UNIVERSITY OF PIRAEUS

1) GENERAL

SCHOOL	ECONOMICS, BUSINESS AND INTERNATIONAL STUDIES
ACADEMIC UNIT	ECONOMICS
LEVEL OF STUDIES	UNDERGRADUATE

COURSE CODE	OKMAΘ09	**SEMESTER**	3

COURSE TITLE	**MATHEMATICAL ECONOMICS**

INTEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	5

COURSE TYPE	Scientific Expertise
PREREQUISITE COURSES	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	ΥΕΣ
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/EBI171/

2) LEARNING OUTCOMES

Learning Outcomes

This course aims at providing the student the advanced mathematical background needed for an in depth understanding of modern economic theory and analysis. It touches upon topics of mathematics such as vector spaces, linear independence, basis, dimension, linear applications, diagonalisability. Elements of differential vector calculus, the Jacobian, the envelop theorem, normed vector spaces, separation theorems, optimisation with one or more (in)equality constraints as well as rudiments of game theory are also discussed. Examples are taken from the classical theory of the consumer, the theory of the firm, competitive markets. Amongst other things, the existence of a utility function, Roy's identity, Shephard's and Hotteling's lemmata as well as the two welafare theorems are proved in application of the techniques learned.

Students are expected to have very good knowledge of advanced mathematical tools. Theyought to be well equipped for an in depth understanding of more complex economic and business problems.

General Competences

- Understanding the quantitative background of theoretical models in economics and business.
- Acquiring good knowledge of advanced mathematical tools applied in economics.
- Modeling economic problems.
- Quantitative evaluation and decision taking.

3) SYLLABUS

- Vector spaces, subspaces - Linear combination of vectors
- Linear independence, basis, dimension - Linear applications, dual space
- Vector spaces with inner product and norm- Distance
- Topological rumblings for metric spaces
- Cones, hyperplanes, orthogonality, convexity
- Hahn-Banach separation theorems
- Profit function, properties, envelop theorem
- Cost function, properties, geometry of cost
- Competitive markets - General equilibrium
- 1st and 2vd welfare theorems

4) TEACHING and LEARNING METHODS	
DELIVERY	In-class lectures
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	Use of ICT in teaching (PowerPoint presentations) and communication with students (email, eclass, class web grading system).
TEACHING METHODS	<table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Study</td><td>52</td></tr><tr><td>Exercises</td><td>26</td></tr><tr><td>Exam</td><td>2</td></tr><tr><td>Total</td><td>132</td></tr></table>
STUDENT PERFORMANCE EVALUATION	The evaluation of the course is implemented through a final examination. The language of evaluation is Greek
ATTACHED BIBLIOGRAPHY	-Suggested bibliography: Α. Ξεπαπαδέας, Ι. Γιαννίκος, Μαθηματικές Μέθοδοι στα Οικονομικά, Gutenberg (2011). - Ι.Α. Πολυράκης, Θέματα Ανάλυσης και Θεωρία Γενικής Ισορροπίας στην Οικονομία, Ι. Πολυράκης. Μ. Λουκάκης, Μαθηματικά Οικονομικών Επιστημών, Εκδόσεις Σοφία. - Further reading: - C.P. Simon, L.E. Blume, Mathematics for Economists, W.W. Norton \& Company (1994). K. Sydsaeter, A. Storm, P. Berck, Economists' Mathematical Manual, Springer-Verlag. A. Chiang, K. Wainwright, Fundamental Methods of Mathematical Economics, McGraw-Hill