I. COURSE INFORMATION

COURSE CODE	COMP3600
COURSE TITLE	INTELLIGENT SYSTEMS
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**7**
CREDIT HOURS	3
CONTACT HOURS	4
PRE-REQUISITES	(COMP3203 AND LANC2058) OR (COMP3603 AND LANC2058)
CO-REQUISITES	
EQUIVALENT COURSES	
INCOMPATIBLE COURSES	

COURSE CATEGORY		
	☐ University Requirement	☐ University Elective
	☐ College Requirement	☐ College Elective
	☐ Department Requirement	☐ Department Elective
	☒ Major Requirement	☐ Major Elective
	☐ Specialization Requirement	☐ Specialization Elective
	☐ Other (specify):	

COURSE OWNER		
	College: Science	Department: Computer Science
	Center:	Unit:

DELIVERY MODE	☒ Face to Face	☐ Blended	☐ Online

COURSE TYPE		
	☐ Lecture	☒ Lecture/Lab
	☐ Lecture/Seminar	☐ Lecture/Studio
	☐ Lecture/Tutorial	☐ Lecture/Lab/Tutorial or Seminar
	☐ Tutorial	☐ Laboratory (Practical)
	☐ Field or Work Placement	☐ Studio
	☐ Seminar	☐ Internship
	☐ Workshop	☐ Project

	☐ Thesis	☐ Other (specify):
LANGUAGE OF INSTRUCTION	English	
COURSE DESCRIPTION	This course introduces students to basic principles, techniques and algorithms for implementing intelligent systems. It covers the key ideas and principles that drive the practice and advancement of Artificial Intelligence, namely, agents and environment, search, knowledge representation, reasoning and learning.	

TEACHING AND LEARNING STRATEGIES		
	☐ Augmented Reality	☐ Flipped Classroom
	☐ Blended Learning	☒ Problem-Based Learning
	☐ Discovery-Based Learning	☐ Project-Based Learning
	☐ Student-Led Learning	☐ Team-Based Learning
	☐ Work-Based Learning	☐ Other (specify):

ASSESSMENT COMPONENT AND WEIGHT			
	☒ In-term examination (20 %)	☒ Quizzes (5 %)	☐ Other (specify): (%)
	☒ Homework assignments (20%)	☐ Project (%)	
	☒ Final examination (40%)	☒ Practical/ Lab (15%)	

TEXTBOOKS AND EDUCATIONAL MATERIAL	"Artificial Intelligence: A Modern Approach": Russell, S. J., & Norvig, P. (2016). Artificial Intelligence: A Modern Approach (3rd ed.). Pearson. An e-copy is provided on Moodle

GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass	☐ 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)	One Section (01)
DAY AND TIME	MON, WED 10:00-12:00	VENUE(S)	Lec: Lab 18
COURSE COORDINATOR	Dr.Noushath Shaffi	COURSE TEAM	Instructor: Dr. Noushath Shaffi (10) TA: to be updated Dr.Mohamed Kherfi (20) TA: to be updated
COORDINATOR OFFICE	DCS 006	OFFICE HOURS	Thursday 11-12
COORDINATOR EXTENSION	2461	COORDINATOR EMAIL	n.shaffi@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	SQU Graduate Attributes	OQF Characteristics
1. Describe various application areas of artificial intelligence AI and their background.	1,2	A,B,C	1,3
2. Explain search strategies	1	A,B	1
3. Solve problems by applying a suitable search method	1,2,6	A,B	2
4. Recognize and apply different knowledge representation schemes	1	A,B	1,2
5. Use inference rules to represent simple knowledge and conduct inferences	1	A,B	1,2
6. Describe the key aspects of intelligent agents	1,2	A,C	1,3
7. Demonstrate an understanding of the role of machine learning in AI	1,2	A,B	1
8. Demonstrate an understanding of the basics of classification and optimization	1,2	A,B	1
9. Implement and evaluate genetic algorithms-based solution	1,2,6	A,B,F	1,2
10. Communicate a devised AI solution to a given problem	3	C	3

CLO1: DESCRIBE VARIOUS APPLICATION AREAS OF ARTIFICIAL INTELLIGENCE AI AND THEIR BACKGROUND.

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Identify AI techniques relevant for solving a problem	Quiz, assignment, test, labtest, final
B)	List a number of AI application domains	
C)	Recognize the wide range of AI applications	

CLO2: EXPLAIN SEARCH STRATEGIES

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Write pseudocode explaining a search strategy	Quiz, assignment, interim test, final
B)	Identify a search strategy given its pseudocode or output	
C)	Explain adversarial search strategies	

CLO3: SOLVE PROBLEMS BY APPLYING A SUITABLE SEARCH METHOD

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Identify the search strategies suitable for a given problem	Quiz, assignment, test, labtest, final
B)	Apply a search method to solve a given problem	
C)	Produce the desired solution based on the search method output	

CLO4: RECOGNIZE AND APPLY DIFFERENT KNOWLEDGE REPRESENTATION SCHEMES

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Recognize the role of knowledge representation in AI	Assignment, interim test, final
B)	Recognize different knowledge representation schemes	
C)	Apply different knowledge representation schemes	

CLO5: USE INFERENCE RULES TO REPRESENT SIMPLE KNOWLEDGE AND CONDUCT INFERENCES

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Demonstrate an understanding of the link between knowledge representation and inference	Assignment, interim test, labtest, final
B)	Apply propositional logic for knowledge inference	
C)	Apply first order logic for knowledge inference	

CLO6: DESCRIBE THE KEY ASPECTS OF INTELLIGENT AGENTS

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	List the main aspects of intelligence	Quiz, assignment, interim test, final
B)	Describe the different types of agents	
C)	Describe the key aspects of intelligent agents	

CLO7: UNDERSTAND THE ROLE OF MACHINE LEARNING IN AI

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS

A)	Demonstrate an understanding of the main difference between rule-based and data-driven computing paradigms	Assignment, interim test, labtest, final
B)	Demonstrate an understanding of the potential of machine learning for solving AI problems	
C)	Demonstrate an understanding of the role of machine learning in advancing AI	

CLO8: DEMONSTRATE AN UNDERSTANDING OF THE BASICS OF CLASSIFICATION AND OPTIMIZATION	

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate an understanding of the input and output in classification tasks	Assignment, interim test, labtest, final
B)	Demonstrate an understanding of at least one classification algorithm	
C)	Demonstrate an understanding of the basics of optimization	
D)	Demonstrate an understanding of the role of optimization in classification	

CLO9: IMPLEMENT AND EVALUATE GENETIC ALGORITHMS-BASED SOLUTION	

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate an understanding of the biological analogy used in genetic algorithms	Assignment, interim test, labtest, final
B)	Describe the fundamental genetic algorithm operations such as crossover and mutation.	
C)	Formulate a problem and implement a solution using a genetic algorithm	

CLO10: COMMUNICATE A DEVISED AI SOLUTION TO A GIVEN PROBLEM	

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Clearly describe the addressed problem	Assignment, interim test, labtest, final
B)	Explain the functionality of the proposed AI solution	
C)	Discuss the limitations of the proposed solution	

V. Course Content and Schedule				
WEEK	**LECTURES/ LAB #**	**TOPICS/ SUBJECTS**	**READING /CHAPTERS**	**REMARKS (e.g., ASSESSMENTS)**
1 Feb 2 – 6, 2025	1	Overview of the course: Introduction to AI	Ch1	Quiz, Test
2 Feb 9 – 13, 2025	2	Intelligent Agents & Environments	Ch2	Quiz, Test
3 Feb 16 – 20, 2025	3	Uninformed search: Breadth First Search, Depth First Search	Ch3, Handout	Quiz, HW, Test, Lab test Final
4 Feb 23 – 27, 2025	4	Uniform Cost Search Introduction to Informed Search - Greedy Best First Search – Introduction to PyGame Library	Ch3, Handout	Quiz, HW, Test, Lab test Final
5 Mar 2 – 6, 2025 (RAMADAN)	5	Informed Search: Greedy Best First Search, A* Search and optimality	Ch3	Quiz, HW, Test, Lab test Final
6 Mar 9 – 13, 2025 (RAMADAN)	6	Adversarial search Minimax, and Tic-Tac-Toe QUIZ	Ch5	HW, Test, Lab test Final
7 Mar 16 – 20, 2025 (RAMADAN)	7	Adversarial search – Continued Alpha-Beta Pruning MID TERM WEEK	Ch5	HW, Test, Lab test Final
8 Mar 23-27, 2025 (RAMADAN)	8	Performance Metrics	Handout	HW, Test, Lab Test, Final
9 Mar30-Apr 3,2025 (EID AL FITR)	9	Possibility of Missing Teaching Hours		
10 Apr 6-Apr10,2025	10	Bayes' Theorem and Bayesian Networks	Handout	HW, Test, Lab Test, Final
11 Apr 13-17, 2025	11	Knowledge Reasoning: Propositional Logic , First Order Logic	Ch6	HW, Test, Lab test Final
12 Apr 20-24, 2025	12	Introduction to Machine learning: Linear Regression	Handout	HW, Test, Lab test Final
13 -14 Apr 27-May7,2025	13-14	Classification: Logistic Regression and MLP LAB TEST	Tutorial, Handout	HW, Test, Lab test Final
15 May 10-14, 2025	15	Review		HW, Test, Lab test Final

VI. ADDITIONAL INFORMATION (e.g., RUBRICS, etc.)

ASSESSMENT PLAN (TENTATIVE, *subject to coverage and scheduling constraints*):

ITEM	WEEK OUT	WEEK DUE	WEIGHT
QUIZ	WEEK5		5%
MIDTERM	WEEK8		20%
LAB TEST	WEEK14		15%
HOMEWORK1	WEEK4	WEEK6	5%
HOMEWORK2	WEEK6	WEEK8	5%
HOMEWORK3	WEEK8	WEEK10	5%
HOMEWORK4	WEEK10	WEEK12	5%
FINAL EXAM	May 22, 2025 11AM-1PM		40%

Department's Late Submission Policy:

(a) 1-24 hours: 25% of the mark will be deducted.
(b) > 24 hours: Not accepted.

Department's Policy for Dealing with Cheating:

It is essential that each student solves all programming assignments, lab tests and exams individually unless instructed otherwise, e.g., for group projects. Copying, plagiarism, collusion, switching, and falsification are violations of the university academic regulations. Students involved in such acts will be severely penalized.
The department has adopted a firm policy on this issue. A zero mark will be assigned the first time a student is caught involved in copying and his/her name will be added to a watch list maintained by the Head of Department. Further repeated involvements in copying will cause the student to get an F grade in that course. This is in line with the university academic regulations.

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**

   SO1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

   SO2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

   SO3. Communicate effectively in a variety of professional contexts.

   SO4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

   SO5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

   SO6. Apply computer science theory and software development 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