COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Financial and Management Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	II-5	**SEMESTER**	1
COURSE TITLE	Operations Research Methodologies		

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**
	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*	Stream Obligatory
PREREQUISITE COURSES:	No
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*

The objective of this course is to provide students with the appropriate basic tools of mathematical programming for the decision support in management and operations systems. The course "Operations Research II" completes to a greater extent this knowledge in order to give students an entire Operations Research methodology. After the successful completion of the course, the student will have:

to know and understand the basic concepts of mathematical programming theory.

to know and understand the basic concepts of mathematical modelling.

to be in position to recognize and classify problems into different categories, i.e., linear programming, integer programming, etc.

to perform the modelling of mathematical programming problems.

to be able to solve efficiently linear programming models

to recognize and apply the appropriate tools for solving linear programming problems.

to analyze, recognize and apply the most suitable methodologies and respective algorithms to solve particular linear

programming cases.

To know and understand the basic concepts of Reliability Modelling.

To know and understand the basic concepts of Reliability, Availability and Maintainability measures

To perform the modelling of Reliability Engineering problems

To be in position to perform computations of Reliability, Availability and Maintainability

To recognize, understand and apply the appropriate tools for solving Reliability Engineering problems

to know and understand the basic concepts of dynamic programming theory

to be able to solve efficiently dynamic programming problems

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
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Critical thinking
Production of free, creative and inductive thinking

(3) SYLLABUS

Introduction to operations research, linear programming, modelling, Simplex method, Big M method, duality, sensitivity analysis. IOR Tutorial and Excel Solver. Network optimization, graphs and networks, the shortest path, minimum spanning trees, maximum flow problem, minimal cost flow problem. Dynamic Programming. System Reliability. Elements of stochastic modelling

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	*Distance learning*
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	*Use of ICT in teaching, use of specific software*
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	30
study and analysis of bibliography	75
laboratory practice	6
Essay writing	36
exams	3
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.*	Essay writing 40% of final grade and Final examination 60% of Final grade

(5) ATTACHED BIBLIOGRAPHY

Suggested bibliography:

Basic bibliography: F.S. Hillier, G. J. Lieberman, Introduction to Operations Research, 8th edition, Mc Graw-Hill International Edition

Operations Research: Applications and Algorithms
W. L. Winston
Duxbury Press, 2003
ISBN 978-0534380588
1440 Pages

Linear Programming
J.P. Ignizio, T.M. Cavalier

Prentice Hall, 1993
ISBN 978-0131837575
666 Pages

Operations Research: Principles and Practice
A. Ravindran, D.T. Philips, J.J. Solberg
Wiley, 1987
ISBN 978-0471086086
656 Pages
Linear Programming and Network Flows
M. S. Bazaraa, J.J. Jarvis, H.D. Sherall
Wiley, 1990
ISBN
684 Pages

Introduction to Operations Research Techniques
H. G. Daellenbach, J. A. George
Allyn and Bacon, 1983
ISBN 978-0205079742
750 Pages

Model Building in Mathematical Programming
H. P. Williams
Wiley, 1999
ISBN 978-0471997887
368 Pages

An Introduction to Management Science: Quantitative Approaches to Decision Making
D.R. Anderson, D.J. Sweeney, T.A. Williams, J.D. Camm, R.K. Martin
South-Western College Pub, 2011
ISBN 978- 1111532222
896 Pages

Tools for Thinking: Modelling in Management Science
M. Pidd
Wiley, 2003
ISBN 978-0470847954
332 Pages

Introduction to Management Science
B.W. Taylor,
Prentice Hall, 2009
ISBN 978-0136064367
840 Pages

A. Practical Introduction to Management Science
D.A. Waters
Addison Wesley Publishing Company, 1998
ISBN 978-0201178470
584 Pages

Introduction to Stochastic Processes,
E. Cinlar,
Prentice-Hall, Engenwood Cliffs, 1975

Probability and Statistics with Reliability, Queuing, and Computer Science Applications
K.S. Trivedi
Wiley-Interscience, 2002
ISBN 978-0471333418
830 Pages

Introduction to Probability Models
S.M. Ross
Academic Press, 2009
ISBN 978-0123756862
800 Pages

Related academic journals:

European Journal of Operational Research, Reliability Engineering and System Safety, IEEE transactions on Reliability, etc…..