



Co-funded by the
Erasmus+ Programme
of the European Union



Natural Languages Processing

Course Introduction

Prof. Gheith Abandah

أ.د. غيث علي عبندة

Outline

- Basic Information
- Video: Natural Language Processing In 5 Minutes
- Textbook and References
- Course Objectives and Outcomes
- Course Outline
- Grading
- Policies
- Important Dates

Basic Information

- **Instructor:** Prof. Gheith Abandah
- **Email:** abandah@ju.edu.jo
- **Office:** CPE 406
- **Home page:** <http://www.abandah.com/gheith>
- **MS Team:** [Link](#)
- **Office hours:** Sun – Thu, 13:00 – 14:00

Natural Language Processing In 5 Minutes

- YouTube Video from Simplilearn

<https://youtu.be/CMrHM8a3hqw>

Textbook

1. H. Lane, C. Howard, and H. Hapke, Natural Language Processing in Action Understanding, analyzing, and generating text with Python, Manning, 2019.
2. Course web page at:
https://www.abandah.com/gheith/?page_id=3182

References

3. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow, 3rd Edition, O'Reilly Media, Oct 2022.
4. François Chollet, Deep Learning with Python, 2nd Edition, Manning Pub. Oct 2021.
5. Tunstall, Von Werra, and Wolf. Natural language processing with transformers. " O'Reilly Media, Inc.", 2022.
6. Cuquantum Technologies, Introduction to Natural Language Processing with Transformers, 2023.
7. Jurafsky and Martin. "Speech and Language Processing." 3rd Ed. Draft, 2024.

Course Objectives

1. Introduce students to the NLP applications and techniques.
2. Introduce students to the practical techniques used in developing NLP solutions.
3. Introduce students to the programming techniques and libraries used in NLP (Python, Scikit-Learn, NLTK, Gensim, and Keras).
4. Enable the students to gain practical skills in solving wide range of NLP problems using modern techniques.

Program Learning Outcomes (PLO)

1. Analyze and discuss the basic concepts, principles, techniques, and theories in AIR including artificial neural networks, machine learning, data science, industrial and service robots, and intelligent and autonomous robots.
2. Use critical thinking on concepts, principles, and practices related to AIR, and rigorously evaluate tools, techniques, and outcomes using structured arguments based on subject knowledge.
3. Apply the methods and techniques of AIR in the design, analysis, and deployment of AIR solutions and solving practical problems.

Program Learning Outcomes (PLO)

4. Show the ability to produce distinguished research work from problem inception to implementation, and write quantitative and qualitative reports, and deliver them orally and in writing.
5. Demonstrate life-long learning, independent self-learning, and continuous professional development skills, and apply new AIR knowledge.
6. Take responsibility, work effectively within a team, abide by professional ethics and societal values in performing tasks and work, and apply work ethics and professional honor codes.
7. Use practical research methodologies to analyze and investigate issues related to AIR.

Intended Learning Outcomes (ILO)

No	ILO	PLO
1	Demonstrate a sound understanding of the main techniques and algorithms in NLP.	1
2	Solve an NLP problem by developing an appropriate NLP system.	3
3	Communicate the development of an NLP system through a detailed technical report and a short presentation.	4
4	Use Python and its specialized libraries to develop programs for solving NLP problems.	3

Course Outline

Week	Topic	ILO	Resources
1	Introduction to NLP	1	1
2	Word tokenization	1, 2, 4	1
3	Math with words: TF-IDF vectors	1, 2, 4	1
4	Semantic analysis	1, 2, 4	1
6	Reasoning with word vectors	1, 2, 4	1
7	Convolutional neural networks in NLP	1, 2, 4	1, 3, 4
8	Recurrent neural networks in NLP	1, 2, 4	1, 3, 4

Course Outline

Week	Topic	ILO	Resources
9	Long short-term memory networks	1, 2, 4	1, 3, 4
10	Sequence-to-sequence models and attention	1, 2, 4	1
11	Transformers and BERT	1, 2, 4	5, 6
12	Named entity extraction and question answering	1, 2, 4	1
13	Dialog engines	1, 2, 4	1
14	Optimization, parallelization, and batch processing	1, 2, 4	1
15	Term Project Presentations	3, 4	3

Grading

Assessment tool	Mark	Topic(s)	Time
Homework assignments	10%	Programming aspects	W2-W14
Midterm exam	30%	Theoretical and practical aspects	W4, W8, W12
Term project report and presentation	20%	Practical and reporting aspects	W15
Final exam	40%	All material	W16
Total	100%		

Policies

- The course uses assignment-based and project-based learning methods.
- Attendance is required
- Makeup exams need acceptable absence cause
- Late penalty is 25%
- All submitted work must be yours. Cheating will not be tolerated
- Open-book exams
- Join the course Microsoft Team at: [Link](#)
- Check department announcements on the MS team of MSc in AIR ([Link](#))

Important Dates

Mon 26/2/2024	First Lecture
Mon 29/4/2024	Midterm Exam
Mon 6/5/2024	Term project proposal is due
Mon 20/5/2024	Term project report is due
Mon 27/5/2024	Last Lecture
Sun 2/6 – Thu 13/6/2024	Final Exam Period