

# Loyola Marymount University

Department of Economics

---

Dorothea K Herreiner

## **Economics 530: Mathematical Economics**

**Fall 2008, UNH 3320, TR 10:50 – 12:05pm**

---

### **Syllabus**

This class introduces and applies the basic mathematical tools used in economics. Several of these tools will be quite familiar to you from earlier classes. The main goal of this class is to offer you a more profound and thorough treatment and to extend the use of the tools beyond the basic versions you probably have encountered so far. In doing so, you will be able to not only apply the tools but also understand them from a mathematical point of view. A second and important goal is to understand how and where these tools can be used. Among other topics, we will be looking at preferences, utility functions, consumer optimization, uncertainty, etc. Some of these economics topics will be familiar to you, others will introduce new concepts and theories.

I will be reviewing all basic concepts we use and that you hopefully remember, however, I will do that at a very fast pace. At some points that will not be a problem, at others it may be too fast for you. If that is the case, PLEASE do come and see me IMMEDIATELY, so that I know what is going on and can help you accordingly.

We will be covering univariate and multivariate calculus, linear algebra, constrained and unconstrained optimization, and some dynamic methods. The outline below is a tentative schedule.

To give you a flavor of how this class extends beyond what you hopefully are familiar with: For instance, after reviewing univariate calculus (functions of one variable), we will be focusing on multivariate calculus (functions that depend on several variables) – you should have seen them in Econ 310 (and 410) and possibly some other classes. Among other aspects, we will be stating the second-order conditions much more carefully and exhaustively – not just as a condition about the sign of the second derivative, but based on matrices and therefore by using linear algebra.

Prerequisites for this class are Econ310 and Math 131 (or 112); Econ 320 is recommended.

The **optional texts** for this class are

#### **Hoy/Livernois/McKenna/Rees/Stengos, Mathematics for Economists**

2001, MIT Press, 2<sup>nd</sup> edition, ISBN 0-262-08294-2 (I do not know the 1<sup>st</sup> edition, so I cannot comment on its usefulness); and

#### **Turkington, Mathematical Tools for Economics**

2007, Blackwell, ISBN 1-4051-3381-3. I may occasionally require some additional reading material.

The Berck/Sydsaeter (1993) Economists' Mathematical Manual will be on reserve for this class. It is a great manual that helps you remind yourself of those basic things one keeps forgetting.

I will be using **Blackboard** to post this syllabus, handouts, in-class exercises, problem sets, answer keys, etc. You will need Acrobat Reader<sup>1</sup> for everything I put on Blackboard. Moreover, I will be using Blackboard's **email** function to communicate with you. This means, that all my emails will be sent to your LMU email account. It is your responsibility to make sure that you receive those emails:<sup>2</sup> do not go

---

<sup>1</sup> Available at <http://www.adobe.com>.

<sup>2</sup> If you do not use your LMU account, then make sure that you have enabled forwarding to another email account you regularly use – see <http://www.lmu.edu/blackboard/forwardinglion.pdf> for instructions. I will not send any emails to other accounts.

over quota on your account (otherwise my messages get bounced) and check it regularly. Please send me an email from Blackboard *before* the next class with the subject “test blackboard”.

**Class attendance** is required. You will only be able to follow classes if you have mastered material covered earlier during the semester. I will be taking attendance. If you have to miss a class, I expect that you let me know *in advance*; it is your responsibility to catch up by consulting your classmates and the reading. I may assign additional homework if you miss class to make sure you are at the same level as everybody else in the class. Make sure you let me know at the beginning of the semester if you are going to miss classes because of required **athletic activities** by providing a detailed written schedule. I also expect you to remind me every time ahead of time when you have to miss a class and to discuss with me how to best study the material on your own.

Your **final grade** will be based on

- class participation 15%
- homework 25%
- two midterms (20 % each) 40 %
- final exam 25%

This adds up to 105% - I will drop the weight of your weakest exam by 5% at the end of the class.

I will assign numerical grades (0-100%) to everything. At the end of the term, I will convert numerical averages into letter grades with appropriate +s and –s according to the standard scale A: 90-100%, B: 80-89%, C: 70-79%, D: 60-69%, F: <60%. If appropriate and only rarely and minimally do I adjust this scale uniformly for everybody in class to the students’ advantage.

The class participation grade relates mainly to the quality of your contributions. Although this class is mainly lecture-based, it relies crucially on your participation. Please do never hesitate to ask a question or to raise an issue.

Bring your own calculator, ruler, pen and pencil, and eraser to each **exam**. I will provide the paper. If the use of any other material is admissible, I will specify that. You are *not* allowed to use or have within reach any other material, nor are you allowed to use your own paper. Any attempt of using any unauthorized material – including consulting another classmate’s work – will be considered cheating, guarantee you an F on the exam, possibly in the whole class, and a report to the Dean (see Bulletin p 61 for the University’s Honor Code and Process). If you have any doubts or questions, about what material may be used during an exam – ask before you start working on an exam!

Doing problem sets and class attendance are the best preparation for the exams. All exams are cumulative, although there will always be a stronger emphasis on material that has no yet been tested in another exam. The majority of exam questions are derivations and proofs; some questions will be dedicated to explaining concepts and their applications.

If you have to miss a midterm exam for a scheduled university-sponsored and required activity, you will have to provide written proof and contact me *at least 2 weeks before the exam* to set up an *earlier* exam time. Such an earlier exam may ask different questions and emphasize other aspects of the relevant material than the regular exam. Otherwise there are no makeup exams. In *documented* cases of a serious family emergency or grave medical illness, I will shift the exam’s weight proportionately to the other midterm and the final exam. If you do not follow these rules, you will get an F for a missed exam.

You have to notify me of any accommodations for disabilities you get at the beginning of the semester by providing me with the written documentation released by the Learning Resources Center (the LRC does *not* notify me). You also have to discuss the particular arrangements for *each* exam at the latest *one*

*week before* an exam – it is your responsibility to approach me with that. If you fail to do so, then you will take the exam with everybody else at the same conditions as everybody else.

The midterm exams are on **Oct 2** and **Nov 6** during regular class hours. The final exam is on **Dec 9 at 11am**.

There is a **problem set** basically *every week*. As you probably know by now, math requires a lot of practice – the problem sets are an essential part of your learning process in this class. Please work in groups of 2 or 3 on the problem sets. Let me know by the end of week 1 who you are working with. Hand in one solution per problem set group. You are welcome and encouraged to discuss the material with others, however, the answer you provide has to be the one you as a group have worked out – do not, ever, just copy material from another group (that is cheating). Make sure you always explain what you are doing and provide derivations. If you have to graph something, provide scales, label everything, and draw carefully and precisely.

Problem sets are **due latest in class on Wednesdays** unless indicated otherwise. They will be posted on my website latest by Friday before the due date. We will usually look at some problems related to the problem set during the Friday class, or earlier.

I will be dropping the two worst problem set grades at the end of the class when I determine that grade component; nevertheless, I strongly suggest that you do *all* problem sets in order to learn the material.

I have extensive **office hours** (see footer – the Wednesday afternoon is there for you if you have questions on the problem set) – make use of them. I am happy to help you with assignments if you get stuck or are not sure you are heading in the right direction. I am your best resource – use me. If you cannot make it during my office hours, send me an email with your questions or ask me for an appointment at a different time – I will tell you what times I can make and happily meet with you at a mutually agreeable time if you send me a confirmation email on time. I do check my e-mail quite frequently, but do not count on me to reply over the weekend or late at night.

Please make sure you talk to me as soon as you run into trouble or fail to understand something.

Delaying to do so will hurt your understanding of material we will cover at a later point. Please do also let me know if you have any concerns about the class in general or your performance.

Academic integrity is essential for a successful learning process – please check the Bulletin (pp 61) for the University’s Honor Code and Process. Among other things, cheating is copying answer, adding your name to a problem set although you did not work on it, using unauthorized material. If I catch anyone cheating, you will receive an F in the course and will be reported to the Dean.

Although, these rules hopefully represent common sense to all of you, let me state what I consider necessary **classroom etiquette**:<sup>3</sup>

- do not disturb the class by arriving late, departing early, or leaving the classroom during class unless for a medical necessity/emergency (if you have an important reason, let me know beforehand; do not make it a regular occurrence);
- do not distract others with personal conversations, eating, using electronic or other gadgets, etc;
- contribute to class in a constructive manner by asking questions, volunteering answers, participating in discussions and activities, and by collaborating with others when requested;
- switch off the volume on all electronic devices and do not dare to use them in class (let alone during an exam) unless you have to do so for a disability (talk to me at the beginning of the semester about that);
- behave in a respectful and civil manner towards everybody else.

Work hard, keep up, participate, and enjoy! I will help you along!

---

<sup>3</sup> Professor Treanor’s “Basic Expectations for Philosophy Classes” coincide with those for economics classes – you may want to consult them at <http://myweb.lmu.edu/btreanor/BasicExpectations.htm>.

**Tentative Schedule**

Exam dates are fixed, while topics may be extended or shortened as needed.

W	Dates	Topic	HLMRS	Turk	Comment
1	Aug 26, 28	Fundamentals	1,2		
2	Sep 2, 4	Fundamentals	2,3		
3	Sep 9, 11	Sequences and Series	3		
4	Sep 16, 18	Univariate Calculus	4		
5	Sep 23, 25	Univariate Calculus, Theorems and Approximations	4,5		
6	Sep 30, Oct 2	Univariate Calculus, Optimization	5		Midterm Oct 2
7	Oct 7, 9	Linear Algebra	7,8	1,2	
8	Oct 14, 16	Linear Algebra	8,9	3,4	
9	Oct 21, 23	Multivariate Calculus	11	5	
10	Oct 28, 30	Multivariate Calculus, Unconstrained Optimization	12	5, 6	
11	Nov 4, 6	Multivariate Calculus, Constrained Optimization	13	6, 7	Midterm Nov 6
12	Nov 11, 13	Multivariate Calculus, Constrained Optimization	14	7	
13	Nov 18, 20	Integration	16	8	
14	Nov 25	Integration	16	8	No class Nov 27
15	Dec 2, 4	Dynamic Methods	17,18	9, 10	
	Dec 9				Final: 11am-1pm