MATHEMATICS FOR ECONOMISTS

IE University
Professor: **TIMOTHY FOREMAN**
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Academic year: 19-20
Degree course: FIRST
Semester: 1º
Category: BASIC
Number of credits: 6.0
Language: English

PREREQUISITES

SUBJECT DESCRIPTION

This course provides an introduction to the mathematics used in economics. It will cover fundamental topics in calculus and linear algebra, with an emphasis on solving problems that arise in economics. Students will also learn how to apply the techniques learned to problems in the world through the collection and processing of data.

OBJECTIVES AND SKILLS

Students will learn the definition of the derivative, as well as the basic rules of differentiation. They will learn to apply these skills to problems in optimization that often arise in economics. Students will have a comprehensive understanding of solving systems of linear equations and matrix algebra. The course ends by covering calculus of several variables and integration.

METHODOLOGY

Each session will consist of a review of the previous session's problems and a lecture on a new topic. Students are expected to spend time outside of class to complete exercises associated with the material from the previous lecture. There will also be in-class group work on applications of the material.

Teaching methodology	Weighting	Estimated time a student should dedicate to prepare for and participate in
Lectures	20.0 %	30 hours
Discussions	4.0 %	6 hours
Exercises	40.0 %	60 hours
Group work	10.0 %	15 hours
Other individual studying	26.0 %	39 hours
TOTAL	100.0 %	150 hours

PROGRAM

SESSIONS 1 - 2

Sequences & Series; Limits & Continuity

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 5 Sections 1-4

SESSIONS 3 - 4

The derivative: concept & definition

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 6 Sections 1-2

SESSIONS 5 - 6

Rules of differentiation and applications

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 6 Sections 3-4

SESSIONS 7 - 8

Product, quotient, and chain rules

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 7 Sections 1-2

SESSIONS 9 - 10

Monotonic & inverse functions; Critical points

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 7 Sections 3-4

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 8 Sections 1-2

SESSIONS 11 - 12

Optimization

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 8 Sections 3-4

SESSIONS 13 - 14

Exponential & log functions; Midterm review

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 9 Sections 1-3

SESSIONS 15 - 16

Midterm; Vectors & matrices: basic operations & linear dependence

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 11 Sections 1-4

SESSIONS 17 - 18

Systems of linear equations

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 12 Sections 1-2

SESSIONS 19 - 20

Matrix inversion

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 12 Sections 3-4

SESSIONS 21 - 22

Matrix determinant & inner products

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 13 Sections 1-4

SESSIONS 23 - 24

Partial derivatives

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 14 Sections 1-2

SESSIONS 25 - 26

Optimization with several variables & constrained optimization

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 16 Sections 1-3
B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 17 Sections 1-2

SESSIONS 27 - 28

Integration

B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 19 Sections 1-4
B.C.: Mathematics for Economists: An Introductory Textbook, Chapter 20 Section 4

SESSIONS 29 - 30

Final Exam

BIBLIOGRAPHY

Required: Mathematics for Economists: An Introductory Textbook. 4th Ed. Malcolm Pemberton & Nicholas Rau. Manchester University Press. 2015. ISBN-10: 9781784991487
ISBN-13: 978-1784991487

Supplemental (Not Required): Calculus. 10th ed. Ron Larson & Bruce Edwards. McGraw-Hill. 2013. ISBN-10: 1285057090
ISBN-13: 978-1285057095

Supplemental (Not Required): Mathematics for Economists, Carl P. Simon & Lawrence Blume. W. W. Norton & Company. 1994. ISBN-10: 0393957330
ISBN-13: 978-0393957334

Online: geogebra.org

Buy your books here

EVALUATION CRITERIA

After each class, a list of problems will be given. While the assignments will not be handed in, students will be asked to give solutions to the problems in class at the beginning of the next session. Students will also be assigned in-class group work to solve problems, which will also count toward the grade. In addition to these assignments, there will be both a miderm and final exam.

Criteria	Percentage	Comments
Class Participation	15 %	
Group Presentation	20 %	
Midterm Exam	25 %	
Final Exam	40 %	

GENERAL OBSERVATIONS

Each student has four attempts over two consecutive academic years to pass this course. Dates and location of the final exam will be posted in advance and will not be changed. Students must attend at least 70% of the sessions. Students who do not comply with the 70% attendance rule will receive a 0.0 on their first and second attempts and go directly to the third one (they will need to enroll in this course again the following academic year). Students who are in the third or fourth attempt should contact the professor during the first two weeks of the course.

ATTENDANCE

Attendance is mandatory at IE University, as it is an essential factor of IE´s learning methodology. While we do closely monitor attendance in each course, we also consider our students responsible for their own agenda and commitments, as adult university students. With that in mind, each student may miss up to 30% of the sessions within a given course and still maintain the possibility of passing that given course. This 30% “buffer” is to be used for any absences, such as: illnesses, personal emergencies, commitments, official/governmental matters, business and/or medical appointments, family situations, etc. Students should manage their various needs, and situations that may arise, within that 30% buffer. If a student is absent to more than the allowed 30% of the sessions (regardless of the reason), s/he will obtain a 0.0 grade for that course in both the ordinary and extraordinary calls of the current academic year, and s/he will have to retake the course during the following academic year. Having established the rule, we strongly discourage to use this buffer as granted, we highly recommend to attend 100% of the classes as it will improve your learning outcomes, it will increase the class performance and it might improve your participation grade. Extreme cases involving emergencies such as: extended hospitalizations, accidents, serious illnesses and other contexts involving force majeure, are to be consulted with the Program Management team for assessment of the situation and corresponding documentation, so that Program Management can support and guide each student optimally.

RETAKE POLICY

Any student whose weighted final grade is below 5 will be required to sit for the retake exam to pass the course (except those not complying with the attendance rules, whom are banned from this possibility). Grading for retakes will be subject to the following rules:

•The retakes will consist of a comprehensive exam. The grade will depend only on the performance on this exam; continuous evaluation over the semester will not be taken into account.
•The exam will be designed bearing in mind that the passing grade is 5 and the maximum grade that can be attained is 8 out of 10.
•Dates and location of the retakes will be posted in advance and will not be changed.

PLAGIARISM / ACADEMIC HONESTY

Plagiarism is the dishonest act of presenting another person's ideas, texts or words as your own. This includes in order of seriousness of the offense:
•providing faulty sources;
•copy-pasting material from your own past assignments (self-plagiarism) without the instructor's permission;
•copy-pasting material from external sources even while citing them;
•using verbatim translations from sources in other languages without citing them;
•copy-pasting material from external sources without citing them;
•and buying or commissioning essays from other parties.

IEU students must contact the professor if they don't know whether the use of a document constitutes plagiarism. The professor will advise the student on how to present said material. All written assignments have to be submitted through Turnitin, which produces a similarity report and detects cases of plagiarism. Professors are required to check each student's academic work in order to guarantee its originality. If the originality of the academic work is not clear, the professor will contact the student in order to clarify any doubts. In the event that the meeting with the student fails to clarify the originality of the academic work, the professor will inform the Director of the Bachelor Program about the case, who will then decide whether to bring the case forward to the Academic Ethics Committee. Very high similarity scores will be automatically flagged and forwarded to the Academic Ethics Committee. Plagiarism constitutes a very serious offense and may carry penalties ranging from getting a zero for the assignment to expulsion from the university depending on the severity of the case and the number of times the student has committed plagiarism in the past.

PROFESSOR BIO

Professor: **TIMOTHY FOREMAN**

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TIMOTHY FOREMAN

Timothy Foreman is a postdoc at the European Institute on Economics and the Environment. His research focuses on environmental and development economics.

OTHER INFORMATION

Email: tforeman@faculty.ie.edu

Office hours will be available by appointment.

CODE OF CONDUCT IN CLASS

1. **Be on time:** : Students arriving more than 5 minutes late will be marked as “Absent”.

Only students that notify in advance in writing that they will be late for a specific session may be granted an exception (at the discretion of the professor).

2. **If applicable, bring your name card and strictly follow the seating chart.** It helps faculty members and fellow students learn your names.

3. **Do not leave the room during the lecture:** Students are not allowed to leave the room during lectures. If a student leaves the room during lectures, he/she will not be allowed to re-enter and, therefore, will be marked as “Absent”.

Only students that notify that they have a special reason to leave the session early will be granted an exception (at the discretion of the professor).

4. **Do not engage in side conversation.** As a sign of respect toward the person presenting the lecture (the teacher as well as fellow students), side conversations are not allowed. If you have a question, raise your hand and ask it. It you do not want to ask it during the lecture, feel free to approach your teacher after class.

If a student is disrupting the flow of the lecture, he/she will be asked to leave the classroom and, consequently, will be marked as “Absent”.

5. **Use your laptop for course-related purposes only.** The use of laptops during lectures must be authorized by the professor. The use of Social Media or accessing any type of content not related to the lecture is penalized. The student will be asked to leave the room and, consequently, will be marked as “Absent”.

6. **No cellular phones:** IE University implements a “Phone-free Classroom” policy and, therefore, the use of phones, tablets, etc. is forbidden inside the classroom. Failing to abide by this rule entails expulsion from the room and will be counted as one absence.

7. **Escalation policy: 1/3/5.** Items 4, 5, and 6 above entail expulsion from the classroom and the consequent marking of the student as “Absent.” IE University implements an “escalation policy”: The first time a student is asked to leave the room for disciplinary reasons (as per items 4, 5, and 6 above), the student will incur one absence, the second time it will count as three absences, and from the third time onward, any expulsion from the classroom due to disciplinary issues will entail 5 absences.