COURSE OUTLINE

(1) GENERAL

SCHOOLS	**ENGINEERING, NATURAL SCIENCES**		
ACADEMIC UNIT/UNITS	**COMPUTER ENGINEERING AND INFORMATICS DEPARTMENT, DEPARTMENT OF MATHEMATICS**		
TITLE OF MASTER'S DEGREE	*MSc in Data Driven Computing and Decision Making*		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	DDCD111	SEMESTER	Autumn
COURSE TITLE	Special Topics of Artificial Intelligence		

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	2	
Recitation sections	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	Total	7.5

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Specialised general knowledge, skills development
PREREQUISITE COURSES:	Undergraduate course in Artificial Intelligence
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Instruction may be given in English if foreign students attend the course.
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.upatras.gr/courses/CEID1178/

(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*

- After the successful completion of the course, the student:
- Will be able to represent knowledge in first-order logic language without or with use of equality and make proofs.
- Will be able to apply capabilities offered by theorem provers in theoretical and practical problems.
- Will be able to represent knowledge in description logics and make reasonings.
- Will be able to design and implement an ontology and conduct the necessary reasonings with it.
- Will be able to interpret and extract from an OWL program corresponding ontology.
- Will be able to compare and apply machine learning algorithms to data sets related to classification problems, using machine learning tools.
- Will be able to select and apply deep learning architectures to data sets related to classification problems.

In general, the student will have obtained advanced skills for the design and implementation of

reasoning and decision making systems.

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…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Decision-making

Working independently

Production of new research ideas

Production of free, creative and inductive thinking

(3) SYLLABUS

Knowledge Representation and Reasoning with First-Order Logic without or with use of Equality. Strategies for Reasoning Control. Theorem Provers. Description Logics. DL Reasoners. Ontologies and Semantic Web. Ontology Engineering. Ontology Language OWL. Machine Learning-Classification Algorithms. Ensemble Classifiers. Deep Learning.

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

Use of ICT in teaching (lectures in electronic form, Internet sources, use of software tools for training etc.) and in communication with students (mailing list, course web site).

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

Activity	*Semester workload*
Lectures	26
Recitation sections	13
Use of tools	39
Projects implementation	110
Course total	***188***

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.

Three projects, one in theorem provers, one in ontologies and one in machine learning.

First project is experimental, the second is of development type (design and implementation) and the third is experimental.

Projects will be presented in the class and will be assessed. The final mark will be produced by a combination of the marks of the three projects.

Language of evaluation: Greek (English if needed, e.g., Erasmus+ students)

(4) ATTACHED BIBLIOGRAPHY

Suggested bibliography:

- John Harrison. Handbook of Practical Logic and Automated Reasoning. Cambridge University Press, 2009.
- Steffen Staab and Rudi Studer (Editors). Handbook on Ontologies. Springer, 2004
- John Domingue, Dieter Fensel and James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.
- Francois Chollet. Deep Learning with Python. Maning 2018.

Internet resources will be also given for each thematic section.