



Sultan Qaboos University
College of Science
Department of Computer Science
Bachelor of Science in Computer Science
Course Outline

I. Course Information

Course Code	COMP5606		
Course Title	Introduction to Natural Language Processing		
Oman Qualification Framework (OQF) Level: 8			
Credit Hours	3		
Contact Hours	4		
Pre-Requisites	COMP3600		
Co-Requisites			
Equivalent Courses: CSAI4103			
Incompatible Courses: -			
Course Category	<input type="checkbox"/> University Requirement	<input type="checkbox"/> University Elective	
	<input type="checkbox"/> College Requirement	<input type="checkbox"/> College Elective	
	<input type="checkbox"/> Department Requirement	<input type="checkbox"/> Department Elective	
	<input type="checkbox"/> Major Requirement	<input type="checkbox"/> Major Elective	
	<input checked="" type="checkbox"/> Specialization Requirement	<input type="checkbox"/> Specialization Elective	
	<input type="checkbox"/> Other (specify):		
Course Owner	College: Science	Department: Computer Science	
	Center:	Unit:	
Delivery Mode	<input checked="" type="checkbox"/> Face to Face	<input type="checkbox"/> Blended	<input type="checkbox"/> Online
Course Type	<input type="checkbox"/> Lecture	<input checked="" type="checkbox"/> Lecture/Lab	
	<input type="checkbox"/> Lecture/Seminar	<input type="checkbox"/> Lecture/Studio	
	<input type="checkbox"/> Lecture/Tutorial	<input type="checkbox"/> Lecture/Lab/Tutorial or Seminar	
	<input type="checkbox"/> Tutorial	<input type="checkbox"/> Laboratory (Practical)	
	<input type="checkbox"/> Field or Work Placement	<input type="checkbox"/> Studio	
	<input type="checkbox"/> Seminar	<input type="checkbox"/> Internship	
	<input type="checkbox"/> Workshop	<input type="checkbox"/> Project	
	<input type="checkbox"/> Thesis	<input type="checkbox"/> Other (specify):	
Language of Instruction	English		

Course Description	This course is an introduction to the field of Natural Language Processing (NLP). Students will learn (NLP) basics with an emphasis on practical NLP such as how to identify and separate words, how to extract topics in a text, and how to build their own fake news classifier. They also learn how to use basic libraries such as nltk, alongside libraries, which utilize learning to solve common NLP problems. This course will give students the foundation to process and parse text using a generic programming language such as Python together with an open source library such as the Natural Language Toolkit.		
Teaching And Learning Strategies	<input type="checkbox"/> Augmented Reality	<input type="checkbox"/> Flipped Classroom	
	<input type="checkbox"/> Blended Learning	<input checked="" type="checkbox"/> Problem-Based Learning	
	<input type="checkbox"/> Discovery-Based Learning	<input checked="" type="checkbox"/> Project-Based Learning	
	<input type="checkbox"/> Student-Led Learning	<input checked="" type="checkbox"/> Team-Based Learning	
	<input type="checkbox"/> Work-Based Learning	<input type="checkbox"/> Other (specify):	
Assessment Component And Weight	<input checked="" type="checkbox"/> In-term examination(s) (20 %)	<input type="checkbox"/> Quizzes (%)	<input type="checkbox"/> Other
	<input checked="" type="checkbox"/> Homework assignments (15%)	<input checked="" type="checkbox"/> Project (15%)	
	<input checked="" type="checkbox"/> Final examination (40 %)	<input checked="" type="checkbox"/> Practical/ Lab (10%)	
Textbooks And Educational Material	Jurafsky, Daniel, and James H. Martin. "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition		
Grading Method	<input checked="" type="checkbox"/> A-F Scale	<input type="checkbox"/> Pass/Not Pass	<input type="checkbox"/> Other (specify):
Grading Method Description			
A-F Grading Scale:	Range	Letter Grade	Description
	90 – 100	A	Exceptional performance: All course objectives achieved and met in a consistently outstanding manner.
	86 – 89.9	A-	
	81– 85.9	B+	Very Good Performance: The majority of the course objectives achieved (majority being at least two-thirds) and met in a consistently thorough manner.
	77 – 80.9	B	
	73 – 76.9	B-	
	68 – 72.9	C+	Satisfactory Performance: At least most of course objectives have been achieved and met satisfactorily.
	64 – 67.9	C	
	60 – 63.9	C-	
	55 – 59.9	D+	Minimally Acceptable Performance: The course objectives met at a minimally acceptable level.
	50 – 54.9	D	
0 – 49.9	F	Unacceptable performance: The course objectives not met at a minimally acceptable level.	
pass/not Pass:			
Other:			

II. Semester Information			
Semester/Year	Fall / 2024	Section(s)	10
Day and Time	Sun, Tues 2:15 – 4:05PM	Venue(s)	
Course Coordinator	Abdulrahman AAlAbdulsalam	Course Team	
Coordinator Office	0086	Office Hours	Sunday, Tuesday: 11-12
Coordinator Extension	2246	Coordinator Email	a.aalabdulsalam@squ.edu.om

III. Alignment of Course Learning Outcomes (CLO), Program Learning Outcomes (PLO), Graduate Attributes (GA), and Oman Qualification Framework (OQF) Characteristics			
CLO	PLO / SO	SQU Graduate Attributes	OQF Characteristics
1. Describe the concepts and algorithms in natural language processing, including tokenization, parts of speech tagging, and parsing.	1	A, B	1,2
2. Demonstrate an understanding of the main NLP techniques and algorithms such as language modeling and probabilistic modeling.	1	A, B	1,2
3. Demonstrate the ability to apply machine learning algorithms using open-source libraries to solve various NLP problems.	1, 2,6	A, B, F	1,2,6
4. Evaluate the performance and assess limitations of various NLP models and techniques, and suggest improvements based on empirical evidence.	1,2	A, B	1,2
5. Utilize NLP tools to develop applications such as sentiment analysis and named entity recognition.	2, 6	B, F	2, 6
6. Examine advanced NLP applications, including chatbots, translation systems, and automated summarization, to understand the underlying technologies and their practical implications.	1,2	A, B	1,2
7. Communicate effectively the processes and results of NLP tasks.	3	C	3

IV. Course Learning Outcomes (CLOs) and Assessment Criteria and Methods (for each CLO)		
CLO1: Describe the concepts and algorithms in natural language processing, including tokenization, parts of speech tagging, and parsing.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods
A)	Define and explain key NLP concepts such as tokenization, tagging and parsing.	Homework assignment, midterm, final
B)	Describe algorithms for language tasks such as tagging and parsing.	
C)	Utilize tagging and parsing methods to analyze sentence structures.	
CLO2: Understand and apply key NLP techniques such as Language modeling and probabilistic modeling.		
Assessment Criteria (to achieve this objective, the student must)		Homework assignment, midterm, Project, final
A)	Understand and Apply language modeling techniques to textual data.	
B)	Understand and Apply probabilistic modeling algorithms to solve linguistic problems.	
CLO3: Demonstrate the ability to apply machine learning algorithms using open-source libraries to solve various NLP problems.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods
A)	Understand how machine learning algorithms are utilized for NLP problems.	Homework assignment, midterm, Project, final
B)	Use and adapt open-source libraries to create NLP machine learning models.	
C)	refine machine learning models to improve performance	
CLO4: Evaluate the performance and Assess limitations of various NLP models and techniques, and suggest improvements based on empirical evidence.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods

A)	Explain and utilize important metrics used for evaluating performance in NLP tasks	Homework assignment, midterm, Project, final
B)	Develop hypotheses on potential improvements for NLP models based on observed performance	
C)	Identify and describe specific limitations in current NLP models, such as biases, under fitting and overfitting	
CLO5: Utilize NLP tools to develop basic applications such as sentiment analysis and named entity recognition.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods
A)	Apply preprocessing techniques to clean and prepare text data for basic NLP applications such as sentiment analysis and named entity recognition	Homework assignment, Project
B)	Apply NLP algorithms and tools to develop solutions to basic NLP applications.	
C)	Test NLP applications with real-world text data to assess their practical utility and reliability.	
CLO6: Examine advanced NLP applications, including chatbots, translation systems, and automated summarization, to understand the underlying technologies and their practical implications.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods
A)	learn about use of NLP techniques to perform advance applications	Homework assignment, midterm, final
B)	describe algorithms and tools for advanced NLP applications	
CLO7: Communicate effectively the processes and results of NLP tasks.		
Assessment Criteria (to achieve this objective, the student must)		Assessment Methods
A)	Prepare tables and graphs that explain NLP concepts, results and findings	Project
B)	present results of nlp experiments to audience of different technical backgrounds	
C)	demonstrate ability to respond to comments and gather feedback for future improvements	

V. Course Content and Schedule				
Week	Lectures #	Topics/ Subjects	Readings/ chapters	Remarks (e.g., assessments)
1		Course Overview; Introduction to NLP Language and Syntax Basics	(Ch. 1 from 2nd edition) (Ch. 2.2, 2.4.5, Ch. 8.1)	Midterm, HW1
2		Probabilities; Naive Bayes Classification	(Ch. 4.1-4.5)	Midterm, HW1
3		Machine Learning Basics; Evaluation	(Ch. 4.7-4.8)	Project, Midterm and Final, HW2
4		Logistic Regression; Classification Models	Ch. 5.1-5.2	Project, Midterm and Final , HW2
5		Morphology & Grammar Basics	Ch. 2.4.4	Project, Midterm and Final, HW3
6		Constituency Parsing Probabilistic Constituency Parsing	Ch. 12.1-12.3, Ch. 13.1 Ch. 13.2, 13.4-13.5	Project and Final, HW3
7		Dependency Parsing	Ch. 14.1-14.4	Project, Lab Test and Final, HW3
8		Language Models;	Ch 3.1-3.5	Project, Lab Test and Final
9		POS Tagging; Named Entity Recognition	Ch. 8.1-8.3	Project and Final, HW4
10		HMMs Viterbi Algorithm;	Ch. 8.3 Appendix A.1-A.2 Ch. 8.4	Project and Final, HW4
11		Vector Semantics Basics & Distributional Similarity	Ch. 6.1-6.3	Project and Final
12		Neural Network Basics	Ch. 7.1-7.3	Project and Final
13		NLP APPLICATIONS I: Chatbots and Dialogue systems	Ch. 15.1-15.3	Final
14		NLP APPLICATIONS II: Chatbots and Dialogue systems	Ch. 15.1-15.3	Project
15		Lecture: Review Project presentations		

VI. Additional Information (e.g., Rubrics, etc.)

Assessment Plan:

Project (20%), Homework Assignments (10%), Midterm (20%), lab test (10%) and Final (40%).

Assessment Component	Posted Date	Due Date	Weight
HW1	Week 2	Week 4	5%
Project - Progress		Week 10	5%
HW2	Week 5	Week 7	5%
Midterm	Week 8 - Sunday		20%
HW3	Week 9	Week 11	5%
Lab Test		Week 14	10%
Project – Part 2		Week 15	10%
Report, Code & Presentation			
Final			40%

VII. Students Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirements and student academic code of conduct.

Academic Integrity	The University expects the students to approach their academic endeavors with the highest academic integrity. Please refer to the Undergraduate Academic Regulations .
Add and Drop	Students who wish to drop or add the course should review the Undergraduate Academic Regulations .
Attendance	Sultan Qaboos University has a clear requirement for students to attend courses, detailed in the Undergraduate Academic Regulations .
Assessment and Grading	To ensure the provision of a sound and fair assessment and grading, please review the Undergraduate Academic Regulations .
Grade Appeal	Students who wish to appeal their grades should review the Undergraduate Academic Regulations .
Classroom Policies	Students are expected to dress professionally during class time as required by the University. Use of phones or any other electronic devices in the classroom during class time is strictly prohibited. Unauthorized use may lead to faculty member confiscation of the device for the remainder of the class. Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. A student responsible for disruptive behavior may be required to leave the class.
Late and Make-Up Work	Students are required to meet the course objectives by submitting coursework no later than the assigned due date. Students may be allowed to submit late work if approved by the course coordinator. Assignments submitted after the due date may be penalized.
Missed Evaluations	All quizzes, tests, clinical evaluations, and exams must be completed by the date they are assigned. If a quiz, test, or exam is missed due to a documented emergency situation (e.g., medical emergency, death in the immediate family), it is the student's responsibility to contact the instructor.
Other	

Course Outline Appendix

1. PROGRAM LEARNING OUTCOMES / STUDENT OUTCOMES

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the Artificial Intelligence discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing and Artificial Intelligence practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the Artificial Intelligence discipline.
6. Apply computer science theory, software development and Artificial Intelligence fundamentals to produce computing-based solutions.

2. SQU GRADUATE ATTRIBUTES AND COMPETENCIES FOR UNDERGRADUATE STUDIES

GRADUATE ATTRIBUTES	GRADUATE COMPETENCIES FOR UNDERGRADUATE STUDIES
A. Cognitive Capabilities: The graduate has sufficient general and specialized theoretical knowledge that enables him/her to deal well with his/her specialty and other related fields.	1. Demonstrates familiarity and works with advanced specialized knowledge in the area of specialization.
	2. Demonstrates a general understanding of the relationship of advanced specialized knowledge with knowledge in other relevant professional fields and aspects.
	3. Demonstrates a comprehensive understanding of the theories, principles, and methods used in his/her specialty, and how to create and apply new knowledge.
	4. Demonstrates general knowledge of the legal environment and necessary relevant regulatory frameworks.
	5. Shows awareness of contemporary literature and research.

B. Skill and Professional Capability: The graduate has sufficient skill and practical experience that enables him/her to perform all tasks related to the specialization and other related fields.	1. Applies concepts, theories, and investigative methods to synthesize and interpret information to evaluate conclusions.
	2. Applies appropriate research methods and techniques and employs digital knowledge
	3. Evaluates and critiques information independently
	4. Uses cognitive and technical skills to analyze complex issues and develop appropriate solutions.
	5. Initiates new ideas or processes in the professional, educational or research context.
C. Effective Communication: The graduate has the ability to communicate effectively with others to achieve the desired results	1. Explains, presents, and adapts information to suit the recipients.
	2. Employs appropriate information and communication technology to collect and analyze information.
D. Autonomy and Leadership: The graduate has the ability to lead, make decisions and take responsibility for decisions.	1. Performs advanced professional activities independently.
	2. Demonstrates leadership skills.
	3. Takes professional responsibility.
	4. Assumes full accountability for the tasks and their output.
E. Responsibility and Commitment: The graduate appreciates the importance of available resources and deals with them effectively and is committed to the ethics of the profession and society.	1. Manages time and other resources assigned to accomplishing tasks effectively and responsibly.
	2. Demonstrates effective practices when working in teams.
	3. Demonstrates advanced levels of understanding of values and ethics relevant to the specialization, profession and local and international society and

	promotes them among others.
	4. Works within the professional, institutional, and specialization guiding frameworks and strategic plans.
	5. Interacts with community affairs positively and preserves national identity.
F. Development and Innovation: The graduate has a passion for development and innovation in the field of specialization.	1. Demonstrates the ability to independently manage learning tasks, with an awareness of how to develop and apply new knowledge.
	2. Utilizes specialized knowledge and skills for entrepreneurship.
	3. Utilizes creative and innovative skills in the field of specialization.

3. OQF CHARACTERISTICS

1. Knowledge
2. Skills
3. Communication, Numeracy, and Information and Communication Technology Skills.
4. Autonomy and Responsibility
5. Employability and Values
6. Learning to learn