هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-154

Course Report
(Bachelor)

Course Title:	Industrial Waste and Carbon Emissions
Course Code:	EVS 1022
Program:	Bachelor of Science in Environmental Science
Department:	Biology
College:	Science
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1
Last Revision Date:	-

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: 2 (Lecture 2 + Lab 2)				
2. Course type				
A.	☐University	☐College	☒ Department	☐ Track
B.	☐ Required		☒ Elective	
3. Level/year at which this course is offered: (Not determined)				
4. Course General Description:				
This course deals with the basic concepts of industrial waste and its waste generated during industrial processes, manufacturing, or production activities. It includes solid waste, hazardous materials, and wastewater. An integrated approach to reducing carbon emissions in industrial clusters, including systemic efficiency, circularity, direct electrification, renewable heat, and hydrogen solutions.				
5. Pre-requirements for this course (if any)**:**				
EVS 1110 EVS 1114				
6. Co-requisites for this course (if any)**:**				
None				
7. Course Main Objective(s):				
To management waste and its emissions processes: carbon dioxide emission processes and non-carbon dioxide emissions (such as methane and nitrous oxide) from the waste sector. Monitoring industrial waste, operating treatment processes, maintaining equipment, and applying instrumentation and control strategies				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	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**	30
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify) ……**	
	Total	30

B. Course Learning Outcomes, Teaching Strategies, Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe methods to estimate greenhouse gas emissions from different waste handling practices, including solid waste disposal sites, domestic wastewater, industrial wastewater, and waste incineration)	K1	Two credits weekly lectures	-Quizzes -Presentations -Assignments -written exams

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.2	Define and apply current remediation processes and technologies for waste management and inform communities and stakeholders about the best practices in waste management	K2	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
1.3	Explain an integrated approach to reducing carbon emissions in industrial clusters, including systemic efficiency, circularity, direct electrification, renewable heat, and hydrogen solutions.	S3	Two credits weekly lectures	Quizzes -Presentations -Assignments -written exams
2.0	Skills			
2.1	Compare, interpret and predict the different biological methods and their applications in various biological industries	S1	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.2	Interpret and Valorization of Industrial Wastes , Focus on minimizing waste generation, promoting reuse, recycling materials, and exploring waste valorization processes and technologies	S2	-Two credits weekly lectures -Tutorials	-Presentations -Assignments -written exams
2.3	Demonstrate the ability to select the criteria of treatment technologies and site remediation	S3, S4	-Two credits weekly lectures -Tutorials	-Presentations -Reports
3.0	Values, autonomy, and responsibility			
3.1	Share in scientific discussions and prepare the scientific reports related to applied waste management	V1	Group discussions	-Presentations -Reports
3.2	Demonstrate the ability to organize and collect data and present it through different modes to a varied audience	V2	Group discussions	-Presentations -Reports

C. Course Content:

No	List of Topics	Contact Hours
1.	Definition: Industrial waste	4
2.	Types of Industrial Waste: Solid Waste: This includes materials like packaging, scrap metal, plastics, and other non-liquid waste.	4
3.	Hazardous Waste: These are materials that pose a risk to human health or the environment. Examples include chemicals, heavy metals, and radioactive substances.	4
4.	Wastewater: Generated from industrial processes, it contains pollutants and requires treatment before disposal.	4
5.	Management Strategies: Reduce: Minimize waste generation through efficient processes and resource optimization. Reuse: Find ways to reuse materials within the industry.	4
6.	Reuse: Find ways to reuse materials within the industry. Recycle: Recycle materials like paper, glass, and metals. Dispose: Properly manage and dispose of waste according to regulations.	2
7.	Definition: Carbon emissions refer to the release of carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the atmosphere.	2
8	Sources of Carbon Emissions: Fossil Fuel Combustion: Burning coal, oil, and natural gas for energy production. Transportation: Cars, trucks, planes, and ships emit CO_2 during fuel combustion. Industrial Processes: Manufacturing, cement production, and chemical industries contribute. Deforestation: Trees absorb CO_2; their removal releases it.	2
9	Mitigation Strategies: Renewable Energy: Transition to clean energy sources like solar and wind. Energy Efficiency: Improve industrial processes and reduce energy consumption.	2
10	Carbon Capture and Storage (CCS): Capture CO_2 emissions and store them underground. Afforestation: Plant trees to absorb CO_2.	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	5th week	20%
2.	Midterm exam 2	10th week	20%
3.	Quizzes, Participation, Attendance	During the semester	20%
6.	Final Exam	15th week	40%
Total			**100%**

*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	• Industrial Waste Treatment Handbook" by Woodard & Curran Inc. "Carbon Emissions in the Industrial Sector" by J. Smith & R. Green. • Reducing Carbon Emissions in Manufacturing: Case Studies from Automotive Industry" by B. Lee & C. Chen.
Supportive References	WWW.United Nations Environment Programme (UNEP): Provides information on waste management and emissions reduction strategies.
Electronic Materials	https://link. Intergovernmental Panel on Climate Change (IPCC): Reports on carbon emissions and climate change mitigation.
Other Learning Materials	Lectures material available in Black Board platform

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom**
Technology equipment (Projector, smart board, software)	**Projector, smart board**
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students' assessment	Faculty	Direct
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Biology Department Council**
REFERENCE NO.	**2**
DATE	**21/02/1446 H**