

ECON 3620: MATH FOR ECONOMICS

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(Please don't use WebCT mail)
Meeting Time: MW, 9:40-11:35 AM
Office Hours: TBD
and by appointment
Prerequisites: College Algebra (MATH 1090 preferred),
ECON 2010 & 2020.

CATALOG DESCRIPTION

The use of mathematical language and techniques to formulate and solve problems in economics. Topics include linear algebra, differential and integral calculus, and constrained optimization.

INSTRUCTOR'S DESCRIPTION

In this course we will explore the mathematical foundations of economics. We will investigate the origins of supply and demand curves as well as an alternative economic model. The aim of the course is to demystify mathematics in order to make plain the foundation upon which modern economics is built.

There are two parts to a course such as this: ideas and machinery. I will attempt to take a fairly high-level approach to the mathematics in this course. Many "classic" theorems and results that would appear in a typical math course will be omitted, and the use of mathematical language will be kept to a minimum. But that is not to say that a precise understanding will not be developed. So much of mathematics is in the details, and we will need to descend into the depths in order to develop an understanding of the material. To succeed in this course, it will take practice to be able to tell apart the details from the whole.

Unfortunately, there is no way to fully engage the concepts without the machinery, so the majority of the course will be devoted to teaching the mathematical machinery of calculus and linear algebra. However, it is important to maintain an awareness of our purpose in learning the mathematics: a deeper understanding of economic theory.

MATH 1090 is a prerequisite for the course, and so the student is required to be conversant with algebra. We will not cover algebraic techniques in this class, but past experience shows that most students need a refresher. There will be a brief review of algebra in the first lecture, but I STRONGLY advise students to take the time to brush up. Any college algebra book will suffice as a companion to the course textbook.

The main book for the course is a book that I have written that exactly parallels the flow of the course. This book will be available on WebCT as a PDF for free, or in a black-and-white print copy from the university copy center.

STUDENT RESPONSIBILITIES

I can't overstate the importance of engaging with the material. Every problem that you do and every lecture you attend will push you further down the road toward comprehension. This course is dense with material, and requires a commitment to working problems. Homework problems are not done for credit, but you should work as many problems on your own as you can.

To further assist your engagement with the material, there will be a social component to this course. Of the 11 quizzes that will be assigned during the term, 9 will be taken in randomly-assigned pairs. Through this collaboration, students will be able to talk through the logic of a problem, learn from each other, and teach each other.

Unfortunately, this arrangement of pairs opens a door to free riders, as such, as I observe the quizzes over the course of the semester, I will look for unprepared students. If an unprepared student causes problems for a student who was prepared, $\frac{1}{2}$ point will be deducted from the former student's final average and added to the latter student's final average.

The final exam will be cumulative, and will be taken individually.

TOPICS

This course is designed to tell a story: that of the evolution of economic theory. We will investigate two parallel lines of reasoning; one corresponds to the mainstream theory of supply and demand, while the other focuses on a production-centric model of the economy. The supply and demand model is a calculus-based model, and so, in this section, we will focus on the calculus techniques needed to understand the origins of supply and demand. *Students must take this section very seriously*, since passing this course is contingent on your ability to demonstrate your some facility with calculus. At the end of this section, you should have a grip on the mathematical basis for supply and demand curves.

The latter part of the course aims to present an alternative economic model. This model takes a slightly different conception of the economy and uses different mathematics to develop it. This model will come to conclusions that are in opposition to the conclusions of the supply-and-demand model.

By following two parallel threads, I intend to show that *mathematics does not provide truth*, merely a means to explore relationships that can be written mathematically.

Table 1 contains the preliminary schedule of topics for the course. This schedule may change somewhat as the term goes on, but I expect that we will cover all the listed topics.

GRADING AND ASSESSMENT

Here is the grading scheme:

Quizzes:	60%
Final:	40%

Week of	Topics	
Aug 24 th	Introduction, Functions, Expressions, Algebra	Intro to Logic, Quiz 1 (solo)
Aug 31 st	Arguments	Quiz 2 <i>Last Day to Drop—Wed, Sept 2nd</i>
Sept 7 th	<i>Labor Day</i>	Proofs
Sept 14 th	Quiz 3	Limits
Sept 21 st	Derivatives, Derivative Rules	Quiz 4
Sept 28 th	Derivative Rules	Quiz 5 (solo)
Oct 5 th	Univariate Max/Min, Elasticity	Quiz 6
Oct 12 th	<i>Fall Break</i>	
Oct 19 th	Multivariable Calculus	Bivariate Max/Min <i>Last Day to Withdraw—Oct 23rd</i>
Oct 26 th	Bivariate Max/Min	Quiz 7
Nov 2 nd	Marginal Rate of Substitution	Constrained Optimization
Nov 9 th	Review	Quiz 8
Nov 16 th	Linear Algebra, Leontief Systems	Spaces, Bases, Determinants
Nov 23 rd	Quiz 9	Homogeneous Systems, Subsistence Prices
Nov 30 th	Eigenvalues, Eigenvectors, Prices with Surplus	Quiz 10
Dec 7 th	Wrap-up and Review	Quiz 11
Dec 17 th	Final (8:00am-10:00am)	

Table 1: Schedule of Topics

From 11 quizzes, the top ten scores will be counted, so each quiz is worth 6 points on your final grade. A rough quiz schedule can be found in table 1. It is your responsibility to be in class in order to keep abreast of the required work and to be aware of changes to the quiz schedule.

There will also be one bonus assignment to help your standing going into the final.

Students will also be allowed a single letter-sized sheet of notes during each quiz and the final. Ideally, students will constantly create, refine, and recreate their note-sheets for each quiz, incorporating new information and better understanding, with this refinement process culminating in a sheet that can be used at the final.

All quizzes and the final are median-curved. That is, I will add however many points I need to raise the median student to 75%. However, even with scaling, the numerical grades may be unreliable. Thus, to set grades for the course I use a qualitative process. At the end of the term, all students will be organized in a list, sorted by the final numerical score. I will start from the bottom of the list and go up. The cutoff between C- and D+ will be set so that no students who cannot apply the derivative to solve a one-variable max/min problem will make better than a D+. *Please note:* it is possible to master the basic techniques and not earn a C- or better! You must learn the basics *and* show commitment to the course in your quiz average.

ADA STATEMENT

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.