

COURSE OUTLINE

NATURAL LANGUAGE PROCESSING (NLP)

1. GENERAL

SCHOOL	CLASSICS AND HUMANITIES		
DEPARTMENT/UPS	HUMANITIES / DIGITAL APPLICATIONS IN ARTS AND CULTURE		
LEVEL OF STUDIES	UNDERGRADUATE – LEVEL 6		
COURSE CODE	XXXXX	SEMESTER	8 TH
COURSE TITLE	NATURAL LANGUAGE PROCESSING (NLP)		
TEACHING ACTIVITIES <i>If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.</i>		TEACHING HOURS PER WEEK	ECTS CREDITS
		3	5
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	SCIENTIFIC AREA		
PREREQUISITES:	NO		
TEACHING & EXAMINATION LANGUAGE:	GREEK		
COURSE OFFERED TO ERASMUS STUDENTS:	YES		
COURSE URL:	https://eclass.duth.gr/courses/XXXXXX/		

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

Upon successful completion of the course, participants will be able to:

- Apply basic knowledge of Python and use it for natural language processing, text processing, data analysis, and visualization.
- Utilize essential Python libraries, such as NLTK for text analysis, and packages like Gensim and Stanza for more complex machine learning tasks.
- Visualize data using tools such as Matplotlib, Networkx, Seaborn, and Bokeh.
- Use NLP tools to conduct research, developing critical thinking and reproducibility.
- Analyze text data to address research questions in the humanities.

General Skills

Name the desirable general skills upon successful completion of the module

<i>Search, analysis and synthesis of data and information, ICT Use</i>	<i>Project design and management</i>
<i>Adaptation to new situations</i>	<i>Equity and Inclusion</i>
<i>Decision making</i>	<i>Respect for the natural environment</i>
<i>Autonomous work</i>	<i>Sustainability</i>
<i>Teamwork</i>	<i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i>
<i>Working in an international environment</i>	<i>Critical thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>Promoting free, creative and inductive reasoning</i>
<i>Production of new research ideas</i>	

- Search, analysis and synthesis of data and information,
- ICT Use
- Adaptation to new situations
- Critical thinking
- Promoting free, creative and inductive reasoning
- Working in an interdisciplinary environment

- Project design and management

3. COURSE CONTENT

- 1. Introduction to NLP**
Week 1: Definition and significance of NLP, applications such as chatbots and translation systems, and basic challenges.
- 2. Basic Linguistic Elements**
Week 2: Linguistic levels and their role in NLP.
- 3. Text Preprocessing and Representation**
Week 3: Text preprocessing (tokenization, stop word removal) and tools like NLTK and spaCy.
Week 4: Text representation: Bag of Words and embeddings (Word2Vec, GloVe).
- 4. Language Models**
Week 5: Introduction to language models and n-gram models.
Week 6: Evaluation of language models: complexity and accuracy.
- 5. Syntactic Parsing**
Week 7: The importance of syntactic parsing and Part-of-Speech tagging.
Week 8: Use of tools for computational syntactic analysis.
- 6. NLP Applications**
Week 9: Sentiment analysis and basic classification models.
Week 10: Named Entity Recognition (NER) and how it works.
- 7. Introduction to Deep Learning for NLP**
Week 11: Basics of neural networks and applications in NLP.
Week 12: Advanced word representations and models like Word2Vec.
- 8. Current Trends**
Week 13: Machine translation, comparison with statistical translation, and introduction to models like BERT and GPT.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	<ul style="list-style-type: none"> • Classroom lectures • Workshops • Active learning (hands-on learning) – Experiential learning • Collaborative group learning 																
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	Use of ICT in teaching and communication with students <ul style="list-style-type: none"> • PPT presentations • Teaching material, announcements and communication through the eClass platform • Student study of supplementary material related to course content • Communication with students via email 																
TEACHING ORGANIZATION <i>The ways and methods of teaching are described in detail. Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.</i> <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity</i></th> <th style="text-align: center;"><i>Workload/semester</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">26</td> </tr> <tr> <td>Workshops</td> <td style="text-align: center;">13</td> </tr> <tr> <td>Essay</td> <td style="text-align: center;">30</td> </tr> <tr> <td>Weekly projects</td> <td style="text-align: center;">38</td> </tr> <tr> <td>Independent study</td> <td style="text-align: center;">40</td> </tr> <tr> <td>Written examination</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Total</td> <td style="text-align: center;">150</td> </tr> </tbody> </table>	<i>Activity</i>	<i>Workload/semester</i>	Lectures	26	Workshops	13	Essay	30	Weekly projects	38	Independent study	40	Written examination	3	Total	150
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Written examination	3																
Total	150																
STUDENT EVALUATION <i>Description of the evaluation process</i> <i>Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written</i>	Formative Weekly projects: 40% Essay (compulsory): 30%																

Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed

Final written examination: 30%

5. SUGGESTED BIBLIOGRAPHY

Briggs, J. (2022). *Natural language processing for semantic search*.

Clark, C., Fox, S., & Lappin, S. (2010). *The handbook of computational linguistics and natural language processing*. Blackwell Handbooks in Linguistics.

Jurafsky, D., & Martin, J. H. (2000). *Speech and language processing: An introduction to natural language processing, computational linguistics, and speech recognition*. Prentice-Hall.

Manning, C. D., & Schütze, H. (1999). *Foundations of statistical natural language processing*. MIT Press.

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	XXXXXXXXXX
Contact details:	XXXXXXXXXX
Supervisors: (1)	YES
Evaluation methods: (2)	Weekly projects: 40% Essay (compulsory): 30% Final written examination: 30%
Implementation Instructions: (3)	The written exams (both mid-term and final) will be conducted via the eClass platform on a date and time that will be announced in advance. Students will be informed of the exam duration and content well ahead of the scheduled exam. The assignment must be submitted through eClass by a specified deadline.

(1) Please write YES or NO

(2) Note down the evaluation methods used by the teacher, e.g.

➤ *written assignment* or/and exercises

➤ written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(3) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises**: the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods**: the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.