COLLEGE OF ENGINEERING
COMPUTER SCIENCE & ENGINEERING

CMPS 251 / Object-Oriented Programming

Spring 2024

Instructor Information

Name: Mohammad Saleh
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Office Hours: Tuesday 11:00 am – 11:50 am in H07-B384

TA Information

Name: Eng.
Office:
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Class Schedule

Sunday/Tuesday/Thursday:
Sunday/Tuesday/Thursday:

Coordinator Information

Name: Mohammad Saleh
Academic Title: Assoc. Prof.
Office: H07-B384
Phone: 4403-4257
E-mail: mohd.saleh@qu.edu.qa

Course Information

Catalog Description:
Fundamentals of object-oriented programming, object-oriented design, apply object oriented concepts such as abstraction, encapsulation, composition, inheritance, polymorphism, and interfaces. Graphical user interface and event-driven programming; exception handling; additional object-oriented features. The laboratory provides practical object-oriented programming experience.

Credits:
4 Credit hours
Contact Hours:
3 Lecture hours
3 Lab hours

Prerequisites:

- CMPS 151 Programming Concepts

Textbook:

Java: How To Program, Early Objects. Paul Deitel and Harvey Deitel. Pearson. 11th Edition.

References:

- Instructor's handouts
- eResources and Videos
- The *Java Tutorials* - Oracle https://docs.oracle.com/javase/tutorial/

Course Objectives:

- Design and develop programs using the object-oriented programming paradigm.
- Apply features of object-oriented paradigm, such as modularity, abstraction, encapsulation, inheritance and polymorphism.
- Analyze and solve problems from an object-oriented perspective.

Course Learning Outcomes (CLO):

- Apply object-oriented concepts including encapsulation, composition, inheritance, and polymorphism in developing a solution to a computing problem.
- Manage data using files.
- Design and implement simple Graphical User Interfaces.
- Work effectively in teams to develop, debug, and document a programming project.

Relationship of Course Outcomes to Student Outcomes (SO):

Course Learning Outcomes (CLO)	Related CS Student Outcomes (SO)						Related CE Student Outcomes (SO)						
	1	2	3	4	5	6	1	2	3	4	5	6	7
1	√	√				√	√						
2		√					√						
3		√					√						
4		√	√		√	√	√		√				

CS Student Outcomes (CS-SO)

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

CE Student Outcomes (CE-SO)

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Relationship of Course Outcomes to Educational Excellence Themes and Graduate Attributes:

Course Learning Outcomes مخرجات التعلم للمقرر	**CLO 1**	**CLO 2**	**CLO 3**	**CLO 4**				
CLOs Level (I: Introduced; D: Developed; M: Mastered)	D	D	D	D				

Education Excellence Themes أطر التميز في التعليم

يرجى اختيار ما هو مناسب من محاور التميز والتدليل على تبنّيها/تنفيذها من خلال نسخ العبارة الدالة على محور التميز من (وصف المقرر أو أهداف المقرر أو مخرجات التعلم للمقرر) ووضعها بين "علامة التنصيص". * يجب أن تتضمن جميع المقررات محور "التعليم المعزز بالرقمنة " و "التعليم المتمركز حول الطالب". كما يجب اختيار محور تميز آخر ذا أولوية من بين محاور التميز في التعليم الثلاثة المتبقية بناءً على موضوع التخصص ومستوى المقرر.

Please choose the appropriate themes and demonstrate their adoption/implementation by quoting (using double quotes) the exact phrases used to indicate their adoption in the text of (the course description, the course objectives, or proposed course learning outcomes). *The themes "Digitally Enriched" and "Learner-Centric" are to be included in all courses. In addition, another prioritized theme out of the three remaining themes is to be chosen based on the discipline and course level.

Themes **المحاور**	**Implemented** **تم تنفيذ المحور**	**Teaching Methods** **طرق التدريس**	**Course Learning Outcomes** **مخرجات التعلم للمقرر**
Digitally Enriched* التعليم المعزز بالرقمنة	Yes ☒ No ☐	Powerpoint slides; videos, software tools	CLO 1, 2, 3, 4
Learner-Centric* التعليم المتمركز حول المتعلم	Yes ☒ No ☐	Powerpoint slides; videos; in-class discussions/activities;	CLO 1, 2, 3, 4
Experiential التعليم التجريبي	Yes ☐ No ☒		
Entrepreneurial التعليم الريادي	Yes ☐ No ☒		

Research-Informed التعليم القائم على البحث العلمي	Yes ☐ No ☒		

Graduate Attribute سمات الخريجين

Graduate Attributes سمات الخريجين	**Supporting Competences** الكفايات الداعمة	**Course Learning Outcomes (CLOs) Addressing the Supporting Competence(s)** مخرجات التعلم للمقرر المتصلة بالكفايات الداعمة							
		CLO 1	**CLO 2**	**CLO 3**	**CLO 4**	**CLO 5**	**CLO 6**	**CLO 7**	**CLO 8**
A1: Competent A 1: الكفاءة	C1: Subject-matter mastery C1: إتقان الموضوع والمادة	x	x	x	x				
	C2: Critical-thinking skills C2: مهارات التفكير الناقد								
	C3: Problem-solving skills C3: مهارات حل المسائل	x	x	x	x				
	C4: Research, and Novel and Adaptive Thinking C4: البحث والتفكير الإبداعي والتكيفي								
A2: Life-long Learner A2 : التعلم مدى الحياة	C5: Self-awareness C5: الوعي الذاتي								
	C6: Adaptability C6: القدرة على التكيف								
	C7: Adaptive Thinking C7: التفكير التكيفي								
	C8: Desire for life-long learning C8: الرغبة في التعلم مدى الحياة								
A3: Well Rounded A3 : الإلمام	C9: Cultured C9: الثقافة								
	C10: Effective communication skills C10 مهارات التواصل الفعالة				x				
	C11: Awareness of local and international issues C11: الوعي بالقضايا المحلية والدولية								
A4: Ethically and Socially Responsible A4 : المسؤولية الأخلاقية والاجتماعية	C12: Embody the Arabic-Islamic identity C12: تجسيد الهوية العربية الإسلامية								
	C13: Embrace diversity C13 : تقبل التنوع								
	C14: Professional and ethical conduct C14: السلوك المهني والأخلاقي								
	C15: Civically engaged C15 : المشاركة المدنية								
	C16: Community and Global Engagement C16 : المشاركة المجتمعية والعالمية								
A5: Entrepreneurial A5 : التفكير الريادي	C17: Creativity and innovation C17:الإبداع والابتكار								
	C18: Collaborative C18: التعاون								
	C19: Management C19:الإدارة								
	C20: Interpersonal C20: مهارات التعامل مع الآخرين								
	C21: Leadership C21: القيادة								

Topics Covered:

Theory

	Topics	Chapter	Weeks
21/01/24	**Unit 1:** Introduction to Java	2, 4, 5	2
04/02/24	**Unit 2:** Concepts of Object-oriented Programming**.**	3, 6	2
13/02/24	**National Sport Day holiday**		
18/02/24	**Unit 3:** Arrays, ArrayLists, and Exceptions. **First Exam 25/02/24 or 26/02/24**	7	2
03/03/24	**Unit 4:** Composition	8	1
10/03/24	**Unit 5:** Inheritance	9	1.5
24/03/24	**Unit 6:** Polymorphism, Abstract Classes, Interfaces **First Exam 24/03/24 or 25/03/24**	10	1.5
03/04/24	**Unit 7:** File Processing	11, 15	1.5
07/04/24 – 15/04/24	**Eid Al-Fitr holiday**		
21/04/24	**Unit 8:** GUI (JavaFX)	12,13	2
28/04/24	**Project Examination**		1
05/05/24	**Review**		1

Lab:

	Topics	Chapter	Weeks
21/01/24	**Lab01 - Getting Started with Java Using Eclipse**	-	1
28/01/24	**Lab02 - Introducing Java Applications I** Variables, constants, data types, var, arithmetic operations, Input/Output, formatting output, ~~JOptionPane~~, casting, String class and its very basic methods.	2, 4, 5	1
04/02/24	**Lab03 - Introducing Java Applications II** Loops (for, while, do/while), decision structures (if, if/else, classic switch, expression switch, functions/methods)	2, 4, 5	1
11/02/24	**Lab04 - Classes and Objects I** Classes and objects, instance fields (attributes), constructors, this, instance methods, access modifiers, setters and getters, constructors overloading, toString method, == operation,	3, 6	1
18/02/24	**Lab05 - Classes and Objects II** Methods overloading, constructors chaining, class fields (static), class methods (static), equal, copy, and clone methods, enumerations (enum), the String and Character classes and their methods.	3,6	1
25/02/24	**Lab06 - Arrays, Lists and Exception Handling** Arrays, arrays of objects, Array Class, enhanced for loop, ArrayList Class, Exception Handling	7	1
03/03/24	**Lab07 - Arrays, Lists and Exception Handling** Arrays, arrays of objects, Array Class, enhanced for loop, ArrayList Class, Exception Handling		
10/03/24	**Lab08 – Composition** Basic composition, composition with arrays and ArrayList, deep equal, copy, and clone methods, inner classes.	8	1

17/03/24	**Lab09 – Inheritance** Super/parent/base and sub/child/derived classes, super, ArrayList of Superclass type, overriding methods, getClass.getName method and instanceof, protected and final in inheritance.	9	1
Mid Semester Break October 22 – October 26, 2023			
24/03/24	**Lab10 - Polymorphism I** Using Polymorphism for container type (array, ArrayList), using Polymorphism for Method Parameters, using Polymorphism for method's return type, up casting and runtime polymorphism.	10	1
31/03/24	**Lab11 - Polymorphism – II** Abstract classes and interfaces	10	1
07/04/24 – 15/04/24	**Eid Al-Fitr holiday**		
21/04/24	**Lab12 - Files, Streams, and Object Serialization** The File class, file I/O using Scanner, Formatter, BufferReader, and PrintWriter classes. Object Serialization, object I/O using ObjectInputStream and ObjectOutputStream	11, 15	1
28/04/24	**Lab13 - Graphical User Interface using JavaFX I** Generic structure of FX application without Scene Builder, basic components, layouts	12,13	1
05/05/24	**Lab14 - Graphical User Interface using JavaFX II** More advanced GUI components and ObservableList	12,13	1

Method of Instruction

The course is taught through lectures, examples, demos and a project. The approach adopted is problem-based learning by developing hands-on multi-phases project and assignments to reinforce the concepts introduced in the lectures. Throughout the course, students perform hands-on exercises that build their practical knowledge and skills to design, build and test Object Oriented Software using Java. The course uses concrete examples taken from real applications.

Learning Activities

To achieve the objectives of the course, students will carry out several learning activities:

1. **Readings**: The students are expected to read the assigned textbook chapter, slides, online resources, videos, and tutorial materials. The assigned reading assignments will elaborate on information presented in the lectures. **Students should get familiar with the provided material prior to the lecture.**
2. **Lectures**: Students are expected to attend every lecture; this is where the course material will be discussed and ambiguities clarified. Class participation is highly encouraged. The technologies to be applied in the project and the assignments will be presented in the lectures via examples and demos. Practical demos are often done in class including designing and coding and end-to-end solution to a given problem. UML is used occasionally to illustrate OO design. The students are required to practice and extend the examples and the demos provided. The study material, examples and links to relevant resources will be made available on Blackboard.
3. **Assignments**: Lab assignments and a project will be given so that students practice and apply the material covered in class. Each assignment will require the students to practice the material learned during the course.

4. **Exams:** To keep the students on track continuous assessment is adopted in-class using quizzes and off-class using lab assignments. The midterm has a theoretical part and the final exams have both a theoretical part and a practical programming part to build a solution to a problem. Quizzes are used for continued assessment.

Assessment Methods and Grading Policy

Quizzes: 0%
Assignments: 0%
First Exam: 15% (Units 1-2)
Second Exam: 15% (Units 3-5)
Final exam: 30% (QU scheduled. Comprehensive including all units)
Lab: 40% (30% 5 out of 6 quizzes, 10% Project)
Bonus Quizzes: 3% Learning support.

ABET Contribution of Course to Professional Component

Math & Basic Science : 20%
Engineering : 80%
Engineering Design :
General Education :

Computer/Software Usage

Eclipse IDE environment is used to develop Java programs.
Visual Paradigm could be used to create Class Diagrams.

Laboratory Projects

See the syllabus of laboratory part of this course.

Course Ground Rules

- Assessment deliverable items should be submitted on time and following given instructions.
- Attendance: Attendance is mandatory according to university policies and more than 25% absence will not qualify you for the course credit.
- Cheating and/or Plagiarism: Cheating and/or Plagiarism will not be tolerated and disciplinary actions will be taken in accordance with Qatar University regulations and policies. Outsourcing or getting external help to complete assignments is strongly prohibited, and disciplinary actions will be taken. Check the undergraduate students' handbook for further details on university policies.
- Blackboard: Check the course website frequently for updates (e.g. announcements, lectures notes, examples, etc.).
- Taking Notes: Students are responsible for taking notes during the lecture. Exams will include some of the material discussed during lecture in addition to that given in the textbook and class notes.
- Due Dates: It is the responsibility of every student to remember all due dates.

University Code of Conduct

QU expects its students to adopt and abide by the highest standards of conduct in their interaction with professors, peers, staff members and the wider university community.

Moreover, QU expects its students to act maturely and responsibly in their relationships with others. Every student is expected to assume the obligations and responsibilities required from them for being members of the QU community.

As such, a student is expected not to engage in behaviors that compromise their integrity, as well as the integrity of QU. Further information regarding the University Code of Conduct may be found on the web at http://www.qu.edu.qa/students/code-of-conduct

Support for Students with Special Needs

It is Qatar University policy to provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their Instructor to ensure that their individual needs are met. The University through its Inclusion and Special Needs Support Center will exert all efforts to accommodate for individuals' needs.

Contact Information for Inclusion and Special Needs Support Center:
Tel-Female: (00974) 4403 7972
Tel-Male: (00974) 4403 7946
Location: Student Activities Building
Email: specialneeds@qu.edu.qa

Academic Support and Learning Resources

The University Student Learning Support Center (SLSC) provides academic support services to male and female students at QU. The SLSC is a supportive environment where students can seek assistance with academic coursework, writing assignments, transitioning to college academic life, and other academic issues. SLSC programs include: Peer Tutoring, the Writing Lab, Writing Workshops, and Academic Success Workshops. Students may also seek confidential academic counseling from the professional staff at the Center.

Contact Information for Students Support and Learning Resources:
Tel: (00974) 4403 3870
Fax: (00974) 4403 3871
Location: Female Student Activities Building
E-mail: learningcenter@qu.edu.qa

College of Engineering Learning Support

The Engineering Success Oasis (ESO) provides academic support services to all students registered in Engineering courses at QU. We provide academic assistance through group and one-on-one tutoring, tailored major programs, and various workshops. Support schedules are announced at the beginning of semesters.

Contact Information for College of Engineering Learning Support:
Females
Tel: (00974) 4403 6380
Email: CENG.SuccessOasis.F@qu.edu.qa

Males
Tel: (00974) 4403 6380
Email: CENG.SuccessOasis.M@qu.edu.qa

Sessions' Booking
Females
1- One-to-one sessions' registration via Simplybook:
https://crulearningfemales.simplybook.me
2- Weekly sessions via email invitation from Engineering Success Oasis (ESO)

Males
1- One-to-one sessions' registration via Simplybook:
https://crulearningmales.simplybook.me
2- Weekly sessions via email invitation from Engineering Success Oasis (ESO)

Student Complaints Policy

Students at Qatar University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the student handbook.

Declaration

This syllabus and contents are subject to changes in the event of extenuating circumstances. The instructor (with approval of the Head of Department) reserves the right to make changes as necessary. If changes are necessitated during the term of the course, the students will be notified by email communication and posting the notification on the online teaching tool Blackboard. It is the student's responsibility to check on announcements made while they were absent.

Faculty Name: Mohammad Saleh Mustafa Saleh
Last Modified: January 14, 2024
Date: January 14, 2024