020.
Final Exam (55%): During Final Exam Period: April 7-25, 2020.
Final exam date for this course will be set by the Registrar's Office.

Additional Information about graded components

The **midterm test** is optional. If you choose to write it, your midterm grade can count 25% towards your final course grade. If you write the term test and do you not like your grade, you can have the weight of the test added to the final exam. Warning! You should write the midterm 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 **classwork assignments** – each worth 2 marks – will take place during lecture hours in each lecture. If you are present for the assignment, you automatically get 1 of the 2 marks. The rest is determined by how you attempt to answer the questions. **If you miss a classwork assignment, you get a grade of 0 for it. If you arrive at lecture after the assignment has been completed by others, you get a grade of 0 for it. If you arrive at lecture while the assignment is being written by others you may write the assignment, but you must end at the same time as the other students.**

There will be two **homework assignments** – each worth 5 marks -- due on Feb 17, 2020 and March 30, 2020. You will receive 2 out of 5 marks just for turning in each assignment. The rest is determined by the quality of your answers. If you miss a homework assignment, you get a grade of 0 for it.

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 to the Faculty of Liberal Arts and Professional Studies 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 and Course Plan

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

1. *Review of Algebra, Chapter 2. (Jan 6)*
    - 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

2. *Equations, Chapter 3 (Jan 13)*
    - 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

3. *Functions of One Variable, Chapter 4 (Jan 20, Jan 27)*
    - 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

4. *Differentiation, Chapter 6 (Feb 3, Feb 10, Feb 24)*
    - 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

5. *Derivatives in Use, Chapter 7 (Mar 2, Mar9)*
    - 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

6. *Limits, Continuity, Series and L'Hopital (Mar 9, Mar 16)*
    - 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
    - Total Present Value Chapter 10, Section 5
    - Mortgages Chapter 10, Section 6
    - L'Hopital's Rule Chapter 7, Section 12

7. *Single-Variable Optimization, Chapter 8 (Mar 16, Mar 23)*
    - 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

8. *Integration, Chapter 9 (Mar 23, Mar 29)*
    - 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 for Students

Important Dates:

- Jan 6, 2020: Winter Courses start
- Jan 19, 2020: Last day to enroll without permission of instructor
- Feb 3, 2020: Last day to enroll with permission of instructor
- Feb 15-22, 2020: Winter term Reading Week
- Mar 13, 2020: Last day to drop course without a grade
- April 5, 2020: Classes end
- April 6, 2020: Study day
- April 7-25, 2020: Winter exam period. Exams dates are set by the Registrar. Special exam dates cannot be set by the instructor. Do not pre-book travel that could conflict with the final exam date.

Other Important Information:

The Senate Committee on Curriculum & Academic Standards (CCAS) provides a Student Information Sheet that includes:

- *York's Academic Honesty Policy and Procedures / Academic Integrity Web site*
- *Access/Disability*
- *Religious Observance Accommodation*
- *Student Code of Conduct*

Additional information:

- *Academic Accommodation for Students with Disabilities*

- *Alternate Exam and Test Scheduling*
- *Grading Scheme and Feedback Policy*

  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.*