

IOWA STATE UNIVERSITY
Department of Economics

Quantitative Methods for Economic Analysis I
(Economics 500)
First Part

Syllabus

Instructor: P. Marcelo OVIEDO.

Time: M,W 08:00 – 10:00

Class location: 274 Heady Hall

Office: 279 Heady Hall

Office hours: Wednesdays, 14:00 – 16:00.

Contact information: oviedo@iastate.edu

Teaching Assistant (TA): Fatma Serttas.

TA's office hours: Thursdays, 14:00 – 16:00.

TA's contact information: serttas@iastate.edu

Course textbook: Mathematical Methods for Economics, by Michael W. Klein, second edition; Publisher: Pearson Education; ISBN: 0-201-72626-2; year 2002.

Course Goal and Description

Mathematics is increasingly important in terms of the expression and communication of ideas in economics. A thorough knowledge of mathematics is indispensable for understanding almost all fields of economics, including both applied and theoretical fields.

The goal of the course is to make students understand and be able to use the mathematics required for studying economics at the masters level. These mathematics also represent a great fraction of what is required for studying economics at the doctoral level. The course is split in two parts and this syllabus corresponds to the first one. Professor Arne Hallam will teach the second part which covers statistical methods.

As a way of showing the importance of mathematics in economics, all mathematical concepts studied in this part of the course will be illustrated with some applications to economics.

Course Requirements

There will be three assignments and two in-class exams for the first part of the course. The grade weights of these requirements are the following:

Homework 1:	10%
Homework 2:	10%
Homework 3:	15%
In-class exam 1:	25%
In-class exam 2:	40%

The conversion of grades from the numerical format to the standard letter-grade system will be performed observing the following equivalence:

Grade Points	96 – 100	93 – 95.99	87 – 92.99	83 – 86.99	80 – 83.99	78 – 79.99	77 – 77.99	76 – 76.99	74 – 75.99	72 – 73.99	70 – 71.99	0 – 69.99
Grade Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Assignment deadlines are strict. A student failing to present an assignment on time will receive a zero-point grade for that assignment. Students are encouraged to discuss assignments with others. However, *answers must be elaborated individually*. I may ask a student to come to my office and to explain the answers submitted. Failure in this regard will result in an unsatisfactory grade for the homework. I am going to be strict in enforcing this policy.

Course Organization

The organization of the first part of the course is summarized in the table on page 3. Students will find there the topics to be studied as well as the schedule for assignments and tests. The table also describes the material to be covered in each test. The readings from the course textbook are required and all others are optional.

Complementary Material

Students may find convenient to know that the following books contain most of the topics studied in the mathematical part of the course.

- Alpha Chiang (1990), *Fundamental Methods of Mathematical Economics*. McGraw Hill. 0-07-010813-7.
- Avinash K Dixit (1990), *Optimization in Economic Theory*. Oxford University Press. ISBN 0-19-877210-6.
- Michael Hoy, John Livernois, Chris McKenna and Thanasis Stengos (2001), *Mathematics for Economics*. The MIT Press. Second Edition. ISBN 0-262-08294-2.
- Carl P. Simon and Lawrence Blume (1994), *Mathematics for Economists*. N.W Norton & Company, Inc. ISBN 0-393-95733-0.

Course Organization

Week	Dates	Topics	Readings	Assignments/Tests
1	8/25, 8/27	Properties of functions; graphical representation of functions; limits and continuity; concavity; necessary and sufficient conditions; some specific functions: power functions; polynomial functions; exponential and logarithmic functions	K 1 to 3 <i>SB 1 & 5</i> <i>Hetal 1</i>	HW1 given out on 8/27 (W)
2	9/3	Matrix (or linear) algebra I. Systems of equations and their representation through matrices and vectors; comparative statics; matrix operations; existence of an inverse.	K 4 <i>SB 6 to 8</i> <i>Hetal 7 & 8</i>	HW1 due on 9/3 (W) HW2 given out on 9/3
3	9/8, 9/10	Matrix algebra II. Determinants; minors and cofactors; some specific matrices: diagonal, triangular, identity, symmetric, idempotent; partition of a matrix; Cramer's rule. Characteristic equation, eigenvalues and eigenvectors.	K 5 <i>SB 9, 10, & 23</i> <i>Hetal 9 & 10</i>	HW2 due on 9/10 (W)
4	9/15, 9/17	Differential calculus I. Difference quotients; derivatives; differentials; rules of differentiation; chain rule and composite functions.	K 6 & 7 <i>SB 2 to 4</i> <i>Hetal 4 to 6</i>	In-class exam on 09/17 (W), from 8AM to 9AM. Chs. 1 to 5.
5	9/22, 9/24	Differential calculus II. Second derivatives; Taylor series; multivariate functions and partial derivatives; chain rule and composite multivariate functions; homogeneous functions; implicit differentiation.	K 7 & 8 <i>SB 13 to 15 & 20</i> <i>Hetal 11</i>	HW3 given out on 9/22 (M)
6	9/29, 10/01	Extreme values of univariate and multivariate functions. Stationary points; first and second-order conditions.	K 9 & 10 <i>SB 17</i>	
7	10/6, 0/08	Constrained optimization. Converting constrained optimization problems into unconstrained optimization problems; Lagrangian functions; Lagrange multipliers; envelope theorem.	K11 <i>SB 18 & 19</i> <i>Hetal 13</i>	HW3 due on 10/6 (M)
8	10/13	Comprehensive exam with emphasis in the material covered in weeks 4 to 7.		In-class exam on 10/13. 8AM to 10AM

Readings: "K x" indicates chapter x in Michael Klein's book (Mathematical Methods for Economics); similarly, "SB" refers to Carl Simon and Lawrence Blume's book (Mathematics for Economists); and "Hetal" refers to the book by Michael Hoy, John Livernois, Crhis McKenna, Ray Rees, and Thanasis Stengos (Mathematics for Economics). Readings in italic are not required.

Assignment s/Tests: HW means homework; and M and W stand for Monday and Wednesday respectively. Notice that exam times are indicated in the last column.