

KIMEP University
Course outline Spring 2013
Course title: Mathematical Economics
Course Code: ECN 3083
(3 credit hours/5 ECTS credits)

Course Meeting Time and Place:

Monday	14:30 -15:45	#111/Valikhanov bld.
Wednesday	14:30 -15:45	

Instructor: Dr. Gerald Pech
Office: # 213 Valikhanov building
Telephone 3040
Email: gpech@kimep.kz

Course Pages:

L-drive: Gerald Pech/Mathematical Economics
Internet: <http://www.geraldpech.net/lectures/ECN3083>

Office Hours

Instructor: Monday and Wednesday 11 am – 1 pm.

Course Description:

This introductory course introduces students to optimization techniques in applications to economic problems in consumer theory and producer theory. The course covers unconstrained, equality constrained and inequality constrained optimization problems including linear programming and a discussion of the Kuhn-Tucker conditions. Matrix algebra and calculus (differentiation and integration) will be briefly reviewed. Equilibrium arguments will be presented within a game theoretic context.

Learning Objectives

- Establishing existence of equilibria in games.
- Familiarize students with the basic tools of optimization theory
- Interpreting the Kuhn-Tucker conditions in inequality constrained optimization problems

Intended Learning Outcomes

Students should be able to

- Demonstrate familiarity with basic concepts of game theory
- Numerically solve game theoretic models under full information
- Apply fixed point arguments
- Obtain solutions to constrained and unconstrained optimization problems
- Derive second order conditions of optimization problems
- Interpret the Kuhn-Tucker-conditions
- Explain the concept of duality

Relationship between Course and Program

Prerequisites: ECN2103 and MSC1101

This course is prerequisite for: no other course

Teaching and Learning Method

In this course we develop the mathematical tools which students need to understand modern economic theory. We develop these tools in class and students will practice applying these tools in problem sets which accompany the lectures. In order to connect the mathematical models with modern economics, we will discuss several applications in class.

Course Outline/Lectures

Week	Date	Subject	Reading
1	09.01.	1. Introduction	
2	14.01. 16.01.	2. Normal form games and domination “	Carmichael 2, Dutta 3, 4, Gibbons 1.1
3	21.01. 23.01.	3. a) Nash equilibrium “	Carmichael 3, Dutta 5, Gibbons 1.1., 1.2
4	28.01 30.01.	3. b) Mixed strategy Nash equilibrium “	Carmichael 5, Dutta 8, Gibbons 1.3
5	04.02. 06.02.	4. a) Application: Oligopoly theory 4. b) Best responses with mixed strategy Nash equilibrium	Hands 3.3 Dutta 8, 28, see also Mas-Colell, appndx
6	11.09. 13.09. 14.02.	5. Extensive form games/ Assignment 1 due “ Review Class, time & place t.b.a.	Gib. 2.1/2.2 Dutta 11
	18.09. 20.02.	No Class Midterm Exam	
7	25.02. 27.02.	Convex and concave functions and sets Unconstrained optimization	Chiang 9, 11, 12 Sydsaeter 11,12, 13
	04.03. – 09.03.	Spring Break	
8	15.10. 17.10.	Equality constrained optimization “	Sydsaeter 14, Chiang 12
9	22.10. 24.10.	Application: Consumer Problem Comparative Statics	Hands 8 Sydsaeter 13,
10	29.10. 31.10.	Comparative Statics Application: Labor Supply Decision	Chiang part 3 Hands 8
11	05.11. 07.11.	Inequality constrained Optimization “	Chiang 13
12	12.11. 14.11.	Application: The Multiproduct Firm Linear programming and duality	handout Sydsaeter 17
13	19.11 21.11	Applications of Optimization Techniques “ / Assignment 2 due	Toumaroff 13 Hands 9
	26.11. 28.11.	Applications of Optimization Techniques Revision	Hands 9

Learning Activities

Apart from attending class, you should engage in the following activities:

Preparing lectures: Read the text book chapters in advance! (1 hour per week)

Practicing and reviewing lectures: After finishing each major chapter, I will post problem sets and review questions which will help you practicing and reviewing the material. (2 hours per week)

Preparing for exams:

Before the midterm and the final, I will post assignments which familiarize you with the style and lay out of the exam. Exams will consist of a short answer section, a problem solving section and a short essay, so you should practice your skills at memorizing, writing and problem solving. (Preparation time for reviewing and doing assignments: 20 hours for midterm, 20-25 hours for the final).

Assessment Scheme

I. Continuous Assessment:

Two assignments	10 %
In-class exercises (3 / 4)	10 %
<u>Midterm</u>	<u>40 %</u>
Sum continuous assessment:	60 %

II. Final Examination: 40 %

Total	100%
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Grading Scale (see course catalogue)

A+	90-100	C+	67-69
A	85-89	C	63-66
A-	80-84	C-	60-62
B+	77-79	D+	57-59
B	73-76	D	53-56
B-	70-72	D-	50-52
		F	0-49

Course Policies and Instructor's Expectations of Students

Attendance

Attendance is strongly encouraged but ultimately it is in the responsibility of the individual student. Note, however, that I shall conduct at least 4 short, unannounced in-class exercises during the semester and I expect each student to participate in at least 3 of them to get full marks. When in the class room, students are expected to conduct themselves in such a way as to foster an effective learning environment.

Honesty

Cooperation between students in doing the assignments is encouraged. Do not, however, try to cooperate during exams! Any attempt at cheating will result in zero marks on the exam. Rules and procedures for cheating apply as laid out in the KIMEP catalogue.

Instructional Resources

The main textbooks for the game theory part are:

- Carmichael, F., A Guide to Game Theory, Prentice Hall, 2004.
- Gibbons, R., A primer in Game theory, Harvester Wheatsheaf, 1992.
- Dutta, P. K., Strategies and Games: Theory and Practice, MIT Press, 1999.

The main textbooks for the optimization part are:

- Chiang, A.C., Wainwright, K., Fundamental Methods in Mathematical Economics, 4th ed., McGraw Hill, 2005.
- Sydsaeter, K., Hammond, P., Essential Mathematics for Economic Analysis, 2nd ed., Prentice Hall 2006

Supplementary texts

- Hands, D.W., Introductory Mathematical Economics, D.H. Heath 1991
- Mas-Colell, A., Whinston, M.D., Green, J.R., Microeconomic Theory, Oxford University Press 1995.
- Toumanoff, P., Nourzad, F., A Mathematical Approach to Economic Analysis, West 1994.

All other course materials can be found in the L-drive folder "Gerald Pech/Mathematical Economics". For additional readings and links to other interesting websites visit our course page at www.geraldpech.net/ECN3083.

Dates for the topics of the class sessions are tentative. This syllabus is subject to preannounced changes.