COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND TECHNOLOGY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**FST_X17**	**SEMESTER OF STUDIES**	Winter
COURSE TITLE	OPTIMIZATION AND OPERATIONS RESEARCH		

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**	**ECTS CREDITS**
Lectures	2	
Exercises	2	
Total	**4**	**5**

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Elective Field of Science
PREREQUISITE COURSES:	Typically, there are not prerequisite course. Essentially, the students should possess knowledge provided through the previously taught course of “Mathematics”.
TEACHING AND ASSESSMENT LANGUAGE:	Greek.
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBPAGE (URL)	https://eclass.upatras.gr/

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*

This course is the introductory lesson in the concepts of Operational Research. It aims at introducing students to the basic concepts of Operational Research, Linear Programming and Integer Programming.

Throughout the course, applications and exercises are from the agronomic and economic field.

By the end of this course the student will be able to:

- easily recognize if the problem to be solved can be addressed by operational research techniques and able to construct their mathematical model
- solve the problem with a software package
- analyze solutions and answer queries related to problem parameter changes (sensitivity analysis)

- know in-depth the basic theoretical knowledge about the subject
- use knowledge and understanding acquired in a manner that indicates a professional approach to their work or profession
- have competences typically demonstrated by developing and supporting arguments and solving problems within their field of knowledge
- communicate information, ideas, problems and solutions to both specialist and non-specialist public
- develop knowledge acquisition skills needed to continue to post graduate studies with a high degree of autonomy
- gather and interpret relevant data (in their knowledge field) to form judgments that include reflection on relevant scientific issues

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

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

By the end of this course the student will, furthermore, have developed the following skills (general abilities):

- Searching, analysis and synthesis of facts and information, as well as using the necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous (Independent) work
- Group work
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Decision making in a business environment and the role of Operational Research
The theory and practice of decision-making
Types of Operations Research Models

1. Linear Programming (LP)
    - Introduction to the subject of LP
    - Fields of use and linear programming hypotheses
    - The modeling methodology of LP models, Examples
    - Graphical problem solving
    - Sensitivity analysis through graphical approach
    - Classical application problems of LPM
    - The Jump package
2. The Simplex method
    - Reduce LP problems in their normal form
    - Basic feasible solutions and their use in LP
    - Solve problems with the Simplex Method
    - Special cases of problems
3. The dual problem
    - Construction of the dual through the economic approach
    - Construction of the duplicate for any original
    - Financial interpretation of the dual variables
    - Sensitivity analysis
4. Integer Linear Programming
    - Modeling of integer linear programming problems
    - Solving them with the branch and bound technique

- Solve them by using the Jump package

4. TEACHING AND LEARNING METHODS - ASSESSMENT

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures, seminars and laboratory work face to face.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use Jump library of Julia Eclass
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*	
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.*	Written examination after the end of the semester (100%) including: • Multiple-choice questions • Solving linear programming problems • Solving integer programming problems • Benchmarking theory elements

Activities	***Work Load per semester***
Lectures (2 hours per week x 13 weeks)	26
Seminars (2 hour per week x 13 weeks)	26
Final examination (3 hours)	3
Non-guided study	70
Total number of hours for the Course (25 hours of work-load per ECTS credit)	**125**

5. RECOMMENDED LITERATURE

1. Operations Research: An Introduction, Hamdy, A. Taha, Hardcover: 832 pages, Publisher: Pearson; 9 edition (September 8, 2010), Language: English, ISBN-10: 013255593X.
2. W.L. Winston, Operations Research, Applications and Algorithms (4th edition), PWS-Kent (2004).