UNIVERSITY OF PIRAEUS

FACULTY/SCHOOL	School of Economics, Business and International Studies			
DEPARTMENT	Department of Economics			
LEVEL OF STUDY	Undergraduate			
COURSE UNIT CODE	OKMAΘ09	SEMESTER	7	
COURSE TITLE	**MATHEMATICAL ECONOMICS**			
WEEKLY TEACHNG HOURS	4	CREDITS (ECTS)		5
COURSE TYPE	Elective			
PREREQUISITE COURSES				
INSTRUCTION LANGUAGE	English	ASSESSMENT LANGUAGE		English
OPEN TO ERASMUS	Yes			

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. They ought 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.
COURSE CONTENT	Course Contents • 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 2d welfare theorems
USE OF ICT IN TEACHING	Use of ICT in lectures
COURSE DESIGN	<table><tr><th>Activity/Method</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Tutorials</td><td>10</td></tr><tr><td>Study</td><td>35</td></tr><tr><td>Exercises</td><td>26</td></tr><tr><td>Exam</td><td>2</td></tr><tr><td>Total</td><td>125</td></tr></table>
COURSE ASSESSMENT	The evaluation of the course is implemented through a final examination. The language of evaluation is Greek.
SUGGESTED 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. - Related Journal: Journal of econometrics • 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.