

Department of Economics
Barnard College
Spring 2015

Economics BC 1007: Mathematical Methods for Economics

Professor Sharon G. Harrison

Course description: This class will cover the mathematics you need to succeed in Intermediate Macroeconomics, Intermediate Microeconomics, and upper level electives in Economics. We start with the basics: algebra, solving equations, and graphing. Other topics include differentiation, functions and optimization. We will make extensive use of examples in Economics to solidify the concepts. These include equilibrium, marginal concepts, and elasticities as well as constrained and unconstrained optimization. Class meetings will consist of lectures as well as working together on sample problems.

Learning Objectives: Upon completion of this course, you will be able to:

1. Show fluency in the basic concepts, models and tools of microeconomics and macroeconomics.
2. Recognize the applicability of particular tools to particular problems in microeconomics and macroeconomics.
3. Recognize the multiple approaches – algebraic, graphic and intuitive – to understanding the solution to a problem in microeconomics and macroeconomics.
4. Work cooperatively with others to solve problems in microeconomics and macroeconomics.

Course prerequisites and sequencing: There are no prerequisites for this class. This course focuses on preparation for Intermediate Microeconomics, BC 3035. Therefore, you may not take this course if you have already taken BC 3035, or its equivalent. The material covered will be repetitive for you.

Class meetings: This class will meet Mondays and Wednesdays from 10:10 to 11:25 am.

Contact Information: My office is in Room **10, Lehman Hall** and my phone number there is **854-3333**. You can also reach me by e-mail at **sh411@columbia.edu**.

Courseworks: Homework assignments, important announcements, and other information will be posted throughout the semester on the courseworks page for this class (go to <https://courseworks.columbia.edu/>).

Office Hours: TBA.

Textbook: The required text for this class is: *Essential Mathematics for Economics and Business*, fourth edition, by Teresa Bradley. It is available at the Columbia bookstore. A copy is also on reserve at the Barnard library.

Evaluation: Your grade in this class will depend on your performance on: 1 midterm exam (35%), a non-cumulative final exam (35%), bi-weekly quizzes (20%), and class participation (10%). I will drop your lowest quiz grade. Quizzes and class participation are explained in more detail on the last page. The date of the midterm is **Wednesday, March 11**. The final exam will be on the date determined by the official schedule. There will be no make-up exams given. Please note that, in order to minimize anxiety on your part, after I submit final grades, I will not respond to emails regarding them.

Teaching assistant: Your teaching assistant is Luba Pogorelova. Her email address is: lp2458@columbia.edu. She will hold weekly recitation sections and office hours. Times and places will be decided during the first week of class. Section meetings are mandatory, and attendance will be taken. However, if you cannot make the scheduled time, you can come to office hours instead. Luba will also be responsible for grading your quizzes; and she will discuss her policies with you during the first week of recitation sections. **Please email her, not me**, with any issues regarding grading of quizzes.

Honor code: I value Barnard's Honor Code for the integrity it fosters. All exams and assignments in this class are to be completed in accordance with the Barnard Honor Code. Columbia students commit themselves to the Honor Code upon registering for a Barnard course. The code says, in part:

“We consider it dishonest to ask for, give, or receive help in examinations or quizzes, to use any papers or books not authorized by the instructor in examinations, or to present oral work or written work that is not entirely our own, unless otherwise approved by the instructor. We consider it dishonest to remove without authorization, alter, or deface library and other academic materials.”

(Rough) Schedule of Topics to be Covered

(Chapter numbers in (.))

(Check courseworks intro page regularly for updates)

WEEK 1: Jan 21:

- Preliminaries (1)
 - Arithmetic operations and fractions
 - Solving equations
 - Working with percentages

WEEK 2: Jan 26, 28:

- Graphing Linear Equations (2)
 - The equation of the line
 - Graphs
 - Applications: supply and demand
- Simultaneous equations (3)
 - Two equations in two unknowns
 - Three equations in three unknowns
 - Applications: equilibrium and its implications

WEEK 3: Feb 2, 4:

- Non-linear equations (4)
 - Quadratic, exponential and logarithmic functions
 - Applications: growth

WEEK 4: Feb 9, 11

- Differentiation (6)
 - Definition and rules

WEEK 5: Feb 16, 18

- Applications of Derivatives (6)
 - Marginal and average functions

WEEK 6: Feb 23, 25:

- Applications of Derivatives cont'd (6)
 - Optimization
 - Maximums and minimums: profits and costs

WEEK 7: March 2, 4:

- Applications of Derivatives cont'd (6)
 - Curvature and second derivatives: profits and costs

WEEK 8: March 9, 11:

- **March 11: Midterm Exam**
- Product rule, Quotient Rule and Chain Rule (6)

WEEK 9: March 16, 18: **Spring Break**

WEEK 10: March 23, 25

- Functions of several variables (7)
 - Partial derivatives

WEEK 11: March 30, Apr 1:

- Functions of several variables cont'd (7)
 - Production functions and isoquants

WEEK 12: Apr 6, 8:

- Functions of several variables cont'd (7)
 - Utility functions and indifference curves

WEEK 13: Apr 13, 15:

- Functions of several variables cont'd (7)
 - Unconstrained optimization
 - Applications: profit and revenue

WEEK 14: Apr 20, 22:

- Functions of several variables cont'd (7)
 - Constrained optimization
 - Applications: utility, cost and the budget constraint

WEEK 15: Apr 27, 29:

- Functions of several variables cont'd (7)
 - Elasticities

WEEK 16: May 4:

- Catch-up and Review

Quizzes:

Will be roughly every other Wednesday. About half will be in class (IC), for 20 minutes at the start. The rest will be open book, take-home (TH), ready a week in advance and due on the date indicated. Here is the tentative schedule, which is subject to change if necessary.

February 4 (IC), 18 (TH)
March 4 (IC)
April 1 (TH), 15 (IC), 29(TH)

Class participation:

Will be measured by the taking of attendance. A sign-in sheet will be passed around at about 1/3 of the class meetings.