Course Specification
(Bachelor)

Course Title:	Sustainable Engineering Design
Course Code:	CE 3503
Program:	Bachelor of Science in Civil Engineering
Department:	Civil Engineering Department
College:	College of Engineering and Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2. Course type					
A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required		☐ Elective		
3. Level/year at which this course is offered: (Level 6 / 3rd Year)					
4. Course General Description:					

This course first discusses sustainability, circular economy, and life cycle assessment (LCA). Then, the course guides students through the iterative phases of the engineering design process. Students will learn to understand and define the problem, establish objectives and constraints, brainstorm to generate innovative ideas and potential solutions, evaluate these ideas against set criteria, create prototypes, test them, and ultimately finalize a solution.

5. Pre-requirements for this course (if any)**:**

CE 2801

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

1- Empower students to explore the essential principles of sustainability and engineering design.

2- Students will gain the skills needed to create impactful solutions for a sustainable future.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 *15= 60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Demonstrate fundamental knowledge of environmental sustainability.	K1; K2	Lectures Training tutorials	Assignments Quizzes Written exams
1.2	Understand the iterative phases of the engineering design process.	K1; K2	Lectures Training tutorials	Assignments Quizzes Written exams
2.0	**Skills**			
2.1	Evaluating solutions ideas with a systematic and quantitative method.	S1;S2	Lectures Training Tutorials Small group work	Assignments Quizzes Written exams Term project
2.2	Design and brainstorm solutions for engineering problems.	S1	Lectures Training Tutorials Small group work	Assignments Quizzes Written exams Term project

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively in modes of independent learning and multi-disciplinary teams.	V.2	Lectures Training Tutorials Small group work	Term project

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	**4**
2.	Sustainability	**4**
3.	Circular Economy	**4**
4.	Life Cycle Assessment	**4**
5.	Sustainable Engineering Design	**4**
6.	Step 0: Introduction to the Engineering Design Process	**4**
7.	Step 1: Clarify Team Assignment	**4**
8.	Step 2: Understand the Problem and Context	**4**
9.	Step 3: Define Design Criteria	**4**
10.	Step 4: Brainstorm Solution Options	**4**
11.	Step 5: Evaluate Solutions	**4**
12.	Step 6: Prototype Solution	**4**
13.	Step 7: Test Solution	**4**
14.	Step 8: Finalize a Solution .	**4**
15.	Teaming, Communication, and Project Planning	**4**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	**3-5-7-9-11**	**10**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Assignments	3-5-7-9-11	10
3.	Lab Assessments	4-6-8-10-12	10
4.	Midterm Exam	7	20
5.	Group Project	13	10
6.	Final Exam	16	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	*Introduction to Engineering Design* - Ann Saterbak and Matthew Wettergreen - August 2021
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms for lectures and exams with students working on their laptops during the scheduled class hours. Well-equipped Laboratory.
Technology equipment (projector, smart board, software)	A white board, Computer with multi-media, a printer, internet connection, and data show.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Instructor Program leader	Indirect Direct Direct
Effectiveness of Students assessment	Independent member teaching staff	Direct
Quality of learning resources	Students	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
	Instructor	Indirect
The extent to which CLOs have been achieved	Instructor Student Program leader	Direct Indirect Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CIVIL ENGINEERING COUNCIL**
REFERENCE NO.	**THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446**
DATE	**30 APRIL 2025**

