INTELLIGENT DECISION SUPPORT SYSTEMS AND SYSTEMS

1. GENERAL

SCHOOL	ENGINEERING		
SECTION	INFORMATICS AND COMPUTER ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE		**SEMESTER OF STUDY**	8th
COURSE TITLE	INTELLIGENT DECISION SUPPORT SYSTEMS AND SYSTEMS		

INDEPENDENT TEACHING ACTIVITIES *in case the credits are awarded in distinct parts of the course e.g. Lectures, Laboratory Exercises, etc. If the credits are awarded uniformly for the entire course, indicate the weekly teaching hours and the total number of credits*	**WEEKLY HOURS TEACHING**	**CREDIT UNITS**
Lectures	2	
Exercises Acts	1	
Laboratory Exercises	1	
Add rows if needed. The organization of teaching and the teaching methods used are described In detail at 4.	**4**	**5**

COURSE TYPE *Background, General Knowledge, Scientific Area, Development Skill*	Scientific Area, Skills Development
PREREQUISITES COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATION:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
ONLINE COURSE PAGE (URL)	

2. LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course are described, the specific knowledge, skills and abilities of an appropriate level that students will acquire after the successful completion of the course.

Consult Appendix A

- *Description of the Level of Learning Outcomes for each course of study according to the European Higher Education Area Qualifications Framework*
- *Descriptors of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B*
- *Summary Guide for writing Learning Outcomes*

The aim of the course is to introduce students to the basic concepts and methods of developing intelligent systems, knowledge-based systems and decision support systems. Course objectives :

- To understand the structure and basic characteristics of the different categories of intelligent systems.
- The analysis and design of intelligent systems as a whole or the development of individual intelligent mechanisms using appropriate methodologies
- The development of capabilities for the implementation, application, synthesis and adaptation of the learned technical intelligent systems and decision-making systems in solving real problems.

General Skills

Taking into account the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and listed below) which of them is the subject aimed at?

Search, analysis and synthesis of data and information, using the necessary technologies	*Project planning and management*
Adapting to new situations Decision making	*Respect for diversity and multiculturalism Respect for the natural environment*
Autonomous work	*Demonstrate social, professional and ethical responsibility and sensitivity to gender issues Criticism and self-criticism*
Teamwork	*Promotion of free, creative and inductive thinking*
Working in an international environment Working in an interdisciplinary environment	
Generating new research ideas	

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adapting to new situations
- Decision-making
- Autonomous work
- Work in an interdisciplinary environment
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Import. Data, information, knowledge, wisdom. Information and decision-making.

Knowledge based systems. Acquisition of knowledge. Representation and codification of knowledge (rules, frameworks and cases, representation of uncertainty). Ontologies. Knowledge analysis, extraction
Conclusions.

Evolutionary algorithms. Types and models of evolutionary algorithms (genetic algorithms, evolutionary strategy, genetic programming). Elements, mechanisms, operators, use of evolutionary algorithms.

Intelligent agents. Characteristics and categories of agents. Multi-agent systems (architectures, communication). Swarm intelligence

Machine learning. Supervised, unsupervised and semi-supervised learning. Reinforcement learning. Deep learning.
Learning algorithms/models: Decision trees, random forests, neural networks, support vector machines.

Decision Support Systems (DSS). Decision theory, decision-making processes, DSS architectures, DSS communication systems, Structured decision modeling, simulation in DSS, Special information systems and DSS, Group decision systems, Data warehouses and direct analytical processing systems, OLAP systems, optical analytics, spatial DSS.

Applications of intelligent and decision support systems in various fields, such as: medicine, transport, industry

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td></td><td></td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES
Use of ICT in Teaching, Laboratory Education, Communication with students</td><td>Development platforms are used specialized software for the development of experienced systems and knowledge management (ontologies, rule bases, cases, etc.)</td></tr>
<tr><td></td><td>Support of the Learning process through the e-learning platform of the University.</td></tr>
<tr><td>TEACHING ORGANIZATION
The way and methods of teaching are described in detail.
Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliography Study & Analysis, Tutorial, Practice (placement), Clinical Practicum, Art Workshop, Interactive teaching, Educational visits, Project preparation, Writing of work / assignments, Artistic creation, etc.
The student's study hours for each learning activity as well as the hours of unguided study are listed so that the total workload at semester level corresponds to ECTS standards</td><td>
<table>
<tr><th>Activity Semester Workload</th><th>Units</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Practice exercises</td><td>13</td></tr>
<tr><td>Laboratory Exercises</td><td>13</td></tr>
<tr><td>Elaboration of papers</td><td>33</td></tr>
<tr><td>Independent Study</td><td>40</td></tr>
<tr><td>Course Total
(25 hours of load working per credit unit)</td><td>125</td></tr>
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<tr><td>STUDENT EVALUATION
Description of the evaluation process
Assessment Language, Assessment Methods, Formative or Inferential, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Report/Report, Oral Exam, Public Presentation, Laboratory Work, Clinical Patient Examination,
Artistic Performance, Other / Other

Explicitly defined assessment criteria are indicated and if and where they are accessible to students.</td><td>I. Written final exam (60%) including :
- Short answer questions
- Problem solving
- Short case study

II. Elaboration of laboratory exercises and work in the field of intelligent and decision support systems (40%)

The syllabus and the evaluation process are communicated to students in the lecture hall, in the laboratory and on the platform.
e-learning of the department.</td></tr>
</table>

5. RECOMMENDED-BIBLIOGRAPHY

- Suggested teaching aids:

1. N. Matsatsinis, Decision Support Systems, New Technologies Publications, 2010.

- Suggested Bibliography:

1. E. Turban, J. E. Aronson, T.-P. Liang, Decision Support Systems and Intelligent Systems (7th Edition) Prentice-Hall, Inc., NJ, USA 2004
2. Kendal S.L., Creen M., An Introduction to Knowledge Engineering, Springer, 2007.
3. Burstein F., HolsappleC.W., Handbook on Decision Support Systems: Basic Themes, Springer, 2008.
4. Zilli A., Corallo A., Ginluca E., Semantic Knowledge Management: An Ontology-based Framework, Idea Group Inc (IGI), 2008.
5. Gonzalez A., Dankel D., The Engineering of Knowledge-Based Systems: Theory and Practice, Prentice Hall, 1994.
6. Jackson P., Introduction to Expert Systems, 3rd ed., Addison-Wesley,1997.
7. Vlahavas, I., Kefalas, P., Vassiliadis, N., Refanidis, I., Kokkoras, F. & Sakellariou, H., Artificial Intelligence, 3rd edition, V. Gkiourdas Publishing, 2011.
8. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, 1st Edition, Pearson, 2008
9. L. Iliadis, A. Papaleonidas, Computational Intelligence and Intelligent Agents, Ed. Giola, 2016.
10. E. Turban, R. Sharda, D. Delen, Business Intelligence and Analytics: Systems for Decision Support, (10th Edition) Pearson 2014

- Related scientific journals:

1. IEEE Intelligent Systems, IEEE Computer Society
2. Expert Systems with Applications, Elsevier
3. Knowledge-based Systems, Elsevier
4. Decision Support Systems, Elsevier
   International Journal of Decision Support Systems, Inderscience Publishers