COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	7		
COURSE CODE	I/II.6	SEMESTER	B'
COURSE TITLE	Computational Methods for Decision Making		

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
10 modules	3	6
Lecturers: Jan Jantzen and Nikolaos Ampazis		
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:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English / Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	Moodle (https://aegeanmoodle.aegean.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*

- Understand the process of decision making (in a municipality for instance)
- Have a working knowledge of different decision-making tools and techniques.
- Understand various methods for decision making using classification and clustering algorithms.
- Be able to effectively apply algorithms to solve decision making problems from various problem domains, e.g., Financial Engineering.
- Be familiar with several successful applications of decision making within energy and climate.

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…*
	…….

1. Analysis and synthesis of data and information, with the use of the necessary technology.
2. Decision-making.
3. Working independently.
4. Teamwork.
5. Working in an international environment.
6. Working in an interdisciplinary environment.
7. Respect for the natural environment.
8. Criticism and self-criticism.
9. Working on real-world case studies within energy and climate.

This course introduces students to algorithms and techniques for automated computational methods and information systems that support decision making. Emphasis is given on information processing methods that can successfully and securely execute a variety of missions in complex environments while exploiting multiple sources of sensor and open domain data. Case studies are presented, along with the lectures, in areas such as resource optimization, renewable sources of energy, financial analysis and web content personalization such as recommender systems.

(3) SYLLABUS

1. Introduction to decision making. Decision examples of engineering projects related to energy and climate.
2. Decision Support and Cumulative Cash-Flow Diagrams. Case study: “Energy saving light bulbs”.
3. Decisions Based in Engineering Economy Principles. Case Study: “Ground Heat”.
4. Regression Models. Training/Test/Validation in Data Analysis. Case Studies: Home Energy Efficiency & Home Energy Savings.
5. Computer decisions by Fuzzy Control.
6. Decisions Based on Cluster Analysis and the Fuzzy C-Means algorithm.
7. Decisions based on a model. Case Study: “Global warming”.

8. Algorithms for statistical classification. Case studies in continuous and discrete problems.
9. Computational-intelligence methods (neural networks, genetic algorithms).
10. Financial data predictions.
11. Recommender Systems.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td></td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in teaching and communication with students
In class teaching, online lectures (Moodle, Big Blue Button), case studies, decision making software hands-on, distance learning with assignments and email teacher feedback, in teams of 2-5 students. All course material is online and free of charge.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lecture</td><td>30</td></tr>
<tr><td>Study</td><td>70</td></tr>
<tr><td>Joint Project work</td><td>47</td></tr>
<tr><td>Exams</td><td>3</td></tr>
<tr><td>Course total</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td><u>Method of assessment and evaluation:</u>
• Individual, written multiple choice exam, 2 hours, all aids are allowed.</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals: