



Form: Course Syllabus	Form Number	
	Issue Number and Date	<u>2/3/24/2022/2963</u> <u>5/12/2022</u>
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	
	The Date of the Deans Council Approval Decision	
	Number of Pages	12

1.	Course title	Natural Language Processing
2.	Course number	1905380
3.	Credit hours	3
	Contact hours (theory, practical)	3
4.	Prerequisites/corequisites	Artificial Intelligence (1905320)
5.	Program title	Artificial Intelligence
6.	Program code	1905
7.	Awarding institution	The University of Jordan
8.	School	King Abdullah II School for Information Technology
9.	Department	Artificial Intelligence
10.	Course level	Undergraduate
11.	Year of study and semester (s)	2023/2024 (Fall)
12.	Other department (s) involved in teaching the course	None
13.	Main teaching language	English
14.	Delivery method	☒ Face to face learning ☐ Blended ☐ Fully online
15.	Online platforms(s)	☒ Moodle ☒ Microsoft Teams ☐ Skype ☐ Zoom ☐ Others.....
16.	Issuing/Revision Date	18 th February, 2024

**17. Course Coordinator:**

Name: Dr. Mohammad A. M. Abushariah

Contact hours: 9:30-10:30 Sun/Tue, or by arrangement (through Teams call)

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18. Other instructors:

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19. Course Description:

The course covers the topics of origins of Natural Language Processing (NLP); Language structure representation; The role of knowledge; Knowledge representation; Parsing techniques; Finite-state techniques; Recursive and augmented transition networks; Language ambiguity; Well-Formed constructs; Features and the lexicon; Language semantics; and Applications.

20. Course aims and outcomes:**A- Aims:**

The aim of the course is to introduce students to the concepts of Natural Language processing and its applications. It discusses the linguistic theories and computational techniques for machine translation, information retrieval, text summarization, reference resolution, question answering, parsing, sense disambiguation, morphological analysis, speech analysis and synthesis.

B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course, students will be able to:

ABET Students Outcomes (SOs):

SO (1): Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

SO (2): Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.



Descriptors	ILO No.	ABET Student Outcome (SO)	SO (1)	SO (2)
		Intended learning outcome (ILO)		
Knowledge	A1	Understand the basic concepts of Natural Language Processing (NLP).	X	
	A2	Recall the problems and solutions of NLP, and their relation to linguistics and statistics.	X	
	A3	Understand the NLP (Morphology, Syntax and Semantics), the language grammar, and context-free parsing techniques.	X	
	A4	Obtain the necessary knowledge and understanding of NLP applications including Information Retrieval Systems, Speech Recognition Systems, and Question Answering Systems.	X	
Skills	B1	Distinguish NLP techniques and apply them in various NL applications.	X	
	B2	Analyze a NL problem and develop tools to solve it.	X	
	B3	Analyze and search for language resources that can be used for developing NLP applications.	X	
	B4	Design a set of tools to support NLP systems		X
	B5	Develop NLP systems that provide suitable solutions for NL problems.		X
Competencies	C1	Work independently as well as part of a team to design a solution for a NL problem (IR system, IE system, QA system, Text summarization system).		X
	C2	Work effectively to implement a Java/Python program that implements the NL application under study.		X
	C3	Interact with other study teams to make use of different implementations and NLP tools.		X
	C4	Deliver and present the final group work in a demo to both technical and non-technical stakeholders by employing clear and concise documentation and presentation.		X



21. Topic Outline and Schedule:

Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
Week 1	1.1	Welcome and orientation (review syllabus, objectives, textbook, project and assignments, online material, and teaching methods) + Introduction to the course - Knowledge in speech and language processing; - Ambiguity; - Models and Algorithms; - Language, Thoughts, and Understanding; - The State of the Art; - Some brief history	A1, A2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Course Syllabus and Announcements on MOODLE Chapter 1- lecture notes (slides) (MOODLE)
	1.2							
	1.3							
Week 2	2.1							
	2.2							
Week 3	3.1	Regular expressions and Automata: - Regular expressions, - Finite-state Automata, Regular languages and FSAs	A2, B1, C1	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 2- lecture notes (slides) (MOODLE)
	3.2							
	3.3							
Week 4	4.1	Words and Transducers: - State Transducers; - FSTs for Morphological Parsing; - Transducers and Orthographic Rules;	A3, B2, B3, B4, C1, C2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 3- lecture notes (slides) (MOODLE)
	4.2							
	4.3							
Week 5	5.1							
	5.2							
	5.3							



Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		- The Combination of FST Lexicon and Rules; - Lexicon-Free FSTs: The Potter Stemmer; - Survey of English Morphology; - Finite-State Morphological Parsing; - Construction of a Finite-State Lexicon; - Word and Sentence Tokenization						
Week 6	6.1	N-Grams: - Counting Words in Corpora; - Simple (Unsmoothed) N-grams; - More on N-grams and their sensitivity to the training corpus; - Smoothing; - N-grams for Spelling and Pronunciation; - Context-Sensitive Spelling Error Correction; - N-grams for Pronunciation Modeling	A3, B2, B3, B4, C1, C2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 4-lecture notes (slides) (MOODLE)
	6.2							
	6.3							
Week 7	7.1							
	7.2							
	7.3							
Week 8	8.1	- Programming Introduction to Language Processing using	B3, B4, C1, C2	In class (face to face) lecture	Python, NLTK	Synchronous	In-lecture questions	In Lab exercises on Chapters 1-4
	8.2							
	8.3							



Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		Python and NLTK (Natural Language Processing)						
Mid Term Exam				Will be announced later			Mid-term exam	Chapters 1 - 4
Week 9	9.1	Word Classes and Part-of-Speech Tagging: – (Mostly) English Word Classes; – Tagsets for English; – Part of Speech Tagging; – Rule-based Part-of-speech Tagging; – Stochastic Part-of-speech Tagging; – A Motivating Example; The Actual Algorithm for HMM tagging	A3, B2, B3, B4, B5, C1, C2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 5-lecture notes (slides) (MOODLE)
	9.2							
	9.3							
Week 10	10.1							
	10.2							
	10.3							
Week 11	11.1			In class (face to face) lecture		Synchronous	In-lecture questions	Chapter 6-lecture notes
	11.2							



Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
	11.3	Context-Free Grammars for English: - Constituency; - Context-Free Rules and Trees; - Sentence-Level Constructions; - The Noun Phrase; - Before the Head Noun; - After the Noun; - Coordination; - Agreement; - The Verb Phrase and Subcategorization; - Auxiliaries; - Spoken Language Syntax; - Disfluencies; - Grammar Equivalence & Normal Form; - Finite State & Context-Free Grammars; - Grammars & Human Processing	A3, B1, C1					(slides) (MOODLE)
Week 12	12.1		A3, B1, B2, B4,	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 7- lecture notes (slides) (MOODLE)
	12.2							



Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
	12.3	Parsing with Context-Free Grammars: - Parsing as Search; - Top-Down Parsing; Bottom-Up Parsing; - Comparing Top-down and Bottom-up Parsing; The Earley Algorithm; Finite-State Parsing Methods .	B5, C1, C2					
Week 13	13.1	Representing Meaning: - Computational Desiderata for Representations; - Meaning Structure of Language; - First Order Predicate Calculus; - Some Linguistically	A3, A4, B1, B2, B4, B5, C1, C2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 8-lecture notes (slides) (MOODLE)
	13.2							
	13.3							
	14.1							
	14.2							
Week 14	14.3							



Week	Lecture	Topic	ILO	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
		Relevant Concepts; – Related Representational Approaches; – Lexical Semantics: – Relations Among Lexemes and Their Senses; – WordNet: A Database of Lexical Relations; – The Internal Structure of Words; – Creativity and the Lexicon						
Week 15	15.1	Information Retrieval, Automatic Speech Recognition, and Question Answering systems	A4, B5, C1, C2	In class (face to face) lecture	Moodle	Synchronous	In-lecture questions	Chapter 9- lecture notes (slides) (MOODLE)
	15.2							
	15.3							
Week 16	16.1	Projects Presentations	C3, C4	In office	-	-	-	-
	16.2							
	16.3							
Week 17	Final Exam							



22. Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SOs	Period (Week)	Platform
Midterm exam	30	Chapters 1-4	1, 2	Week 8	-
Quiz	5	Specific Topics	1	Week 15	juexams
Project	15	All topics	1, 2	Weeks 2-15	elearning
Final exam	50	All topics	1, 2	Week 15-16	-

23. Course Requirements

Student should have:

- Hardware:
 - Computer
 - Internet connection
 - Microphone & speakers
- Software
 - Moodle account
 - MS Teams account

24. Course Policies:

A- Attendance policies:

Maximum allowable absence 15% of number of Lectures/Semester

Attending online meetings is mandatory. Attendance will be taken for each meeting. Regular attendance is essential for satisfactory completion of this course and university regulations will be applied.

B- Absences from exams and submitting assignments on time:

It is the student's responsibility to ensure that he/she is aware of all assignments, announcements and contents of missed sessions

Any student who misses any exam will receive a zero grade. Permission for makeup will be granted only if the student notifies the instructor in due time and presents evidence of an officially excused absence. Submitting the assignments will be through the Moodle platform, the time duration for each home assignment will be determined clearly. Late submissions are not allowed; any student exceed this time duration without submitted his/her assignment will take the zero as mark.

C- Health and safety procedures:



University Regulations

D- Honesty policy regarding cheating, plagiarism, misbehavior:

It is the student's responsibility to ensure that he/she is adhere with cheating, plagiarism, misbehavior.

Assignments are individual or done in learning teams. While students are free to discuss their individual assignments with anybody, including fellow students, individual assignments are expected to show the expertise, creativity and critical faculty of the individual student. Virtually identical individual assignments (in the judgment of the instructor) are not acceptable. Plagiarism is unacceptable and will be punished with an F for the full course. References to all source materials are necessary. For more details on University regulations please visit <http://www.ju.edu.jo/rules/index.htm>

E- Grading policy:

All of the following are important in the evaluation of a student's work.

Mid term exam 30%

Project and quiz: 20%

Final exam: 50%

- Satisfactory completion of this subject requires a 50% pass in the end-of-semester
- Suggested Grading Scale:

0-44	F	45-49	D-	50-54	D	55-59	D+	60-63	C-	64-68	C
69-72	C+	73-76	B-	77-80	B	81-84	B+	85-89	A-	90-100	A

The grading policy is subject to change at the end of the semester according to the overall performance of students.

F- Available university services that support achievement in the course:

elearning.ju.edu.jo

JUexams.com

<http://teams.office.com/>

LIBRARY <http://ezlibrary.ju.edu.jo/>

**References:**

A- Required book (s), assigned reading and audio-visuals:

[1] Dan Jurafsky and James H. Martin (2020) "Speech and Language Processing" 3rd edition

B- Recommended books, materials, and media:

[2] محمد زكي خضر، محمد السعودي، مجدي صوالحة، سامي عابينة، يوسف حمدان، مأمون خطاب (2019) "دليل أبحاث حوسبة اللغة العربية"، اللجنة الوطنية للنهوض باللغة العربية، مجمع اللغة العربية الأردني، الطبعة الأولى، عمان – الأردن.

[3] J. Pustejovsky, A. Stubbs (2012) "Natural Language Annotation for Machine Learning", First Edition, O'Reilly.

[4] Steven Bird, Ewan Klein, Edward Loper (2009) "Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit" 1st Edition, O'Reilly.

[5] other extra materials provided by instructors on e-learning system. <http://e-learning.ju.edu.jo>

26. Additional information:

- The instructor can make changes to this syllabus when necessary.

- University regulations will be preserved at all times

Name of Course Coordinator: Mohammad A. M. Abushariah Signature: 

Date: 18/2/2024

Head of Curriculum Committee/Department: -----Signature: -----

Head of Department: -----Signature: -----

Head of Curriculum Committee/Faculty: -----Signature: -----

Dean: -----Signature: -----