Faculty: Information Technology	
Department: Computer Science	**Program: Master**
Academic year:	**Semester:**

Course Plan

First: Course Information

Course No.: 1501786	***Course Title: Natural Language Processing***	***Credit Hours: 3***	***Theoretical: 3***	***Practical: 0***
Prerequisite No. and Title:	***Section No.:***	***Lecture Time:***		
Level in JNQF	***9***			
Type Of Course:	☐ ***Obligatory University Requirement*** ☐ ***Elective University Requirement*** ☐ ***Obligatory Faculty Requirement*** ☐ ***Elective Faculty Requirement*** ☐ ***Obligatory Specialization Requirement*** ■ ***Elective Specialization Requirement*** ☐ ***Ancillary course***			
Type of Learning:	☐ ***Face-to-Face Learning*** ■ ***Blended Learning (2 Face-to-Face + 1 Asynchronous)*** ☐ ***Online Learning (2 Synchronous+ 1 Asynchronous)***			

Second: Instructor's Information

Course Coordinator:			
Name:	***Academic Rank:***		
Office Number:	***Extension Number:***	***Email:***	
Course Instructor:			
Name:	***Academic Rank:***		
Office Number:	***Extension Number:***	***Email:***	
Office Hours:	***Sunday Monday Tuesday Wednesday Thursday***		

Third: Course Description

This course provides a comprehensive exploration of advanced Natural Language Processing (NLP) techniques, focusing on recent advancements and applications. Students will gain in-depth knowledge of Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), LangChain, and chatbot development. Through lectures, discussions, assignments, and a final project, students will develop the skills to apply these techniques to real-world NLP tasks.

Fourth: Course Objectives

- To understand and implement advanced techniques in Natural Language Processing.
- To explore state-of-the-art Language Model Fine-tuning methods.
- To analyze and implement Retrieval-Augmented Generation (RAG) models.
- To design and develop applications using Langchain technology.
- To build and deploy advanced chatbots using the latest methodologies.

Fifth: Learning Outcomes

Level descriptor according to (JNQF)	*CILOs Code*	*CILOs* If any CLO will not be assessed in the course, mark NA.	*Associated PILOs Code* *Choose one PILO for each CILO**	*Assessment method* *Choose at least two methods*
Knowledge	**K1**	**Relate** NLP principles to various real-world applications like machine translation and text summarization.	**PK1**	Mid-term Exam Final Exam
	K2	**Recall** the fundamental concepts and techniques of Natural Language Processing (NLP).	**PK1**	Mid-term Exam Final Exam
	K3	**Repeat** and explain the key characteristics of different NLP algorithms, including LLMs, RAG, and LangChain.	**PK2**	Mid-term Exam Final Exam
Skills	**S1**	**Apply** NLP techniques to solve practical problems in text analysis and generation	**PS1**	Mid-term Exam Final Exam
	S2	**Compare** and **analyze** the performance of different NLP models for a specific task.	**PS2**	Mid-term Exam Final Exam
	S3	**Construct** NLP pipelines using various tools and libraries.	**PS3**	Mid-term Exam Final Exam
	S4	**Employ** machine learning frameworks and tools for NLP tasks.	**PS3**	Mid-term Exam Final Exam
	S5	**Develop** a chatbot utilizing dialogue management and natural language understanding techniques.	**PS4**	Mid-term Exam Final Exam
Competencies	**C1**	**Collaborate** effectively in teams to design and implement NLP solutions.	**PC1**	Participation Assignments Group Presentation
	C2	**Exhibit leadership** in group projects by demonstrating critical thinking and problem-solving skills.	**PC2**	Participation Assignments Group Presentation

*CILOs: Course Intended Learning Outcomes; PILOs: Program Intended Learning Outcomes; For each CILO, the PILO could be the same or different.

Sixth: Learning Resources

Main Book:	Natural Language Processing with Transformers		
Author: Lewis Tunstall	***Issue No.:*** 1st ed	***Print:*** O'Reilly Media	***Publication Year:*** 2022
Additional Sources: Website:	• Machine Learning Techniques for Text: Apply modern techniques with Python for text processing, dimensionality reduction, classification, and evaluation • by Nikos Tsourakis (Author) Packt Publishing (October 31, 2022) Francois Chollet, Deep Learning with Python, Second Edition 2nd Edition		
Teaching Type:	■ ***Classroom*** □ ***Laboratory*** □ ***Workshop*** ■ **MS Teams** ■ **Moodle**		

Seventh: Course Structure

Week	Course Intended Teaching Outcomes (CILOs)	Topics	Teaching Procedures*	Teaching Methods**	References***
1	K1, K2, S1 S2	**Introduction** Introduction to NLP, POS, NER, Embedding	Face-to-Face	Lecture Preparation	---------
	K1, K2, S1 S2	Write a Summary	Asynchronous	Asynchronous	Chapter 1
2	K1, K2, K3, S2 S3	**LLM Architectures:** Transformer Architecture, Pre-training Techniques	Face-to-Face	Lecture Preparation	Chapter 2
	K1, K2, S2 S3	Write a Summary	Asynchronous	Asynchronous	Chapter 2
3	K1, K2, S3 S5	**LLM Applications:** Text Generation, Machine Translation, Question Answering	Face-to-Face	Lecturing with active participation	Chapter 2
	K1, K2, S3 S5	Quiz	Asynchronous	Asynchronous	Chapter 2
4	K1, K2, K3, S1 S2, S3	**Retrieval-Augmented Generation** (RAG)	Face-to-Face	Lecturing with active participation	Chapter 2

		Introduction to RAG, Combining Retrieval and Generation			
	K1, K2, K3, S1 S2, S3	Assignment	Asynchronous	Asynchronous	Chapter 2
5	K1, K2, K3, S3 S5	**Language Chain (LangChain)** Introduction to LangChain, Building NLP Pipelines	Face-to-Face	Lecturing with active participation	Chapter 2
	K1, K2, K3, S3 S5 C1	Create A model	Asynchronous	Asynchronous	Chapter 2
6	K1, K2, K3, S3,	**RAG Applications** RAG for Text Summarization, Dialogue Systems	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S3 S5	Assignment	Asynchronous	Asynchronous	Chapter 3
7	K1, K2, K3, S3, S4 S5	**RAG Applications** RAG for Text Summarization, Dialogue Systems	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S3, S4 S5 C1, C2	Quiz	Asynchronous	Asynchronous	Chapter 3
8	K1, K2, K3, S3,S4 S5	**Chatbots**: Design and Development Dialogue Management, Natural Language Understanding	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S3,S4 S5, C1, C2	Write a Summary	Asynchronous	Asynchronous	Chapter 3
Midterm Exams					
9	K1, K2, K3,S1, S2.	**Sentiment Analysis in Social Media** •Techniques for sentiment analysis in unstructured text •Handling domain-specific sentiment analysis challenges	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S1, S2.	Write a Summary	Asynchronous	Asynchronous	Chapter 3
10	K1, K2, K3, S3 S5	**Case *studies*** on sentiment analysis in social media and online reviews	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S3 S5	Assignment	Asynchronous	Asynchronous	Chapter 3

	C1, C2				
11	K1, K2, K3, S1 S2	**Knowledge Graphs** Building and utilizing knowledge graphs for NLP applications	Face-to-Face	Lecturing with active participation	Chapter 3
	K1, K2, K3, S1 S2, C1, C2	Create Chatbot 1	Asynchronous	Asynchronous	Chapter 3
12	K1, K2, K3, S3 S5	**NLP in Marketing and Customer Insights** Customer sentiment analysis for marketing strategies	Face-to-Face	Lecturing with active participation	Chapter 4
	K1, K2, K3, S3 S5	Create Chatbot 2	Asynchronous	Asynchronous	Chapter 4
13	K1, K2, K3, S1 S2	**NLP Applications** Text mining for brand monitoring and market trends Personalized marketing using NLP techniques	Face-to-Face	Lecturing with active participation	Chapter 4
	K1, K2, K3, S1 S2	Create Chatbot 3	Asynchronous	Asynchronous	Chapter 4
14	S3, S4 S5 C1, C2	Presentation	Face-to-Face	Lecturing with active participation	
	S3, S4 S5 C1, C2	Presentation	Asynchronous		
Final Exams					

*Teaching procedures: (Face-to-Face, synchronous, asynchronous). ** Teaching methods: (Lecture, video….).
*** Reference: (Pages of the book, recorded lecture, video….)

Eighth: Assessment Methods

Methods	Online Learning	Blended Learning	Face-To-Face Learning	Specific Course Output to be assessed. **If any CILO will not be assessed in the course, mark NA.									
				K1	K2	K3	S1	S2	S3	S4	S5	C1	C2
First Exam													
Second Exam													
Mid-term Exam			30	✓	✓	✓	✓	✓	✓	✓	✓		
Participation			10									✓	✓
Asynchronous Activities													
Quizzes													
Assignments			10									✓	✓
Group presentation			10									✓	✓
Final Exam			40	✓	✓	✓	✓	✓	✓	✓	✓		
Total out of 100			100										

Ninth: Course Policies

- All course policies are applied to all teaching patterns (online, blended, and face-to-face Learning) as follows:
  a. Punctuality.
  b. Participation and interaction.
  c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).

Approval	Name	Date	Signature
Head of Department			
Faculty Dean			