COURSE OUTLINE

GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Department of Mathematics		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ΣΤ6	**SEMESTER**	1
COURSE TITLE	Mathematical 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	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*	special background
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

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 course learning outcomes are: the presentation of mathematical programming problems, the presentation of their solution techniques and their applications in several areas such as production, distribution, routing, etc.

Upon successful completion of the course the student will be able to:

1. model complex systems
2. comprehend the mathematical foundation of the Simplex method and the dual theory
3. understand and apply the appropriate techniques required to solve linear optimization problems
4. understand the principles of dynamic programming and apply dynamic programming solution techniques
5. recognize and apply the appropriate inventory management policies (depending, each time, on underlying assumptions of the system)

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

Working independently
Decision-making
Adapting to new situations
Production of free, creative and inductive thinking
Synthesis of data and information, with the use of the necessary technology

SYLLABUS

Linear programming problems formulation. The Simplex algorithm. Big M-method. Two-Phase method. Revised Simplex method. Duality theory. Dual Simplex algorithm. Sensitivity analysis. Parametric analysis. Transportation problem. Transhipment problem. Assignment problem. Dynamic programming: Bellman principle of optimality, finite and infinite horizon problems. Applications of dynamic programming. Inventory control.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Lindo/Lingo Software, Email, class web.
TEACHING METHODS *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials,*	

Activity	***Semester workload***
Lectures	39
Independent study	78
study and analysis of bibliography, Fieldwork (6-7 set of homework)	33

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*	<table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Course total</td><td>150</td></tr></table>
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 METHODS OF EVALUATION: written work (30%), Final exam (70%)

ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. Bellman, R.E.. *Dynamic Programming*, Princeton University Press, 1957, Princeton, NJ. Republished 2003
2. Bertsekas D. P. Dynamic Programming and Optimal Control, Vols. I and II, Athena Scientific, 1995, (3rd Edition Vol. I, 2005, 4th Edition Vol. II, 2012),
3. BERTSIMAS D. and J. N. TSITSIKLIS Introduction to Linear Optimization, Athena Scientific 1997
4. GASS S. Linear Programming Methods and Applications, McGraw-Hill 1985
5. HADLEY G. Linear Programming, Addison-Wesley Publishing Company, INC, 1965
6. HAMDY TAHA, Επιχειρησιακή Έρευνα Εκδόσεις Α. Τζιολα & ΥΙΟΙ Α.Ε., 2011
7. Harris F. W. (1990). How many parts to make at once (reprinted from Factory The Magazine of Management, 1913, 10(2), 135-136). Operations Research 38(6), 947-950.
8. HILLIER F. S. and G. J. Lieberman Introduction Operations research. The McGraw-Hill Companies, 2001
9. Johnson L. A. and D. C Douglas, Operations research in production planning scheduling and inventory control. John Willey and Sons, New-York, 1974
10. Silver E. A., D.F. Pyke and R. Peterson, Inventory Management and Production Planning and Scheduling. John Willey and Sons, New-York, 3rd Edition, 1998
11. Tersine R. J., Principles of inventory and materials management, Prentice Hall International Inc, New Jersey, 4rd Edition, 1994
12. Wagner H.M and T.M Within (1958) Dynamic version of the economic lot size model.

Management Science, 5(1), 89-96
13. WINSTON W. L., Operations research (Applications and algorithms). Duxbury Press (International Thomson Publishing) 1994.
14. ΒΑΣΙΛΕΙΟΥ Π. και ΤΣΑΝΤΑΣ Ν., Εισαγωγή στην επιχειρησιακή έρευνα, Εκδόσεις ΖΗΤΗ 2000.
15. ΚΟΥΝΙΑΣ Σ. και ΦΑΚΙΝΟΣ Δ., Γραμμικός Προγραμματισμός, Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη 1999.
16. ΛΟΥΚΑΚΗΣ Μ. Επιχειρησιακή έρευνα γραμμικός προγραμματισμός, Εκδοτικό Κέντρο Βορείου Ελλάδας, 1994.
17. ΠΑΠΑΡΡΙΖΟΣ Κ., Γραμμικός Προγραμματισμός. Εκδόσεις Ζυγός, Θεσσαλονίκη 1999.
18. ΣΙΣΚΟΣ Γ., Γραμμικός Προγραμματισμός, Εκδόσεις Νέων Τεχνολογιών, Αθήνα 1998.
19. ΦΑΚΙΝΟΥ Δ. και ΟΙΚΟΝΟΜΟΥ Α., Εισαγωγή στην επιχειρησιακή έρευνα- Θεωρία και Ασκήσεις, Αθήνα 2003.

- *Related academic journals:*

Mathematical Programming Journal, Series A and Series B
INFORMS Transactions on Education (ITE)