COURSE OUTLINE: MATHEMATICS FOR ECONOMISTS II

GENERAL

SCHOOL	ECONOMICS AND BUSINESS		
ACADEMIC UNIT	ECONOMICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΜΠ0102**	**SEMESTER**	**2nd**
COURSE TITLE	**MATHEMATICS II**		

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**
	3	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, specialized general knowledge, skills development*	ECONOMIC ANALYSIS, GENERAL BACKGROUND
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	https://www.econ.uth.gr/σπουδές/προπτυχιακό/περιγραφή-μαθημάτων/1ο-εξάμηνο/μαθηματικά-ι

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*

The course is designed for first-year students and aims to introduce them to new mathematical concepts not covered in secondary education, as well as to demonstrate how these concepts are applied in Economic Science. Additionally, the course aims to equip Economics students with the necessary mathematical tools to understand economic concepts that are directly linked to mathematics. Upon successful completion of the course, students will be able to:

- Understand the subject, methodology, and various applications of Mathematics in Economics.
- Comprehend the concept of input-output models.
- Understand the concepts of quadratic forms, eigenvalues, eigenvectors, and the diagonalization of symmetric matrices.
- Apply derivatives in Economic Analysis and use partial derivatives in comparative static analysis.
- Understand point elasticity and its utility in Economics.
- Work with derivatives of implicit functions.
- Apply optimization methods and use first and second derivative criteria to identify relative maxima or minima with equality constraints.
- Use the method of Lagrange multipliers and apply it to economic problems.
- Understand utility functions.

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…
…….

- Research, analysis, and synthesis of data and information, utilizing the necessary technologies.
- Decision-making.
- Independent work.
- Work in an international environment.
- Critical thinking and self-reflection.
- Development of free, creative, and inductive thinking.

SYLLABUS

1. **Leontief Input-Output Models**
   - Introduction to input-output models in economic systems.
2. **Quadratic Forms**
   - Definition and properties.
   - Determining the sign of quadratic forms.
3. **Eigenvalues and Eigenvectors**
   - Definition and characteristic equation.
   - Determining the sign of quadratic forms using eigenvalues.
   - Diagonalization of symmetric matrices.
4. **Comparative Static Analysis**
   - Introduction to the rate of change.
   - Derivatives of single-variable functions.
   - Differentiation rules and applications to economic problems.
   - Partial derivatives of functions with two or more variables.
   - Applications in Comparative Static Analysis.
   - Jacobian determinants.
   - Differential calculus, point elasticity, and total differential.
   - Derivatives of implicit functions.
5. **Optimization**
   - A specialized case of equilibrium analysis.
   - Relative maxima and minima of single-variable functions.
   - First derivative test.
   - Second (and higher-order) derivatives and the second derivative test.
   - Relative maxima and minima of two-variable functions.
   - Second derivative test using the Hessian determinant.
   - Relative maxima and minima with equality constraints (Lagrange multiplier method).

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	
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,*	

Activity	***Semester workload***
Lectures	39
Study and analysis of bibliography	105
Tutorial exercises	26
Lab exercises	5
Exams	5

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*	Course total: ***180***
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.*	The final grade for the course is determined by choosing one of the following two alternatives: • **Written examinations at the end of the semester**, accounting for 100% of the final grade, including multiple-choice questions, open-ended questions, and critical analysis. • **Written assessment through three progress tests**, consisting of multiple-choice questions, open-ended questions, and critical analysis: (20%) + (20%) + (60%), conducted after the completion of lectures. The above evaluation criteria are communicated to students during the first lecture of the course, and the information remains continuously accessible via relevant announcements on the course's e-class platform. **ERASMUS students** follow the same evaluation methods but are taught and examined in English.

ATTACHED BIBLIOGRAPHY

- Πρόσκληση στα Μαθηματικά, τόμος Β', Μανώλης Λουκάκης, Εκδόσεις ΣΟΦΙΑ
- Μαθηματικά Οικονομικών Επιστημών, Michael Hoy, John Livernois, Chris McKenna, Thanasis Stengos, Εκδόσεις Γ. ΔΑΡΔΑΝΟΣ ΚΑΙ ΣΙΑ Ε.Ε.
- Μαθηματικά για Οικονομολόγους με Εφαρμογές, James Bergin, Εκδόσεις Γ. ΔΑΡΔΑΝΟΣ ΚΑΙ ΣΙΑ Ε.Ε.