COURSE OUTLINE

(1) GENERAL

SCHOOL	Science and Technology		
ACADEMIC UNIT	Science and Technology		
PROGRAMME OF STUDIES	MSc in Data Science, MSc in Information and Communication Technology (ICT) Systems, Cybersecurity		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	DSE01, ISE02, CE03	SEMESTER	2
COURSE TITLE	Knowledge Management in the Web		
COURSE TYPE *Elective, compulsory*	Elective		
INSTRUCTOR(S)	Prof. Nikolaos Bassiliades		

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
	3	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

TEACHING ACTIVITIES BREAKDOWN	WEEKLY HOURS
Theory	3

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*	Special background
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://elearn-ucips.ihu.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*

On completing the course, the student will acquire:

- **Knowledge**: Familiarization with principles and technologies for representing and reasoning about data, metadata, and knowledge in the Semantic Web, Familiarization with Ontology Engineering and Knowledge Graph deployment techniques, Training on XML editors/processors and RDF and Ontology editors, RDF databases (triplestores).
- **Skills:** Developing metadata vocabularies and ontologies, Representation of data, metadata, knowledge and ontologies using the following languages: XML, DTD, XSLT, XPATH, RDF, RDF Schema, SPARQL, OWL, SWRL and SPIN.

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
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
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
- Project planning and management
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

Introduction and General vision of the Semantic Web (SW). SW Architecture. Technologies and Languages of the SW. Modern examples of applications using the SW.

XML (Description, DTD, Namespaces, XPath, XML tools).

RDF (Description, Turtle/n-triples/XML syntax, RDF Schema, RDF/RDFS Semantics, Querying RDF/RDFS with SPARQL, Linked Open Data, RDF tools).

OWL (Introduction to ontologies and OWL, Description and syntax, OWL flavors, Examples, OWL in OWL, Future extensions, OWL tools). OWL2 Presentation.

Ontology Engineering (Ontology creation, Reusing ontologies, Semi - automatic methods).

SW Applications. Linked Open Data.

Logic and Inferencing (SWRL, OWL2 RL, RIF, RuleML, SPIN, SHACL rules). .

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Hybrid: Face to face and synchronous distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of ICT in Teaching** During the educational process, various Web and Semantic Web modeling tools are used, along with the material available at the e-learning platform (mostly Powerpoint slides) The hybrid teaching method involves synchronous learning with the support of the videoconferencing tool Zoom. Students are taught a variety of tools related to the course content and material.

Use of ICT in Communication with students

- The course material (slides, scientific articles, exercises, etc.) is posted on the course page at the e-learn platform (Moodle).
- Use of Moodle Forums announcements.
- Live video meetings via Zoom.
- Contact via email.

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, recitation, 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	30 hrs.
Projects	45 hrs.
Exams	3 hrs.
Non-Directed Study	72 hrs.
Course total	***150 hrs.***

COURSE MATERIAL ARRANGEMENT

Lectures

Introduction to Semantic Web	3 hours
XML, DTD, Xpath	4 hours
RDF, RDF Schema, SPARQL, Linked Open Data, TopBraid Composer	8 hours
OWL, OWL 2, Protege	6 hours
Ontology Engineering	2 hours
Rules, SWRL, OWL2 RL, SPIN	4 hours
Recapitulation, Exams training	3 hours

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

Language of Evaluation: English

Evaluation Procedure:

- Written Exams (50%). Methods of evaluation:
  - Open-ended questions
  - Problem solving
- Individual projects (50%):
  - Modelling exercises on 3 SW technologies and corresponding tools (XML/Altova XML Spy, RDF(S)-SPARQL/TopBraid Composer, OWL-SWRL/Protégé)
  - The students should achieve a passing grade to participate in the written exams.

The evaluation procedure is announced to the students during the first lecture and is also accessible at the e-learn platform throughout the entire semester.

STUDENT OBLIGATIONS

Compulsory attendance of lectures, labs, recitations, compulsory participation in midterms, exams, compulsory delivery of homework, projects, etc.

- Compulsory attendance of lectures
- Compulsory participation in the exams
- Compulsory delivery of project

(5) ATTACHED BIBLIOGRAPHY

- Suggested Textbooks

1. "A Semantic Web Primer", 2nd Edition, Grigoris Antoniou and Frank van Harmelen, MIT Press, 2008, ISBN 978-0-262-01242-3.
2. "A Semantic Web Primer", 3rd Edition, Grigoris Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra, MIT Press, 2012, ISBN 978-0-262-01828-9.

- *Additional Bibliography:*

1. S. Staab, R. Studer, eds., "Handbook on Ontologies", 2nd ed., Springer-Verlag, 2009.
2. A. Gomez-Perez, O. Corcho, M. Fernandez-Lopez, "Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web", Springer-Verlag, 2004.
3. Joe Fawcett, Danny Ayers, Liam R. E. Quin, “Beginning XML”, 5th Ed., Wrox, 2012.
4. D. Allemang & J. Hendler, Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, 2nd Ed, Morgan Kaufmann,2011.