COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering
ACADEMIC UNIT	Mechanical Engineering
LEVEL OF STUDIES	*Undergraduate*
COURSE CODE	ΟΠ0500 **SEMESTER** 3rd
COURSE TITLE	Linear Programming

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, Practical Exercises	5	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*	Core
PREREQUISITE COURSES:	N/A
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://www.mie.uth.gr/?page_id=10270

(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*

The goal of this course is to introduce the students to the theory of optimization and to familiarize them with the basic concepts of linear programming as well as its relevant applications. Upon successful completion of this course, the student will be able to:
- formulate a linear programming problem
- apply a suitable methodology to solve it
- validate the obtained solution using optimization software

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*
Working in an international environment	*Production of free, creative and inductive*
thinking Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Retrieve, analyze and synthesize data and information, with the use of necessary technologies
- Autonomous Work
- Decision Making

- Design and project management
- Exercise judgement and self-evaluation
- Development of free, innovative and inductive thinking
- Development of new research ideas
- Team Work

(3) SYLLABUS

Review of linear algebra. Categorization and formulation of optimization problems. Introduction to optimization theory. Introduction to linear programming. The simplex method. Duality theory. Sensitivity analysis. Extensions of linear programming. Network problems (shortest path, maximum flow, minimum cost flow, minimum spanning tree). Transportation, transshipment and assignment problems.

(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*	Usage of ICT for education (support of the learning process through the course's website), for research activities (search of bibliographic resources on the web) and communication with students (e-mail)	
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	70
	Self-evaluating exercises	30
	Autonomous work	50
	Course Total	*150*
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.*	I. Written final exam (60%) II. Midterm (30%) III. Homework (10%) The evaluation criteria are made known to the students at the beginning of the semester and are posted on the course's website.	

(5) **ATTACHED BIBLIOGRAPHY**

- Suggested bibliography:

Βασιλείου Π.Χ. & Τσάντας Ν., (2000). Εισαγωγή στην επιχειρησιακή έρευνα. Εκδόσεις Ζήτη.

Κιόχος Π., Κιόχος Α., Θάνος Γ. & Σαλαμούρης Δ., (2002). Επιχειρησιακή έρευνα: Μέθοδοι & τεχνικές λήψης επιχειρηματικών αποφάσεων. Εκδόσεις Σύγχρονη Εκδοτική.

Λουκάκης Μ., (2010). Γραμμικός προγραμματισμός: Αριστοποίηση σε δίκτυα. Εκδόσεις Σοφία.

Ξηρόκωστας Δ., (1999). Επιχειρησιακή έρευνα, αντικείμενο και μεθοδολογία: Γραμμικός προγραμματισμός. Εκδόσεις Συμμετρία.

Παπαρρίζος Κ., (1999). Γραμμικός προγραμματισμός: Αλγόριθμοι & Εφαρμογές. Εκδόσεις Ζυγός.

Πραστάκος Γ., (2000). Διοικητική επιστήμη: Λήψη επιχειρησιακών αποφάσεων στην κοινωνία της πληροφορίας. Εκδόσεις Σταμούλη.

Σίσκος Γ., (2000). Γραμμικός προγραμματισμός. Εκδόσεις Νέων Τεχνολογιών.

Υψηλάντης Π., (2007). Επιχειρησιακή έρευνα: Λήψη επιχειρηματικών αποφάσεων. Εκδόσεις Έλλην.

Υψηλάντης Π., (2010). Επιχειρησιακή έρευνα: Εφαρμογές στη σημερινή επιχείρηση. Εκδόσεις Προπομπός.

Φράγκος Χ., (1988). Εισαγωγή στην επιχειρησιακή έρευνα. Εκδόσεις Σταμούλη.

Hillier F.S. & Lieberman, G.J., (1984). Εισαγωγή στην επιχειρησιακή έρευνα, Τόμοι Α-Γ. Μετάφραση Γ. Οικονόμου. Εκδόσεις Παπαζήση.

Hillier F.S., Lieberman G.J., (2001). Introduction to Operations Research. McGraw-Hill.

Taha H., (2011). Introduction to Operations Research. Μετάφραση στα ελληνικά, Εκδόσεις Α. Τζιόλα & Υιοί Ο.Ε.

Winston W.L., Venkataramanan M., (2002). Introduction to Mathematical Programming. Duxbury Press.

- Related scientific journals:
- Annals of Operations Research
- Computational Optimization and Applications
- Computers and Industrial Engineering
- Computers and Operations Research
- Discrete Optimization
- Engineering Optimization
- European Journal of Industrial Engineering
- European Journal of Operational Research
- INFORMS Journal on Computing
- International Transactions in Operational Research
- Journal of Global Optimization
- Journal of Industrial and Management Optimization
- Journal of Optimization Theory and Applications
- Journal of the Operational Research Society
- Management Science
- Mathematical and Computer Modelling
- Mathematical Methods of Operations Research
- Mathematical Programming
- Mathematics of Operations Research
- Naval Research Logistics
- Operational Research
- Operations Research
- Operations Research Letters
- Optimization
- Optimization and Engineering
- Optimization Letters
- Optimization Methods and Software
- OR Spectrum
- RAIRO - Operations Research
- SIAM Journal on Optimization