COURSE OUTLINE

(1) GENERAL

SCHOOL	Faculty of Social, Political and Economic Sciences		
ACADEMIC UNIT	Department of Economics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NK13	SEMESTER	1
COURSE TITLE	MATHEMATICS I		

INDEPENDENT TEACHING ACTIVITIES *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*	WEEKLY TEACHING HOURS	CREDITS
Lectures	4	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	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/

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Introduction to basic mathematical concepts of differential -integral calculus and optimization theory (functions of one and two variables). 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:

- ✓ 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.

General Competences

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?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

- Production of free, creative and inductive thinking
- Analysis and synthesis of data and information
- Decision-making
- Working independently

(3) SYLLABUS

The first goal of the course is to teach the key mathematical tools that are useful for the study of economics. The second goal, is to show real (but relatively simple) mathematical proofs so that you can get familiar with mathematical reasoning. This should be helpful to understand proof arguments in micro- macro or econometric classes.

Section 1: Basic concepts

One-variable calculus:

a. Introduction, sets, numbers, and proofs
b. Sequences, limits, continuity, differentiability
c. Applications, Taylor expansions
d. Concavity, convexity
e. Maxima and minima

f. Integration

Section 2: Calculus of functions of two variables
a. Basic topology: Limits and open sets, compact sets
b. Functions of two variables: Geometric representation (graphs, level curves), partial derivatives, differentiability, chain rule
c. Convex and concave functions of two variables
d. Homogeneous functions, implicit functions and derivatives

Section 3: Optimization (functions of two variables)
a. Unconstrained optimization
b. Constrained optimization (first order conditions)
c. Constrained optimization (second order conditions)
d. Concave programming
e. Economic applications

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures in auditorium
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of mathematical package (Mathematica) • Support of the learning process via e-class
TEACHING METHODS *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*	

Activity	*Semester workload*
Lectures	52
Study	98
Course total	150 (25hours per Credit Unit)

STUDENT PERFORMANCE EVALUATION *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.*	**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, *Mathematics for Economics* (in Greek), Ed. Tziolas,2019. (Primary textbook)

- E. Loukakis*, Invitation to Mathematics of Economics and Management Sciences Vol.* A΄ (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