

**Natural Language Processing and the Semantic Web  
COURSE OUTLINE**

**(1) GENERAL**

<b>SCHOOL</b>	ENGINEERING		
<b>ACADEMIC UNIT</b>	INFORMATICS AND COMPUTER ENGINEERING		
<b>LEVEL OF STUDIES</b>	UNDEGRADUATE		
<b>COURSE CODE</b>		<b>SEMESTER</b>	7
<b>COURSE TITLE</b>	Natural Language Processing and the Semantic Web		
<b>INDEPENDENT TEACHING ACTIVITIES</b> 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		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
	Lectures	3	
	Laboratory Exercises	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		4	5
<b>COURSE TYPE</b> general background, special background, specialised general knowledge, skills development	Specialised general knowledge, skills development		
<b>PREREQUISITE COURSES:</b>	No prerequisites. Preferred knowledge of Data bases II and Information Retrieval.		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes in English		
<b>COURSE WEBSITE (URL)</b>	eclass.uniwa.gr		

**(2) LEARNING OUTCOMES**

<p><b>Learning outcomes</b></p> <p>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</p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul> <p>The postgraduate students who complete successfully this course will gain a foundational understanding in Natural Language Processing methods and techniques. They will also:</p> <ul style="list-style-type: none"> <li>• Gain knowledge of the principles of Natural Language Processing, Computational Linguistics, the Semantic Web and Social Network Analysis</li> <li>• Get specialized skills in problem-solving that arise during the development of Information Extraction Systems required in research and innovation in order to contribute to the development of new knowledge and processes.</li> <li>• Be critical of cutting-edge knowledge issues in innovative fields such as Opinion Mining</li> <li>• Have the ability to manage complex Semantic Web environments and apply new strategic approaches to address unforeseen problems that arise during their management.</li> </ul>
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**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  
Working independently  
Team work  
Adapting to new situations  
Decision-making

**(3) SYLLABUS**

- Introduction in Computational Linguistics
- Natural Language Processing and Applications
- Information Extraction
- Natural Language Processing and the Semantic Web
- Automatic Ontology development
- Natural Language Processing and Social Networks
- Sentiment Analysis and Opinion Mining

**(4) TEACHING and LEARNING METHODS - EVALUATION**

<b>DELIVERY</b> Face-to-face, Distance learning, etc.	Face-to-face, implementations with appropriate software	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b>  Use of ICT in teaching, laboratory education, communication with students	Use of ICT in: <ul style="list-style-type: none"> <li>• Teaching</li> <li>• Laboratory education</li> <li>• Communication with students</li> </ul>	
<b>TEACHING METHODS</b> 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	<b>Activity</b>	<b>Semester workload</b>
	Lectures	39
	Laboratory practice	13
	Study and analysis of bibliography and Project	25
	Fieldwork	48
	Course total	<b>125</b>
<b>STUDENT PERFORMANCE EVALUATION</b> 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.	<p>I. Written final exam (60%*) which includes:</p> <ul style="list-style-type: none"> <li>- Short answer questions</li> <li>- Problem solving</li> <li>- Comparative evaluation of theory elements</li> </ul> <p>II. Lab project (20%)</p> <p>III. Team work presentation (20%)</p> <p>*The final exam can be replaced by a bibliography research project and its public presentation. The evaluation criteria are communicated to students during the lectures and posted on the course website (e-class)</p>	

**(5) ATTACHED BIBLIOGRAPHY**

- Suggested bibliography:

1. Bird Steven, Klein Ewan & Loper Edward (2009) *Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit*, O'Reilly Media, 2009, <http://www.nltk.org/book/>
2. Clark Alexander, Fox Chris, Lappin Shalom (eds) (2010) *The Handbook of Computational Linguistics and Natural Language Processing*, Wiley-Blackwell
3. Heath, Tom and Christian Bizer, Christian (2011) *Linked Data: Evolving the Web into a Global Data Space (1st edition)*. Synthesis Lectures on the Semantic Web: Theory and Technology, 1:1, 1-136. Morgan & Claypool.
4. Jurafsky, Daniel & Martin, James. (2008). *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition (2<sup>nd</sup> edition)*,

Prentice Hall.

5. Liu, Bing (2012). Sentiment Analysis and Opinion Mining, Synthesis Lectures on Human Language Technologies, Vol. 5, No. 1 , Pages 1-167, Morgan & Claypool
6. Maynard, Diane, Bontcheva Kalina, Augenstein Isabelle (2016). *Natural Language Processing for the Semantic Web*, Synthesis Lectures on the Semantic Web: Theory and Technology, December 2016, Vol. 6, No. 2 , Pages 1-194, Morgan & Claypool, (<https://doi.org/10.2200/S00741ED1V01Y201611WBE015>)
7. Πούλος Μ. (2015), Σημασιολογική Επεξεργασία της Πληροφορίας, Ελληνικά Ακαδημαϊκά Συγγράμματα και Βοηθήματα, <http://www.kallipos.gr>
8. Στεφανιδάκης, Μιχαήλ, Ανδρόνικος, Θεόδωρος, Παπαδάκης, Ιωάννης(2015). Ανοικτά συνδεδεμένα δεδομένα και εφαρμογές, Ακαδημαϊκά Συγγράμματα και Βοηθήματα, <http://www.kallipos.gr>
9. Wilks, Yorick and Brewster, Christopher (2009), *Natural Language Processing as a Foundation of the Semantic Web*, Foundations and Trends in Web Science, Vol. 1, Nos. 3–4, 199–327, Morgan & Claypool, <http://dx.doi.org/10.1561/1800000002> Professional, 2011

- Websites:

- [www.linkeddatatools.com](http://www.linkeddatatools.com)
- <https://nlp.stanford.edu/software/>
- <http://www.nltk.org>
- <https://web.stanford.edu/~jurafsky/slp3/>

- Related academic journals:

- [Computational Linguistics, MIT Press](#)
- [Corpora, Edinburgh University Press](#)
- [Information Processing and management, Elsevier](#)
- [Journal of Web Semantics, Elsevier](#)
- [Natural Language Engineering, Cambridge University Press](#)
- [Semantic Web, IOS Press](#)