COURSE OUTLINE

1. GENERAL

SCHOOL	SCHOOL OF ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	**630035**	**SEMESTER**	**1o**
COURSE TITLE	EXPERT SYSTEMS IN THE STUDY OF NATURAL RESOURCES		

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**
Theory: Lectures	2	5
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*	General knowledge, Scientific Area, Skills development
PREREQUISITE COURSES:	
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*

Expert systems are computer programs that use knowledge and reasoning to solve problems in a particular domain. In the context of natural resources, expert systems can be used to help scientists and resource managers make decisions about the management of natural resources. Students are going to be familiarized with the theory, methods, and the tools of expert systems and especially methods and tools that are used in the management of natural resources namely water resources, soil resources, biodiversity conservation, and environmental monitoring.

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. Search, Analysis and Synthesis of Data and Information, using the Necessary Technologies
2. Adapting to New Situations
3. Decision-making
4. Autonomous Work
5. Teamwork
6. Project planning and management
7. Respect for the natural environment

3. SYLLABUS

- Introduction to Expert Systems

Overview of expert systems, Types of expert systems, Applications of expert systems in natural resources, Benefits and limitations of expert systems

- Knowledge Representation in Expert Systems

Knowledge representation formalisms, Conceptual modeling, Rule-based systems, Frame-based systems, Object-oriented systems,

- Reasoning in Expert Systems

Inference engines, Forward chaining, Backward chaining, Uncertainty handling

- Development of Expert Systems

Expert system development life cycle, Knowledge acquisition, Knowledge engineering, System implementation, System testing and evaluation

- Expert Systems in Natural Resources Applications

Forest management, Water resources management, Biodiversity conservation, Environmental monitoring,

- Ethical and Legal Issues in Expert Systems

Liability and responsibility, Confidentiality and privacy, Bias and discrimination

- Future of Expert Systems in Natural Resources

Emerging trends in expert systems, Hybrid intelligent systems, Machine learning and deep learning, Big data analytics

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classroom and in laboratory (face-to-face)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Exploitation of Information and Communication Technologies in teaching, in laboratory training and in communication with students. Use of dedicated software. Use of integrated e-learning system. Communication with students via open eclass platform and e-mail.
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.*	Four written laboratory exercises (40%) of study cases (development of spatial data, their processing, modeling, calculations, cartography). Oral examination (60%) on how to deal with and implement the study cases that each student (or group of students) faced. **Marking Scale:** 0-10. **Minimum Passing Mark:** 5.

Activity	***Semester workload***
Lectures	35 hours
Laboratory work and case studies	75 hours
Exercises and presentations	15 hours
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

Proposed literature:

1. Expert Systems: Principles and Programming, Fourth Edition 4th Edition, Joseph C. Giarratano, Gary D. Riley
2. Expert Systems in Environmental Planning, Jeff R. Wright, Lyna L. Wiggins, Ravinder K. Jain, T. John Kim