Course Specification
(Bachelor)

Course Title:	Solid Waste Management
Course Code:	CE 4505
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: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (Level 9-10 / 5th Year)					
4. Course General Description:					
This course focuses on the engineering and management principles, practices, and techniques associated with the management and disposal of solid waste. Key topics include the characteristics of solid waste, its generation, handling, storage, separation, collection, transportation, processing, resource recovery, disposal methods, and landfilling. The course covers the key types of solid wastes: municipal, hazardous, medical, and electronic.					
5. Pre-requirements for this course (if any)**:**					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
To provide students with an understanding of technical issues and the management of solid wastes. The course includes solid waste policy, both domestic and international, and then examines appropriate methods of storage, collection, transfer, treatment and disposal appropriate for industrialized and developing countries. The course also provides case studies about waste management to better understand links between theory and practice.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

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

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	Identify sources, quantities generated, composition, properties of solid waste	K2	Lectures Training tutorials	Assignments Quizzes Written exams
1.2	Identify Treatment and Disposal of solid waste	K2	Lectures Training tutorials	Assignments Quizzes Written exams
2.0	**Skills**			
2.1	Describe the components of landfill design and processes.	S1	Lectures Training Tutorials Small group work	Assignments Quizzes Written exams Term project
2.2	Develop a strategy to deal with hazardous and medical waste.	S1	Lectures Training Tutorials Small group work	Assignments Quizzes Written exams

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
				Term project
3.0	**Values, autonomy, and responsibility**			
3.1	Function effectively in modes of independent learning and multi-disciplinary teams.	V2	Lectures Training Tutorials Small group work	Term project

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction:** Importance of Waste Management in Sustainability, Ecological Health, and Climate Change - Overview of Waste Generation	**3**
2.	**Municipal Solid Waste:** Introduction - Source, Composition, and Quantity	**3**
3.	**Municipal Solid Waste:** Collection and Disposal - Incineration and Waste-to-Energy Conversion	**3**
4.	**Municipal Solid Waste:** Composting - Physical and Chemical Properties	**3**
5.	**Municipal Solid Waste:** Landfill	**3**
6.	**Hazardous Waste:** Introduction - Definition and Classification - Sources and Generators	**3**
7.	**Hazardous Waste:** Storage and Transportation	**3**
8.	**Hazardous Waste:** Treatment and Disposal	**3**
9.	**Medical Waste:** Introduction - Nature, Source, and Quantity	**3**
10.	**Medical Waste:** Hazards Associated with Regulated Medical Waste - Treatment and Disposal	**3**
11.	**Electronic Waste:** Introduction - Nature and Composition - Quantity- Recycling and Recovery of Valuable Metals	**3**
12.	**Electronic Waste:** Health and Environmental Impacts - Sustainable Management of E-Waste	**3**

13.	**Pharmaceuticals and Personal Care Products:** Introduction - Concerns for PPCPs - Sources of PPCPs in the Environment - Environmental Impacts of PPCPs	**3**
14.	**Waste Minimization:** Introduction – Definitions – Approaches	**3**
15.	**Waste Minimization:** Recycling- Innovative Waste Minimization Technologies - Waste Exchange - Zero Waste -	**3**
Total		**45**

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**
2.	Assignments	**3-5-7-9-11**	**10**
3.	Midterm Exam	**7**	**25**
4.	Group Project	**13**	**15**
5.	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	Hasan, S. E. (2022). Introduction to waste management: A Textbook. John Wiley & Sons.
Supportive References	Handbook of Solid Waste Management, George Tchobanoglous, Frank Kreith, Second Edition, ISBN: 0-07-135623-1, McGraw-Hill Companies Municipal Solid Waste: Engineering Principles and Management. Prof. Shaukat Hayat & Prof. Dr. Sajjad H. Sheikh.
Electronic Materials	Waste Management & Research: SAGE Journals Journal of Solid Waste Technology and Management

	International Journal of Waste Resources
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 Instructor	Indirect 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**

