

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	DEPARTMENT OF CIVIL ENGINEERING		
<b>DEPARTMENT</b>	SCHOOL OF ENGINEERING		
<b>LEVEL OF STUDY</b>	UNDERGRADUATE		
<b>COURSE UNIT CODE</b>		<b>SEMESTER OF STUDY</b>	5th
<b>COURSE TITLE</b>	Operational Research		
<b>COURSEWORK BREAKDOWN</b>		<b>TEACHING WEEKLY HOURS</b>	<b>ECTS Credits</b>
Lectures, Workshops and Laboratory Exercises		2	3
<b>COURSE UNIT TYPE</b>	CONCENTRATION - SPECIALIZATION		
<b>PREREQUISITES :</b>			
<b>LANGUAGE OF INSTRUCTION/EXAMS:</b>	GREEK		
<b>COURSE DELIVERED TO ERASMUS STUDENTS</b>	YES (in English)		
<b>MODULE WEB PAGE (URL)</b>			

### 2. LEARNING OUTCOMES

#### Learning Outcomes

The Operations Research is an essential tool of management for solving executive and operational decision problems throughout the functionality of enterprises and organizations as well as in dealing with engineering projects. The course provides the fundamental knowledge and main areas of Operational Research and the description of methods and applications in modeling problems of optimal allocation of scarce resources.

After completing the course, students will be able to:

- Describe accurately real world decision problems and identify the steps to solve the problem (problem formulation, modeling, methodological approaches and algorithms, exploitation of the results , implementation of the decision).
- Exploit effectively the results of the processing of the problems data.
- Identify previous cases which are relevant and can help to solve the problem.
- Analyze complex decision problems and construct mathematical models describing them, taking into account all the parameters and restrictions governing the decision problem .
- Select and apply the appropriate methodological approach for solving decision problems.
- Use appropriate mathematical software and develop applications to solve problems.
- Analyze the results and propose a solution or solutions (decisions).

- Argue for the choice of the proposed decision.

#### General Skills

- Search, analysis and aggregation of data and information with the utilisation of the required technology
- Decision Making
- Individual work

### 3. COURSE CONTENTS

- Introduction to Operational Research
- Linear Programming Γραμμικός προγραμματισμός,
  - Description and Problem Formulation,
  - Graphical Solution of Linear Programme for two variables
  - SIMPLEX method
  - Sensitivity Analysis
  - Economical Interpretation of the results
  - Use SIMPEX method for minimisation problems
  - Case Studies, Exercises
- Integer Programming and Applications
- Network Optimisation
  - The Transportation problem
  - Optimisation of networks
  - Maximisation of Network Flows
  - The Shortest Path Root problem
- Solving problems using MS EXCEL

### 4. TEACHING METHODS - ASSESSMENT

<b>MODE OF DELIVERY</b>	In-Class	
<b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b>	Support of the learning process through the e-class platform.## Use of the MS EXCEL, LINDO and ENVI/IDL software Use of software developed by the Teaching Team.	
<b>TEACHING METHODS</b>	<b>Method description</b>	<b>Semester Workload</b>
	Lectures	26
	Presentation of Case Studies, Class Discussions	
	Group Projects	
	Laboratory	24
	Personal Study	25
	<b>TOTAL</b>	<b>75</b>
<b>ASSESSMENT METHODS</b>	<b>I. Final Written Exam (70%) (Summative Evaluation)</b> includes: <ul style="list-style-type: none"> <li>- Short answer questions</li> <li>- Problems solutions with the taught methods</li> </ul> <b>II. Individual project (30%) (Summative Evaluation):</b>	

	<p><u>Evaluation Criteria:</u></p> <ul style="list-style-type: none"><li>• Completeness - 35%</li><li>• Clearness - 25%</li><li>• Documentation - 30%</li><li>• Critical Evaluation- 10%</li></ul>
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## 5. RESOURCES

- *Recommended Book and Journal Article Resources:*

- Μοσχονά Θ., Χαλικιάς Μ., Χελιδόνης Γ. (2010) Επιχειρησιακή Έρευνα Σύγχρονη Εκδοτική
- Υψηλάντης Π. (2010) Επιχειρησιακή Έρευνα, εκδ. Προπομπός
- Albright, S.C. and Winston, W.L. (2005). Spreadsheet Modeling and Applications: Essentials of Practical Management Science, Thomson Brooks/Cole .
- Anderson, D.R., Sweeney, D.J., Williams, T.A., Camm, J.D. and Martin, K. (2010). An Introduction to Management Science, Quantitative Approaches to Decision Making, 10th ed., Delmar Cengage Learning.
- Σισκος, Ι. (1999), Γραμμικός Προγραμματισμός, Εκδόσεις Νέων Τεχνολογιών.

-*Journals:*

- European Journal of Operational Research, Elsevier
- Operational Research: An International Journal, Springer
- Annals of Operations Research, Springer