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

I. COURSE INFORMATION			
COURSE CODE	COMP2102		
COURSE TITLE	Problem Solving and Programming		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	6		
CREDIT HOURS	4		
CONTACT HOURS	4		
PRE-REQUISITES	COMP2101		
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 emphasizes problem solving techniques and computer programming. The topics include problem solving using problem decomposition and modularity, composite data types, dynamic data structures, and recursion.	
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) (15 %)	☒ Lab Exercises (5 %)
	☒ Homework assignments (20 %)	☐Project (%)
	☒ Final examination (40 %)	☒ Practical/ Lab (15%)
		☐Other (specify): Quiz (5%)
TEXTBOOKS AND EDUCATIONAL MATERIAL		
GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass ☐ Other (specify):

GRADING METHOD DESCRIPTION			
A-F GRADING SCALE:	**Range**	**Letter Grade**	**Description**
	90 – 100	A	

	86 – 89.9	A-	**Exceptional performance:** All course objectives achieved and met in a consistently outstanding manner.
	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:	**Textbook(s) and Supplemental Material:** (CPH) Competitive Programming Handbook by Antti Laaksonen, 2018 (https://cses.fi/book/book.pdf)(P4E) Python for Everyone, 2nd Edition, by Cay Horstmann and Rance Necaise, Wiley, 2016.		

II. SEMESTER INFORMATION			
SEMESTER/YEAR	Spring 2025	**SECTION(S)**	10
DAY AND TIME	SUN - TUE	**VENUE(S)**	DCS Lab (18)
COURSE COORDINATOR	Dr.Noushath Shaffi	**COURSE TEAM**	-
COORDINATOR OFFICE	0006	**OFFICE HOURS**	**SUN, MON 10:00 – 11:00**
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 / SO**	**SQU Graduate Attributes**	**OQF Characteristics**
1. Analyze a small size problem and identify computing requirements of the solution	**1**	A,B	**1, 3**
2. Design modular programs for solving small and medium size problems.	**2**	**A,B**	**1**
3. Implement mathematically defined problems	**2**	**A,B**	**1**
4. Use Lists, Sets and dictionaries	**2**	**A,B**	**1**
5. Design and implement recursive functions.	**2**	**A,B**	**1**
6. Implement basic searching and sorting algorithms	**2**	**A,B**	**1**
7. Design and Implement Object-based Solutions to Simple Problems	**2**	**A,B**	**1**
8. Use current debugging tools when developing a program	**1**	**A,B,C,D**	**1,6**
9. Design a testing plan to assess correctness of a developed program	**1,2**	**A,B**	**1**

IV. Course Learning Outcomes (CLOs) and Assessment Criteria and Methods (for each CLO)		
CLO1: Analyze a small size problem and identify computing requirements of the solution		
Assessment Criteria (to achieve this objective, the student must)		**Assessment Methods**
A)	Develop algorithms, pseudocode	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)	Develop solution using Python.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
C)	Validate the input data and Design Testing Plan	Lab Exs, HWs, Lab Test,
CLO2: Design modular programs for solving small and medium size problems.		
Assessment Criteria (to achieve this objective, the student must)		**Assessment Methods**
A)	Develop Python functions to solve small size problems	Lab Exs, HWs, Lab Test, In-Term, or Final Exam

B)	Develop Recursive solution to solve problem.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
C)		
CLO3: Implement mathematically defined problems		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Solve problems that involves mathematical calculations	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)		
C)		
CLO4: Use Lists, Sets and dictionaries		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Solve problems that uses Lists	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)	Solve problems that uses sets	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
C)	Solve problems that uses Dictionary	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
CLO5: Design and implement recursive functions.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Solve problems using recursion in Python.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)	Trace the solution to recursive problem.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
C)		
CLO6: Implement basic searching and sorting algorithms		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Develop searching and sorting programs in Python.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)	Compare between different search and sort algorithms	Lab Exs, HWs, Lab Test, In-Term, or Final

		Exam
C)		
CLO7: Design and Implement Object-based Solutions to Simple Problems		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Develop programs using object-oriented techniques	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
B)	Treat data entities and their functions as objects.	Lab Exs, HWs, Lab Test, In-Term, or Final Exam
C)		
CLO8: Use current debugging tools when developing a program		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Understand the debugging tool.	Lab Exs, HWs, Lab Test
B)	Use the debugging tools to check the developed program.	Lab Exs, HWs, Lab Test
C)		
CLO9: Design a testing plan to assess correctness of a developed program		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Design a testing plan	Lab Exs, HWs, Lab Test
B)	Evaluate a computing-based solution against a given set of computing requirements.	Lab Exs, HWs, Lab Test
C)		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)		
B)		
C)		

V. COURSE CONTENT AND SCHEDULE				
WEEK	**LECTURES #**	**TOPICS/ SUBJECTS**	**READINGS/ CHAPTERS**	**REMARKS (e.g., ASSESSMENTS)**
1	Lecture 1 Lab Feb 2 – 6, 2025	Welcome and Course Description PROGRAM DESIGN AND DEVELOPMENT	Handout, chapter 1	Final
2	Lecture 2 Lab 1 Feb 9 – 13, 2025	FUNDAMENTAL ALGORITHMS OF PROBLEM SOLVING	chapter 1	HW1, midterm, lab test, final
3	Lecture 3 Lab 2 Feb 16 – 20, 2025	REVIEW OF FUNCTIONS AND RECURSION – I	Chapter 5	HW1, midterm, lab test, final
4	Lecture 4 Lab 3 Feb 23 – 27, 2025	RECURSION – II	Chapter 5	HW1, midterm, lab test, final
5	Lecture 5 Lab 4 Mar 2 – 6, 2025 (RAMADAN)	DATA CONTAINERS AND PROBLEM SOLVING – I [LISTS, SETS, TUPLE, DICTIONARY]	Chapter 6	HW2, midterm, lab test, final
6	Lecture 6 Lab 5 Mar 9 – 13, 2025 (RAMADAN)	DATA CONTAINERS AND PROBLEM SOLVING – II [LIST WITHIN LIST, DICTIONARY WITHIN DICTIONARY, ETC]	Chapter 6	HW2, midterm, lab test, final
7	Lecture 7 Lab 6 Mar 16 – 20, 2025 (RAMADAN)	SEARCH ALGORITHMS: LINEAR AND BINARY (RECURSION AND ITERATION) MID TERM	Chapter 7	HW2, midterm, lab test, final
8	Lecture 8 Lab 7 Mar 23-27, 2025 (RAMADAN)	**SORTING ALGORITHMS** (BUBBLE, INSERTION, SELECTION)	Chapter 11	HW3, lab test, final
9	Lecture 9 Lab 8 Mar 30-Apr 3, 2025	**ALGORITHMIC STRATEGY: GREEDY ALGORITHMS**	Chapter 12	HW3, lab

	(Eid Al – Fitr)	(EID AL FITR WEEK) – Possibility of Missing Teaching Hour		test, final
10	Lecture 10 Lab 9 Apr 6-10, 2025	**ALGORITHMIC STRATEGY: DIVIDE AND CONQUER** **[Quick Sort and Merge Sort]**	Chapter 11	HW3, lab test, final
11	Lecture 11 Lab 10 Apr 13-17, 2025	**ALGORITHMIC STRATEGY: DYNAMIC PROGRAMMING**	Chapter 9	HW4, lab test, final
12	Lecture 12 Lab 11 Apr 20-24, 2025	**MORE PROBLEM SOLVING BASED ON DIFFERENT ALGORITHMIC STRATEGIES**	Chapter 10	HW4, lab test, final
13	Lecture 13 Lab 12 Apr 27-May 1,2025	GRAPH BASED PROBLEM SOLVING: [DIJKSTRA, BELLMON FORD, KRUSKAL]	Handout	Final
14	Lecture 14 May 4-7, 2025	MORE PROBLEM SOLVING LAB EXAM	Handout	Final
15	May 10-14, 2025	Review		Final

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

Item	Posted On Moodle	Due Date	Marks
Assignment 1	**W3** 20-02-2025	**W5** *06-03-2025*	5%
Assignment 2	**W5** 06-03-2025	**W8** 27-03-2025	5%
Midterm	**W7** To be Determined	**NA**	15%
Assignment 3	**W8** 27-03-2025	**W10** 10-04-2025	5%
Quiz	**W10** To be Determined	**NA**	5%
Assignment 4	**W10** 10-04-2025	**W13** 01-05-2025	5%
Lab Test	**W14** To be Determined	**NA**	15%
Lab Exercises	**Weekly Submissions**	**Same day of the Lab**	5%
Final	NA	Exam Date: 27/05/2025 TUE 08:00 – 11:00 AM	40%

Department's Late Submission Policy:

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

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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 / Student Outcomes

SO1. Analyze a complex computing problem and to 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	1. Manages time and other resources assigned to accomplishing tasks effectively and responsibly.

available resources and deals with them effectively and is committed to the ethics of the profession and society.	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