SEE1003: INTRODUCTION TO SUSTAINABLE ENERGY AND ENVIRONMENTAL ENGINEERING

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Introduction to Sustainable Energy and Environmental Engineering

Subject Code
SEE - School of Energy and Environment
Course Number
1003

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
GE1355 Sustainable Energy and Environmental Engineering

Part II Course Details

Abstract

This course introduces students to concepts related to energy and environmental science and engineering. Current and future energy resources, energy systems, and conversion technologies as well as energy conservation and management systems will be introduced. Key principles related to air, water and waste treatment technologies and the management of environmental systems and the ecosystems will be addressed. Noise measurements and controls and solids waste treatment will be emphasized. Sustainable development will be emphasized throughout the course, and the role of policy and economic strategies will be discussed. A quantitative framework will be adopted to aid the analysis of energy and environmental systems and technologies. This course intends to lay the foundation for students to pursue advanced courses in their subsequent study.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Demonstrate an understanding on key energy and environmental issues in the 21st century and the importance of sustainable development	10		x	
2	Apply fundamental principles in energy and environmental science and engineering	40		x	
3	Analyze the current and future energy and environmental technologies	40	x	x	
4	Explain the role of policy and economic strategies in the energy and environmental sectors	10		x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts and principles related to energy and environmental science and engineering	1, 2, 3, 4	2.5
2	Tutorial	Solidify students' concepts and understanding with practice	1, 2, 3, 4	0.5

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	In-class test to evaluate students' understanding of the key concepts, theories, and methodologies covered in the course.	1, 2, 3, 4	25	
2	Assignment (semester-long project) allow students' to apply their knowledge and skills to a real-world problem related to sustainability.	1, 2, 3, 4	25	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

Examination duration: 2 hrs
Percentage of continuous assessment, examination, etc.: 50% by continuous assessment; 50% by exam

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards continuous assessment (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task

1. In-class test

Criterion

Ability to explain concepts, analyze and solve problems related to energy and environmental science and engineering

Excellent (A+, A, A-)

Demonstrates a comprehensive understanding of concepts with clear, precise, and detailed explanations.

Good (B+, B, B-)

Shows a solid understanding of concepts with clear explanations, though may lack some detail

Fair (C+, C, C-)

Demonstrates a basic understanding of concepts with explanations that may be somewhat vague or incomplete.

Marginal (D)

Shows minimal understanding of concepts with explanations that are often unclear or incorrect.

Failure (F)

Not even reaching marginal levels

Assessment Task
2. Assignment

Criterion
Ability to explain concepts, analyze and solve problems related to energy and environmental science and engineering

Excellent (A+, A, A-)
Thoroughly analyzes problems, identifies key variables, and uses logical reasoning to break down complex issues.

Good (B+, B, B-)
Analyzes problems competently, identifying most key variables and using logical reasoning. May have minor gaps in analysis.

Fair (C+, C, C-)
Analyzes problems but may miss some key variables or show inconsistent reasoning.

Marginal (D)
Attempts to analyze problems but misses most key variables and shows flawed reasoning. Analysis is superficial.

Failure (F)
Not even reaching marginal levels

Assessment Task
3. Final exam

Criterion
Ability to explain concepts, analyze and solve problems related to energy and environmental science and engineering

Excellent (A+, A, A-)
Consistently high performance across all sections of the exam, with no significant gaps or errors.

Good (B+, B, B-)
Good performance across most sections of the exam, with only minor errors or gaps.

Fair (C+, C, C-)
Satisfactory performance across most sections of the exam, but with noticeable errors or gaps.

Marginal (D)
Barely meets the minimum requirements across sections, with significant errors or gaps.

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Local and global energy and environmental issues (e.g. Climate change, clean water)
- Sustainable development

- Basic energy and environmental science and engineering concepts and principles (e.g. conservation laws, unit operations)
- Basic policy and economic strategies in the energy and environmental sectors
- Fossil fuels processes
- Renewable energy technologies
- Energy conservation and management technologies
- Water and air quality
- Noise and waste management
- Environmental technologies
- Ecosystem and environmental management

Reading List

Compulsory Readings

	Title
1	Tester, Jefferson W., Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, and William A. Peters. Sustainable Energy: Choosing Among Options. 2nd edition. MIT Press, 2012. ISBN: 9780262017473.
2	Nazaroff, W.W. and L. Alvarez-Cohen. 2000. Environmental Engineering Science. John Wiley & Sons, Inc.

Additional Readings

	Title
1	Current and important scientific articles will be provided to supplement lecture materials