	**SULTAN QABOOS UNIVERSITY** **COLLEGE OF SCIENCE** **DEPARTMENT OF COMPUTER SCIENCE** **BACHELOR OF SCIENCE IN ARTIFICIAL INTELLIGENCE** **COURSE OUTLINE**

I. COURSE INFORMATION			
COURSE CODE	COMP5101		
COURSE TITLE	Comparative Programming Languages		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**8**		
CREDIT HOURS	3		
CONTACT HOURS	4		
PRE-REQUISITES	COMP 3203 and COMP3501		
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	The main goal is to provide the students with the tools necessary for the critical evaluation of current programming languages. The course describes		

	major programming language constructs, discuss their design and implementation issues, for a variety of programming languages.		
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(s) (20%)	☒Quizzes (05 %)	☐Other (specify): (%)
	☐Homework assignments	☒Project (20 %)	
	☒Final examination (40%)	☒Practical/ Lab (15 %)	
TEXTBOOKS AND EDUCATIONAL MATERIAL	Textbook: Concepts of Programming Languages, by R. Sebesta, 8th Edition, Pearson, Addison Wesley, 2008. References: 1. 1- Programming Language Explorations, by R. Toal, R. Rivera, A. Schneider, and E. Choe, CRC Press, 2017. 2- Programming Languages: Principles and Paradigms, by A. Tucker and R. Noonan, cond Edition, 2007.		
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	Spring 2025	**SECTION(S)**	
DAY AND TIME	Lecture: Tuesday, @10:00 AM Lab: Thursday, 8:00 AM	**VENUE(S)** Lecture: E11 Lab: 0018	
COURSE COORDINATOR	Dr. Imran Khan	**COURSE TEAM**	
COORDINATOR OFFICE	0013	**OFFICE HOURS**	Sunday: 12:00 - 1:00
COORDINATOR EXTENSION	0002	**COORDINATOR EMAIL**	i.khan@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. Demonstrate the ability to identify the reasons of studying programming concepts, the criteria for evaluating programming languages, the major methods of implementing programming languages and major influences on language design.	**1**	A	**1**
2. Demonstrate the ability to identify the basic programming components of a new programming language.	**1**	**A**	**1**
3. Apply Backus-Naur Form (BNF) for describing language syntax.	**6**	**B, F**	**2, 6**
4. Apply finite automata to design and develop a syntaxical analyzer for a simple language	**1, 2, 6**	**A, B, F**	**1, 2, 6**
5. Analyze, discuss, and implement the basic programming concepts (names, scopes, binding, data types, expressions, control structures, subprograms, and exception handling) designed in languages.	**6**	**A, B**	**1, 2, 6**
6. Demonstrate the ability to communicate clearly and effectively ideas, concepts and intentions within the field of programming languages.	**3, 5**	**C**	**3**

IV. COURSE LEARNING OUTCOMES (CLOS) AND ASSESSMENT CRITERIA AND METHODS (FOR EACH CLO)

CLO1: Demonstrate the ability to identify the reasons of studying programming concepts, the criteria for evaluating programming languages, the major methods of implementing programming languages and major influences on language design.

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Demonstrate the ability to identify the reasons for studying programming concepts and the criteria	Midterm, Final Exam

	for evaluating programming languages.	
B)	Demonstrate the understanding of the major methods of implementing programming languages and the major influences on language design.	Midterm, Final Exam
CLO2: Demonstrate the ability to identify the basic programming components of a new programming language.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to identify the basic programming components of a new programming language.	Project
B)	Apply this knowledge to effectively understand and work with new programming languages.	
CLO3: Apply Backus-Naur Form (BNF) for describing language syntax.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Understand the principles of Backus-Naur Form (BNF) and its role in describing language syntax.	Project, Midterm, Final Exam
B)	Apply Backus-Naur Form (BNF) to define and describe the syntax of programming languages.	
CLO4: Apply finite automata to design and develop a syntaxical analyzer for a simple language.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Apply finite automata to design a syntaxical analyzer for a simple language.	Project, Midterm, Final Exam
B)	Develop a syntaxical analyzer for a simple language using finite automata.	
CLO5: Analyze, discuss, and implement the basic programming concepts (names, scopes, binding, data types, expressions, control structures, subprograms, and exception handling) designed in languages.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Analyze and discuss the basic programming concepts such as names, scopes, binding, data types, expressions, control structures, subprograms, and exception handling designed in languages.	Project, Midterm, Final Exam
B)	Implement the basic programming concepts including names, scopes, binding, data types, expressions, control structures, subprograms, and exception handling in various programming languages.	

CLO6: Demonstrate the ability to communicate clearly and effectively ideas, concepts and intentions within the field of programming languages.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to communicate clearly and effectively ideas and concepts within the field of programming languages.	Project
B)	Demonstrate the ability to communicate intentions effectively within the field of programming languages.	

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.

V. COURSE CONTENT AND SCHEDULE

WEEK	LEC. #	TOPICS/ SUBJECTS	READINGS/ CHAPTERS	REMARKS (e.g., ASSESSMENTS)
1	Lec 1	Introduction: Reasons for studying Concepts of Programming Languages and Language Evaluation Criteria.	Chp1	Quiz I, Midterm, Final
2	Lec 2	Introduction: Design, Implementation, Evaluation Issues	Chp1	Project, Quiz, Midterm, Final
3	Lec 1	Language Syntax and Semantics: Describing Syntax, Context-Free Grammars, Backus-Naur Form Grammars (BNF), Parse Trees, Grammar Derivations, Grammar Ambiguity, and Extended BNF.	Chp3	Project, Quiz, Midterm, Lab Test, Final
4	Lec 1	Lexical Analysis: Lexical Analysis, State Diagrams, Regular Expressions, Finite State Automata, and From Formal Design to Code.	Chp4	Project, Quiz, Midterm, Final
5	Lec 2	Syntax Analysis: Parsing Problem, Recursive-	Chp4	Project, Quiz,

		Descent Parsing, Bottom-Up Parsing, and LR Parsing		Midterm, Final, Lab Test
6	Lec 1	Names, Binding, Type Checking and Scopes: Names, Variables, Concept of Binding, Type Checking, Strong Typing, Type Compatibility, Scope, Life- time, and Referencing	Chp5	Project, Midterm, Final, Lab Test
7	Lec 1	Data Types: Basic Data Types, User-Defined Types, String Types, Array Types, Associative Arrays, Record Types, Union Types, Pointer and Reference Types	Chp6	Project, Midterm, Final, Lab Test
8	Lec 1	Expressions and Assignment Statements: Arithmetic Expressions, Traversing Parse Trees, Overloading Operators, Type Conversions, Relational and Boolean Expressions, and Assignment Statements.	Chp7	Project, Midterm, Final, Lab Test
9	Lec 1	Statement-level Control Structures: Selection Statements, Iterative Statements, Unconditional Branching	Chp8	Project, Midterm, Final, Lab Test
10	Lec 1	Subprograms: Fundamentals, Design Issues, Local References, Parameter Passing, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User-defined Overloaded Operators.	Chp9	Project, Final, Lab Test
11	Lec 1	Implementing Subprograms: Semantics of Calls and Returns, and Implementing Subprograms, Nested Subprograms, Blocks, and Dynamic Scoping.	Chp10	Project, Final, Lab Test
12	Lec 1	Object Oriented Programming Languages: Data Abstraction, Design Issues for Abstract Data Types, Object Oriented Programming, Design Issues for Object Oriented Programming, and Exception Handling.	Chp1, Chp2, Chp4	Project, Final, Lab Test
13	Lec 1	Functional Programming Languages: Mathematical Functions, Fundamentals of Functional Programming Languages, Examples of Functional Programming Languages	Chp15	Project, Final
14	Lec 1	Logical Programming Languages: Introduction to Predicate Calculus.	Chp16	Project, Final
15		Project Oral Presentation		Project

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

Assessment Plan:

Component	Date Out	Due Date	Weight
Project - Part 1	Week 3 - Sunday	Week 5 - Sunday	4%
Quiz	Week 6 – Thursday		5%
Project - Part 2	Week 5 - Sunday	Week 8 - Sunday	4%
Midterm	Week 9 – Tuesday		20%
Project - Part 3	Week 8 - Sunday	Week 10 - Sunday	4%
Project - Part 4	Week 10 – Sunday	Week 12 - Sunday	4%
Lab Test	Week 14		15%
Project - Part 5	Week 12 – Sunday	Week 15 - Sunday	4%
Project Presentation	Week 15		
Final Exam	-		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**
   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