COURSE OUTLINE: COMPUTATIONAL ECONOMICS

GENERAL

SCHOOL	ECONOMICS AND BUSINESS
ACADEMIC UNIT	ECONOMICS
LEVEL OF STUDIES	UNDERGRADUATE
COURSE CODE	ΜΠ802 **SEMESTER** 8th (Major C)
COURSE TITLE	**COMPUTATIONAL ECONOMICS**

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*	Special background, skills development
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/

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 contributes to the following learning outcomes:

- *Ability to conceptualize an economic problem verbally, to formulate it as a mathematical model, and then represent the mathematics in software so that the model can be solved on a computer is a crucial skill for economists.*
- *Focus not just on solving the models, but also on developing the ability to modify them to reflect one's interest and point of view.*
- *Data management skills.*
- *Ability to perform symbolic, numerical, and graphical calculations in a computational environment.*
- *Proficiency in data visualization.*

Upon completing the course, students will be able to:

- *Understand the basic principles of programming.*
- *Learn computational economics via mathematical methods. The mathematical route would focus on algorithms to solve various classes of mathematical models.*
- *Use computer-based economic modeling to solve analytically and statistically formulated economic problems.*

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

- *Search for, analysis and synthesis of data and information, with the use of the necessary technology*
- *Working independently*
- *Production of free, creative and inductive thinking*
- *Production of free, creative and inductive thinking*
- *Decision-making*

SYLLABUS

This course focuses on the use of computer algebra systems (Mathematica, Xcas), the language for statistical computing R, and teaches the students the capabilities of these languages with examples from Economics. Students will be acquainted with the development and the implementation of programming techniques in computational software, learn how to analyze and ultimately solve many economic models, perform symbolic computations, visualize economic functions, data, trading relations. The skills they learn in this course will greatly enhance computational thinking along with analytical problem solving capabilities. The course is applications oriented. Indicative modules of the course are:

- Software Packages' Overview: Notational Conventions and Typesetting / Palettes / Character Formatting / Syntax and Basic Commands. Basic operations on numbers, expressions, and functions are introduced and discussed. Importing, managing, and analyzing data.
- Linear Algebra. Input-output models.
- Graphical representation, plot manipulation, data visualization. Supply and demand curves, cost curves, market equilibrium, consumer and producer surplus, isoquant and isocost lines, visualization of traditional input-output models.
- Computational optimization. Cost minimization, profit maximization in market models (pure competition to pure monopoly), intertemporal consumer theory, consumer's choice, cost-benefit analysis.
- Case studies in Microeconomics. Modeling in a problem-solving framework.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face, hands-on training. The course is a computer laboratory class.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, laboratory education. Use of the e-class platform for posting: (a) lecture materials, (b) announcements, (c) exercises, case studies, and pertinent articles.

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.*	*Activity*	*Semester workload*
	Lectures	39
	Exams	2
	Study of bibliography	33
	laboratory practice	60
	Problem-solving assignment	40
	Follow-up meetings for the semester-long problem-solving assignment	6

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 will be determined by selecting one of the following options: - Final written exam: 100% (A computer-based exam at the end of the semester that requires students to formulate and solve economic models). - Semester-long problem-solving assignment (100%). These evaluation criteria are provided to students during the course's first lecture and are continually accessible through relevant announcements on the course's eclass platform. Erasmus students will follow the same examination methods but will be taught and examined in English.

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography*
- *Wagon, S. (2010). "Mathematica in Action" [electronic resource], HEAL-Link Springer ebooks (Eudoxus code 73245375).*
- *Hazrat, R. (2015). "Mathematica. A Problem-Centered Approach" [electronic resource], Εκδόσεις: HEAL-Link Springer ebooks (Eudoxus code 73264913).*
- *Kotsios, S., & Lomis, I. (2024). "Mathematica for Economists", [electronic resource], Kallipos, Open Academic Editions. https://dx.doi.org/10.57713/kallipos-169 (Eudoxus code 118392906).*

- *Related academic journals*

- *Computational Economics (Springer)*
- *Journal of Economic Dynamics and Control (Elsevier)*
- *Journal of Economic Interaction and Coordination (Springer)*
- *Journal of Mathematical Economics (Elsevier)*