

COURSE OUTLINE

(1) GENERAL

SCHOOL	Faculty of Social, Political and Economic Sciences		
ACADEMIC UNIT	Department of Economics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NK23	SEMESTER	2
COURSE TITLE	MATHEMATICS II		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures		4	6
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Core		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://econ.duth.gr/courses/%ce%bc%ce%b1%ce%b8%ce%b7%ce%bc%ce%b1%cf%84%ce%b9%ce%ba%ce%b1-%ce%b9%ce%b9/		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none">• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i>• <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i>• <i>Guidelines for writing Learning Outcomes</i>																		
<p>The course consists of two parts:</p> <ol style="list-style-type: none">I. Introduction to Linear AlgebraII. Differential Calculus and Optimization of multivariable functions. <p>Emphasis is placed on understanding and use of mathematics in economic theory. Upon successful completion of the course the student / her will be able to:</p> <ul style="list-style-type: none">✓ Understands concepts of economic theory using mathematical methods.✓ To use mathematical methods in economics (modeling using these methods)✓ To analyze and synthesize data.✓ To use various ways of thinking (eg inductive, productive).✓ To develop different problem solving strategies.																		
<p>General Competences</p> <p><i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?</i></p> <table><tbody><tr><td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td><td><i>Project planning and management</i></td></tr><tr><td><i>Adapting to new situations</i></td><td><i>Respect for difference and multiculturalism</i></td></tr><tr><td><i>Decision-making</i></td><td><i>Respect for the natural environment</i></td></tr><tr><td><i>Working independently</i></td><td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td></tr><tr><td><i>Team work</i></td><td><i>Criticism and self-criticism</i></td></tr><tr><td><i>Working in an international environment</i></td><td><i>Production of free, creative and inductive thinking</i></td></tr><tr><td><i>Working in an interdisciplinary environment</i></td><td><i>.....</i></td></tr><tr><td><i>Production of new research ideas</i></td><td><i>Others...</i></td></tr><tr><td></td><td><i>.....</i></td></tr></tbody></table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>	<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>.....</i>	<i>Production of new research ideas</i>	<i>Others...</i>		<i>.....</i>
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<ul style="list-style-type: none">• Production of free, creative and inductive thinking• Analysis and synthesis of data and information• Decision-making• Working independently																		

(3) SYLLABUS

<p>Section 1: Introduction to Linear Algebra</p> <ol style="list-style-type: none">a. Linear models, systems of linear equationsb. Vector space and subspacesc. Matrices, rank, determinantd. Linear mappingse. Eigenvalues and eigenvectorsf. Symmetric matrices, quadratic forms <p>Section 2: Calculus of Several Variables</p> <ol style="list-style-type: none">a. Basic topology: Limits and open sets, compact sets

- b. Calculus of several variables: partial derivatives, differentiability, chain rule, special determinants and matrices (Jacobian, Hessian)
- c. Convex and concave functions of several variables
- d. Homogeneous functions, implicit functions and derivatives

Section 3: Optimization – Comparative Static Analysis

- a. Unconstrained optimization
- b. Constrained optimization: Equality constraints (Lagrange method),
- c. Constrained optimization: Inequality constraints- the Kuhn – Tucker theorem
- d. Concave programming
- e. Comparative statics, envelope theorems
- f. Economic applications

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Lectures in auditorium	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<ul style="list-style-type: none"> • Use of mathematical package (Mathematica) • Support of the learning process via e-class 	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<i>Activity</i>	<i>Semester workload</i>
	Lectures	52
	Study	98
	Course total	150 (25 hours per Credit Unit)
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Written examination (written examination includes questions of various types (multiple choice questionnaires, short-answer questions, open-ended questions, problem solving))	

(5) ATTACHED BIBLIOGRAPHY

- G. Sarafopoulos, N. Mylonas, *Linear Algebra, Optimization and Dynamics for Economics* (in Greek), Ed. Tziolas, 2019 (Primary Textbook)

- E. Loukakis, *Invitation to Mathematics of Economics and Management Sciences Vol. B'* (in Greek), Ed. Sofia, 2011
- Alrha C.Chiang-Kevin Wainwright, *Fundamental Methods of Mathematical Economics* (in Greek), Ed. Kritiki,2009
- E. Dowling, *Introduction to Mathematical Economics*, McGraw – Hill,2001
- M. Hoy et al. *Mathematics for Economics*, Addison Wesley,2001
- Simon - L. Blume, *Mathematics for Economists* Norton Co. 2004