COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Informatics and Computer Science		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE		**SEMESTER**	**7, 9**
COURSE TITLE	Optimization		

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	2	
Class exercises	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	4	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Special Background, Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

(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

Upon successful completion of the course, the students will be familiar with the basic concepts of optimization and be able to

- model optimization problems
- use software to solve real world problems
- implement algorithm taught in the course
- understand scientific literature on the subject

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
Adapting to new situations	Respect for difference and multiculturalism
Decision-making	Respect for the natural environment
Working independently	Showing social, professional and ethical responsibility and sensitivity to gender issues
Team work	Criticism and self-criticism
	Production of free, creative and inductive thinking

Working in an international environment	……
Working in an interdisciplinary environment	Others… ……..
Production of new research ideas	

- Autonomous work
- Generating new research ideas
- Promotion of free, creative and inductive thinking

(3) SYLLABUS

The concept of Optimization. Examples. Review of Linear Algebra elements and functions. Optimization through derivatives. The Linear Problem (LP) and its extension to the Integer Problem (IP): general description and difficulties of solving (classes of complexity of the problems). The Dual problem and the necessary and sufficient optimality conditions of the LP (Karush, Kuhn, Tucker conditions) - introduction to the theory of convex sets and functions. Algorithmic solution of the LP – the Simplex method. Economic Interpretation of Simplex Tableau Elements. Special cases and addressing them through the Simplex algorithm.- multiple optimal solutions, degenerate points, empty solution space. The Simplex method with bounds to variables. Sensitivity analysis, introduction of new variables and constraints, parametric programming. Optimization and Networks. Discrete Optimization

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Lectures (live)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Eclass platform for communicating with the students and publishing slides, lecture notes and exercises with solutions.
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	
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,	Final exam

Activity	Semester workload
Lectures	39
Class exercises	26
Home study	60
Course total	**125**

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.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. M. Padberg, Linear Optimization and Extensions, Springer,1999.
2. M. Bazaraa, J.J. Jarvis, HD. Sherali, Linear Programming and network flows, John Wiley, 1990.
3. R. Ahuja, T. Magnanti, J. Orlin, Network Flows, Prentice Hall, 1993.
4. B. Korte, J. Vygen, Combinatorial Optimization, Springer 2000.
5. R. Garfinkel, G. Nemhauser, Integer Programming, John Wiley and Sons, 1972.
6. A. Schrijver, Theory of Linear and Integer Programming, John Wiley, 1986.

- Related academic journals:

- Mathematical Programming
- Discrete Optimization