COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**4304**	**SEMESTER**	**8th**
COURSE TITLE	**Algorithm 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		**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, specialised general knowledge, skills development*	Scientific area		
PREREQUISITE COURSES:	NONE		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK/ENGLISH		
COURSE DELIVERED TO ERASMUS STUDENTS	YES		
MODULE WEB PAGE (URL)	https://eclass.uowm.gr/		

2. LEARNING OUTCOMES

Learning outcomes
The purpose of this course is to introduce the students to the theory, algorithms and applications of combined optimization, with emphasis on problems related to flows, paths and matching graphs. The aim is to familiarize students with the basic principles of algorithm design and in particular with discrete optimization algorithms as well as to investigate applications of such problems to real optimization problems. **On successful completion of this module the learner will be able to:** 1. Knows the theory and algorithms of combinatorial optimization 2. Analyzes real problems as optimization problems 3. Distinguishes the possibility of applying specific algorithms 4. Applies optimization algorithms to real problems 5. Designs optimization algorithms
General Skills
Upon successful completion of the program students will: • have the theoretical and practical background on the field of product and systems design engineering and the corresponding profession. • utilize scientific knowledge to understand, analyze and solve problems. • apply a wide range of scientific and technical knowledge concerning the design and development of products and systems.

3. COURSE CONTENTS

- Optimization problems,
- Complexity,
- Computational solubility,
- Precise algorithms,
- Integral programming,
- Approximation algorithms,
- Local search,
- Simulation.

4. TEACHING METHODS - ASSESSMENT

MODE OFDELIVERY	In class, face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Video and slide presentations via projector • Support of teaching process via the electronic platform e-class • Communication with students.
TEACHING METHODS	
ASSESSMENT METHODS	Final written exam which includes: i. Short-answer questions ii. Multiple choice questions iii. Problem solving

Activity	***Semester workload***
Lectures	90
Non-directed study	60
Course total	**150**

5. ATTACHED

- Suggested bibliography:

- J. Kleinberg and E. Tardos, *Σχεδιασμός Αλγορίθμων*, Εκδόσεις Κλειδάριθμος, 2008.
- T. Cormen, C. Leiserson, R. Rivest, and C. Stein, *Εισαγωγή στους Αλγορίθμους*, Πανεπιστημιακές Εκδόσεις Κρήτης, 2016.
- I. Κολέτσος και Δ. Στογιάννης, *Εισαγωγή στην Επιχειρησιακή Έρευνα*, 2015.
- R. Ahuja, T. Magnanti, J. Orlin, *Network Flows: Theory, Algorithms, and Applications*, Prentice-Hall, 1993.
- C. Papadimitriou, K. Steiglitz, *Combinatorial Optimization: Algorithms and Complexity*, Prentice-Hall, 1982.
- J. Bang-Jensen and G. Gutin, *Digraphs: Theory, Algorithms and Applications*, Springer-Verlag, 2001.
- W. Cook, W. Cunningham, W. Pulleyblank, and A. Schrijver, *Combinatorial Optimization*, John Wiley & Sons, 1998.