

COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
DEPARTMENT	Electrical and Computer Engineering		
LEVEL OF STUDY	Undergraduate		
COURSE UNIT CODE	9.025	SEMESTER OF STUDY	9o
COURSE TITLE	Knowledge Systems		
COURSEWORK BREAKDOWN		TEACHING WEEKLY HOURS	ECTS Credits
Lectures and Exercises		5	4
COURSE UNIT TYPE	Special Background		
PREREQUISITES	None		
LANGUAGE OF INSTRUCTION/EXAMS	Greek		
COURSE DELIVERED TO ERASMUS STUDENTS	No		
WEB PAGE (URL)	https://eclass.hmu.gr/courses/TP315/		

(2) LEARNING OUTCOMES

Learning Outcomes

Upon successful completion of the course the student will acquire the following scientific knowledge, skills and abilities of the appropriate level.

- Familiarity with the role of knowledge engineering in Artificial Intelligence.
- Understanding the different phases of development of a knowledge system.
- Understanding the concepts of Semantic Web and Ontologies.
- Practice in developing knowledge systems for the World Wide Web using Semantic Web and Ontologies.
- Ability to extract knowledge from an expert and formalizing it.
- Ability to design and implement a knowledge system. Ability to develop knowledge systems on the World Wide Web.
- Ability to compare and to contrast knowledge systems implemented with different methodologies.
- Ability to design and implement knowledge systems with the technology of Semantic Web and Ontologies.
- Ability to compare and to contrast technologies of the Semantic Web.
- Construct Ontologies and Reasoning systems in tools of the semantic web (e.g. Protégé).

General Skills

The course aims to acquire, by the graduate, the following general skills:

- Search, analysis and synthesis of data and information, using the necessary technologies.
- Adaptation to new situations.
- Autonomous work.
- Teamwork.
- Work in an interdisciplinary environment.
- Production of new research ideas.
- Promoting free, creative and inductive thinking.
- Application of knowledge in practice.

(3) SYLLABUS

- Systems that represent, organize and utilize knowledge: Knowledge representation (rules, semantic networks) and Reasoning. Knowledge Representation and Reasoning with Uncertainty. The Rete algorithm. Architecture of Knowledge systems. Extraction of knowledge. Decision support systems on the web. Design and implementation of knowledge systems with languages such as Prolog, Python, Java, etc., or with open source shells such as Pyke, Clip, etc.
- Introduction to Semantic Web Technology by structuring Web documents with XML. Describing Web resources with RDF. Descriptive Logic. Ontology Web Language, Logic and Reasoning: Rules on the Web. Intelligence and knowledge systems in the semantic web. Web Intelligence techniques. Ontology Engineering. Development of knowledge systems on the web in languages and tools that support knowledge representation and reasoning in the semantic web such as Prolog, Protégé, Pellet.

(4) TEACHING METHODS - ASSESSMENT

MODE OF DELIVERY	In-Class Face-to-Face	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	Use of ICT in lectures. Use of ICT in labs. Use of ICT in communicating with students through the electronic platform e-class.	
TEACHING ORGANISATION	Method description / Activity	Semester Workload
	Lectures	52
	Lab	13
	Independent study	55
	Total Contact Hours	120
ASSESSMENT METHODS	Language of Assessment: Greek Evaluation methods: 1. Written final exam (70%). • Problem solving. 2. Mid-term exam 30%. 3. Written examination with questions requiring extended answers. 4. Evaluation of written laboratory exercises. 5. Written teamwork. 6. Written individual assignments. 7. Laboratory assignments.	

(5) RECOMMENDED BIBLIOGRAPHY

<p><i>In Greek</i></p> <ol style="list-style-type: none"> 1. G. Antoniou and F. van Harmelen, <i>Introduction to Semantic Web</i>, Kleidarithmos Publications,, 2009, ISBN: 978-960-461-234-5. 2. G. Stamou, <i>Representation of Ontological Knowledge and Reasoning</i>, <i>Greek Academic Textbooks and Aids</i>, www.kallipos.gr, Hellenic Academic Libraries Association, 2015, ISBN: 978-960-603-157-1. 3. I. Vlahavas, P. Kefalas, N. Vasiliadis, F. Kokkoras, , H. Sakellariou, <i>Artificial Intelligence, D Edition</i>, 2020, University of Macedonia Publications, ISBN 978-618-5196-44-8. 4. M. Marakakis, <i>Prolog: Programming in Logic for Artificial Intelligence</i>, <i>New Technologies Publications</i>, 2nd edition, 2019, ISBN: 978-960-578-055-5. <p><i>In English</i></p> <ol style="list-style-type: none"> 1. S.L. Kendal, M. Creen, <i>An Introduction to Knowledge Engineering</i>, Springer, 2007, ISBN 13: 978-1-84628-475-5. <p>- Related Scientific Journals:</p> <ol style="list-style-type: none"> 1. <i>Expert Systems with Applications</i>, Elsevier.
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2. *Knowledge-Based Systems, Elsevier.*
3. *Journal of Web Semantics, Elsevier.*
4. *Data and Knowledge Engineering, Elsevier.*
5. *The knowledge Engineering review, Cambridge University Press.*