

Faculty of Liberal Arts & Professional Studies

Department of Economics

ECON 1530 Section H

Fall 2023

Course Outline: September 6, 2023

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

Term: Fall (F) Term of Academic Year 2023-24

Course Instructor: Sudeshna Maitra

Office: 1072 Vari Hall (Office Hours: By email appointment)

Email: sm2.teaching@gmail.com

Course Webpage (on e-class):

Section H: <https://eclass.yorku.ca/course/view.php?id=83094>

Please check this site regularly for important announcements, lecture notes, assignments and solutions.

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.

Time and Location:

Tuesdays, 11:30 am to 12:50 pm, in DB 0006

Thursdays, 11:30 am to 12:50 pm, in DB 0006

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 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 (REQUIRED)

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

Weighting of Course Components

Midterm Test (30%): Tuesday, October 17, 2023 (during lecture hours)

Classwork (10%): Every lecture

Homework (10%): Throughout term

Final Exam (50%): Dec 7-20, 2023

The date of the final exam will be set by the Registrar's Office.

DO NOT PLAN TO TRAVEL DURING THIS PERIOD.

Additional Information

The **midterm test** is optional. If you choose to write it, your midterm grade can count 30% 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. 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 1 mark – will take place during lecture hours in each lecture, and will be based on the material covered in that lecture. If you submit answers to the assignment, you automatically get the 1 mark. **If you miss a classwork assignment, you get a grade of 0 for it. You MUST arrive in the lecture room before 12:15 pm to attend the lecture and write the classwork assignment.**

The **homework assignments** – each worth 1 mark – will be posted on e-class and must be submitted on e-class by a stipulated deadline. If you submit answers to the assignment on time, you automatically get the 1 mark. **If you miss (or are late for) 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 (Tentative)

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

1. 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

2. 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

3. 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

4. *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

5. *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

6. *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
- 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*

- 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*

- 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:

- Sep 6, 2023: Classes start
- Sep 20, 2023: Last day to enroll without permission of instructor
- Sep 28, 2023: Last day to enroll with permission of instructor
- Oct 7-13: Reading Week
- Nov 8, 2023: Last day to drop course without a grade
- Dec 5, 2023: Classes end
- Dec 6, 2023: Study Day
- Dec 7-20, 2023: 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:

- **Academic honesty and integrity:**

In this course, we strive to maintain academic integrity to the highest extent possible. Please familiarize yourself with the meaning of academic integrity by completing SPARK's Academic Integrity module at the beginning of the course. Breaches of academic integrity range from cheating to plagiarism (i.e., the improper crediting of another's work, the representation of another's ideas as your own, etc.) All instances of academic dishonesty in this course will be reported to the appropriate university authorities and can be punishable according to the Senate Policy on Academic Honesty.

- Final course grades given by the instructor will use the standard York grading scale and may be adjusted to conform to Program or Faculty grades distribution profiles.
- All students are expected to familiarize themselves with the following information, available on the Senate Committee on Curriculum & Academic Standards webpage; <http://secretariat-policies.info.yorku.ca>
 - Senate Policy on Academic Honesty and the Academic Integrity Website: <https://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>
 - Ethics Review Process for research involving human participants: <https://secretariat-policies.info.yorku.ca/policies/ethics-review-process-for-research-involving-human-participants-policy/>
 - Academic Accommodation for Students with Disabilities (Policy): <https://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/>
 - Student Conduct Standards: <http://www.yorku.ca/oscr/standards.html>
 - Religious Observance Accommodation: <https://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-religious-observances-policy-guidelines-and-procedures/>
 - Religious Observances Dates: <https://registrar.yorku.ca/enrol/dates/religious-accommodation-resource-2023-2024>
 - Grading Scheme and Feedback (Senate) Policy:* <http://secretariat-policies.info.yorku.ca/policies/grading-scheme-and-feedback-policy/>
 - Alternate Exam and Test Scheduling: <https://altexams.students.yorku.ca/>
 - Important Sessional Dates: <https://registrar.yorku.ca/enrol/dates>

**Additional information:*

- ***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. Final course grades may be adjusted to conform to Program or Faculty grade distribution profiles.