ETY908 - Computational Methods for Complex Systems

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING
ACADEMIC UNIT	DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
LEVEL OF STUDIES	UNDERGRADUATE
COURSE CODE	ETY908 **SEMESTER** 9
COURSE TITLE	COMPUTATIONAL METHODS FOR COMPLEX SYSTEMS

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 and labs	3	3
Add rows if necessary. The organization 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
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	http://pc164.materials.uoi.gr/dpapageo/courses/ymps/

(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*

This is an introductory course in numerical optimization. Upon completion of the course the student

Knowledge: Knows and understands the basic principles and theory of numerical optimization.

Skills: Distinguishes between different categories of optimization and numerical problems, their scope and limitations.

Ability: Is able to suggest and apply appropriate numerical methods to solve optimization problems, evaluate the performance of each method and interpret the behavior of the method in the given problem.

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, analyze and synthesize data and information, using the necessary technologies.
- Independent work
- Team work

(3) SYLLABUS

Local optimization. Optimality conditions. Algorithms and convergence. On-dimensional optimization. Ad-hoc methods. Quadratic models. Newton-type methods. Conjugate gradient methods. Special methods for sum of squares. Introduction to global optimization. Optimization software and applications.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In class, lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	By nature of the course, computers are used in the lab. In addition, specialized software is used to conduct laboratory exercises.	
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	26
	Laboratory	13
	Self-study (preparation for the final exam)	36
	Course total	75
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.*	LANGUAGE OF EVALUATION: Greek METHOD OF EVALUATION: Final written examination or project presentation.	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- D. Papageorgiou, Computational methods for complex systems, University of Ioannina, 2004.