SULTAN QABOOS UNIVERSITY

COLLEGE OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE OUTLINE

I. COURSE INFORMATION			
COURSE CODE	COMP5701		
COURSE TITLE	Web Services		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**8**		
CREDIT HOURS	3		
CONTACT HOURS	4		
PRE-REQUISITES	COMP3401 and COMP3700		
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 the concept of Web services as fundamental building blocks of the service-oriented computing (SOC). First, it introduces the concepts related to distributed applications such as client-server, RPC, proxy (client stub and servant skeleton). Then, it details the Web services stack and its underlying technology: XML, SOAP, WSDL, UDDI, and BPEL. Finally, it comes to Web services design and		

	development, Web services implementation and deployment with tools such as Axis, and Web services management within an IDE such as WebSphere.		
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 %)	☐ Quizzes (%)	☐Other (specify): (%)
	☒ Homework assignments (10%)	☒Project (20 %)	
	☒ Final examination (40%)	☒ Practical/ Lab (15%)	
TEXTBOOKS AND EDUCATIONAL MATERIAL	**Textbook** • Web services and Service-Oriented Architecture: principles and technology, 2nd Edition, Michael P. Papazoglou, Pearson, 2012. **Supplemental Materials:** • https://www.w3schools.com/xml/default.asp, https://www.w3schools.blog/jsp-tutorial • Handout, Hands-On and various other Web Sites (References will be provided to students in a timely manner)		
GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass	☐ Other (specify):

GRADING METHOD DESCRIPTION

	Range	Letter Grade	Description
A-F GRADING SCALE:	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 & TUE / 12:00-13:50	**Venue(s)**	SCI/0022
Course Coordinator	Dr. Yassine Al Jamoussi	**Course Team**	-
Coordinator Office	No. 11, CS Dept.	**Office Hours**	Mon 8:00-09:50
Coordinator Extension	2464	**Coordinator Email**	yessine@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**	Error! Reference source not found.	Error! Reference source not found.
1. Recognize the new kinds of capability that may be developed and deployed using loosely coupled services with published interfaces and dynamic composition.	**6**	A	**1,2**
2. Acquire hands-on experience with the full range of technologies that support service oriented approaches.	**2, 6**	**A**	**1,2**
3. Design and Implement a network based application modeled in terms of a SOA.	**2, 6**	**A**	**1,2**
4. Reflect on the differences between traditional client server, SOA, and Web service approaches to systems.	**6**	**A**	**1,2**
5. Justify the choice of development technics and technologies related to SOA.	**6**	**A**	**1,2**

IV. Course Learning Outcomes (CLOs) and Assessment Criteria and Methods (for each CLO)		
CLO1: Recognize the new kinds of capability that may be developed and deployed using loosely coupled services with published interfaces and dynamic composition.		
Assessment Criteria (to achieve this objective, the student must)		**Assessment Methods**
A)	Demonstrate a clear understanding of the principles and advantages of loosely coupled services in a software architecture	Midterm and/or Final
B)	Show knowledge of how published interfaces are designed and used to enable interoperability between services	Homework and/or Project and/or Final
C)	Application of web service composition	Project
CLO2: Acquire hands-on experience with the full range of technologies that support service oriented approaches.		
Assessment Criteria (to achieve this objective, the student must)		**Assessment Methods**
A)	Demonstrate proficiency in using key technologies such as XML,SOAP, REST, WSDL, and micros-services frameworks	Homework and/or Labtest and/or Final

B)	Successfully implement and integrate multiple services using service-oriented architecture (SOA) principles	Project
C)	Effectively utilize middleware and tools that support service-oriented approaches, such as message brokers, service registries, and API gateways	Project
CLO3: Design and Implement a network based application modeled in terms of a SOA.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to design a robust and scalable service-oriented architecture for a web-based application	Project and/or Final
B)	Successfully implement the designed services using appropriate technologies and ensures they interact correctly in a network-based environment	
C)	Test the network-based application to ensure all services function correctly, individually and as part of the integrated system	
CLO4: Reflect on the differences between traditional client server, SOA, and Web service approaches to systems.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to analyze and compare the key characteristics, benefits, and limitations of traditional client-server, SOA, and Web service approaches	Midterm, Project and or Final
B)	Show an understanding of the practical implications and real-world applications of each approach, including scenarios where each is most appropriate	
CLO5: Justify the choice of development technics and technologies related to SOA.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Provide a justification for the selection of specific development techniques and technologies in the context of SOA	Project and/or Final
B)	Evaluate alternative development techniques and technologies, comparing them to the chosen approach and explaining why the chosen approach is preferable	

V. COURSE CONTENT AND SCHEDULE				
WEEK	**LECT. #**	**TOPICS/ SUBJECTS**	**READINGS/ CHAPTERS**	**REMARKS (e.g., ASSESSMENTS)**
1	1	Introduction to Web Services: Motivation, Principles of Service-Orientation (Types, State properties, loose coupling, granularity).	Ch1	Midterm and/or Final
2	1	Brief overview of XML, JAXB (marshalling and un-marshalling), XPath, JSON, Starting Rational Application Developer (IDE).	Handout	HW1, Project, Labtest, Midterm and/or Final
3	1	Basics of Distributed Computing, Distributed computing infrastructure, Web and Application Server, Server side programming (Servlet, JSP, AJAX, XSLT), Development and deployment tools with an IDE.	Ch2	HW1, Project, Midterm and/or Final
4	1	Service-oriented Architecture: SOA Fundamentals (roles of interaction, layers, technology stack, WS-* standards), Web Services Description Language (WSDL).	Ch3	Midterm, Project and/or Final
5	1	Developing Web services and Web service clients: Java API for XML-based Web Services (JAX-WS), Web services Messaging (SOAP).	Ch4-5	HW2, Labtest, Midterm and/or Final
6	1	Developing Restful Web services: Java API for RESTful Web Services (JAX-RS), Web services Messaging (REST).	Handout	HW2, Project, Labtest and/or Final
7	1	Developing Restful clients: Java API for RESTful Web Services (JAX-RS), Web services Messaging (REST).	Handout	HW2, Project, Labtest and/or Final
8	1	Registering and discovering services: Web Services Repository (UDDI)	Ch6	Final
9	1	Event notification and Integration infrastructure for SOA applications: Frameworks, Middleware, ESB, MOM, heterogonous application connectivity	Ch7-8	Project, Labtest and/or Final
10	1	Service composition and business processes: Business processes and workflow systems, Web service models such as (BPML, BPEL, WS-CDL, etc.)	Ch9	Project, Labtest and/or Final
11	1	Database connectivity and Web Services.	Handout	Project, Labtest and/or Final
12	1	SOA development lifecycle: Phases, SOA analysis and design, SOA implementation and testing techniques.	Ch15-16	Project and/or Final
13	1	Security and Authentication: XML security services, WS-Security standards such as (WS-Security, WS-Security Policy, WS-Trust, etc.)	Ch11	Project, and/or Final
14	1	Trends of Web services	Handout	Final
15		Revision - Final Project Presentations		

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

A- ASSESSMENT PLAN

2 assignments (10%), Project – 2 parts (20%), Midterm (15%), Lab Test (15%), and Final Exam (40%)

Items	Date Out	Due Date	Weights
HW1	Week 2 - Tuesday	Week 4- Saturday	5%
HW2	Week 5 - Sunday	Week 7 - Saturday	5%
Midterm	Week 8/Tuesday		15%
Project Part1	Week 9 - Sunday	Week 11 - Saturday	5%
Lab Test	Week 12/Tuesday		15%
Project Part2	Week12 - Sunday	Week 14 - Saturday	10%
Presentation	Week15/Sunday		5%
Final Exam	7 – Jan – 2025 / Tue @ 11:30		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 program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. 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