GE1308: ENERGY: TODAY AND TOMORROW

Effective Term
Semester B 2023/24

Part I Course Overview

Course Title
Energy: Today and Tomorrow

Subject Code
GE - Gateway Education
Course Number
1308

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
3

Level
A1, A2 - Associate Degree
B1, B2, B3, B4 - Bachelor's Degree

GE Area (Primary)
Area 3 - Science and Technology

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The world energy demand continues to grow at an increasing rate, especially in the developing countries, such as China. However, available fossil fuel resources are decreasing. It is predicted that the world oil production will reach the peak in a few years. The energy crisis problems will escalate seriously then. Moreover, burning fossil fuels is the main source of greenhouse gas and air pollutants, which are detrimental to the environment. Therefore, our present fossil fuel based energy supply is indeed not sustainable.

Recently, research and development on clean energy and renewable energy are very active. New government policies, commitments and regulations are set to promote green energy. The energy industry is entering a new era of sustainability.

This course is designed to enable students to develop a broader perspective and critical understanding of the current energy issues. The students after taking the course will have the basic comprehension of the science and technologies related to energy supply and utilization. The students will understand the environmental impacts and political conflicts arising from the world's heavy reliance on fossil fuel based energy supply. The students will also be able to apply the knowledge learned to assess innovative alternative energy technologies and policies in different contexts, such as economy, environment, social and political matters. The major learning activities include lectures, tutorials, seminars, live demonstration experiments, project and field trip.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the basic physics of energy conversion and the working of power plants.	10		x	
2	Assess environmental impacts arising from energy production.	20		x	
3	Describe global energy consumption trends and discuss the issues with various energy resources in the wider economic, social and environmental contexts.	20		x	x
4	Evaluate energy options from a holistic perspective and reflect on trade-offs between access, availability, affordability and acceptability.	20		x	
5	Describe the significance of sustainability (economic, environmental & social factors) in the power industry.	10		x	x
6	Apply the principles of energy science and engineering in understanding contemporary challenges and proposing solutions to them.	20	x	x	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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Introduction to science, engineering principles, practical systems and strategies of energy supply and demand.	1, 2, 3, 4, 5, 6	2
2	Tutorials	Practice on problem solving; questions and answers; group discussion.	1, 2, 3, 4, 5, 6	1
3	Demonstration experiments	Live demonstration experiments to illustrate how energy is converted into various useful forms and the energy conversion efficiency.	1, 3, 4	NA
4	Seminars	Knowledge and experience sharing by experts in the energy industry.	1, 4, 5	NA
5	Fieldwork	Visit to power plant, renewable energy plant, or other energy related facilities.	1, 5	NA
6	Reading; Self-study; Project	Data and information collection; problem solving, critical and creative thinking, report writing.	1, 2, 3, 4, 5, 6	5

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Participation: Students' involvement throughout the course	1, 2, 3, 4, 5, 6	10	
2	Quizzes: Short written questions to assess students' knowledge and understanding in energy	1, 2, 3, 4, 5, 6	20	
3	Assignments: Individual homework assignments on problem solving and analysis in energy sciences, policy and supply strategies.	1, 2, 3, 4, 5, 6	30	

4	Project: Group exercise where students work together to comprehensively analyze an innovative and novel energy technology	1, 2, 3, 4, 5, 6	40	

Continuous Assessment (%)

100

Examination (%)

0

Examination Duration (Hours)

N/A

Additional Information for ATs

Examination duration: N/A
Percentage of coursework, examination, etc.: 100% by coursework

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (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. Quizzes

Criterion

Capacity for self-directed learning to understand the principles of energy science, engineering, and basic energy economics.

Excellent (A+, A, A-)

Excellent conceptual understanding of energy science, engineering, and basic energy economics.

Good (B+, B, B-)

Good conceptual understanding of energy science, engineering, and basic energy economics.

Fair (C+, C, C-)

Acceptable conceptual understanding of energy science, engineering, and basic energy economics.

Marginal (D)

Marginally acceptable conceptual understanding of energy science, engineering, and basic energy economics.

Failure (F)

Poor conceptual understanding of energy science, engineering, and basic energy economics.

Assessment Task

2. Assignments

Criterion

Ability to explain concepts, analyse and solve problems related to energy science, engineering, and basic energy economics.

Excellent (A+, A, A-)

Excellent understanding of concepts and ability to analyze and solve problems related to energy science, engineering, and basic energy economics.

Good (B+, B, B-)

Good understanding of concepts and ability to analyze and solve problems related to energy science, engineering, and basic energy economics.

Fair (C+, C, C-)

Acceptable understanding of concepts and ability to analyze and solve problems related to energy science, engineering, and basic energy economics.

Marginal (D)

Marginally acceptable understanding of concepts and ability to analyze and solve problems related to energy science, engineering, and basic energy economics.

Failure (F)

Poor understanding of concepts and ability to analyze and solve problems related to energy science, engineering, and basic energy economics.

Assessment Task

3. Project

Criterion

Ability to identify problems and research gaps from literature and apply the concepts of energy science and engineering in proposing potential solutions.

Excellent (A+, A, A-)

Excellent ability to identify and understand contemporary energy challenges and apply concepts learned in proposing solutions.

Good (B+, B, B-)

Good ability to identify and understand contemporary energy challenges and apply concepts learned in proposing solutions.

Fair (C+, C, C-)

Moderate ability to identify and understand contemporary energy challenges and apply concepts learned in proposing solutions.

Marginal (D)

Marginally acceptable ability to identify and understand contemporary energy challenges and apply concepts learned in proposing solutions.

Failure (F)

Poor ability to identify and understand contemporary energy challenges and apply concepts learned in proposing solutions.

Part III Other Information

Keyword Syllabus

1. Introduction to energy sciences and energy resources
2. Fossil-fuel based power plants and nuclear power plants
3. Environmental impacts of energy use
4. Demand side management and energy for transportation
5. Renewable energy and energy storage
6. Economics and policies related to energy

Reading List

Compulsory Readings

	Title
1	Anon 2008. Environment and energy. Transportation Research Board, Washington D.C.
2	Aubrecht G.J. 2006. Energy: Physical, Environmental, and Social Impact. 3rd ed., Pearson Prentice Hall.
3	Elliot D. 2007. Sustainable energy: opportunities and limitations. Palgrave Macmillan.
4	Goswami Y.D., Kreith F. and Kreider J.F. 2000. Principles of Solar Engineering. 2nd ed., Taylor & Francis.
5	Hafemeister D. 2007. Physics of societal issues: calculations on national security, environment and energy. Springer.
6	Herring H. and Sorrell S. 2009. Energy efficiency and sustainable consumption: the rebound effect. Palgrave Macmillan.
7	http://www.emsd.gov.hk/emsd/eng/pee/index.shtml
8	http://www.energyinst.org.hk/
9	http://www.hkaee.org/
10	http://www.unep.org/themes/energy/?page=home
11	http://www.withouthotair.com
12	http://www.elsevier.com/wps/find/journaldescription.cws_home/269/description#description

Additional Readings

	Title
1	Nil

Annex (for GE courses only)

A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)

PILO 1: Demonstrate the capacity for self-directed learning

1, 2, 3, 4, 5, 6

PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology

1, 2, 3, 4

PILO 3: Demonstrate critical thinking skills

5, 6

PILO 4: Interpret information and numerical data

1, 3, 4

PILO 5: Produce structured, well-organised and fluent text

1, 2, 3, 4, 5, 6

PILO 6: Demonstrate effective oral communication skills

1, 2, 3, 4, 5, 6

PILO 7: Demonstrate an ability to work effectively in a team

1, 2, 3, 4, 5, 6

PILO 9: Value ethical and socially responsible actions

5

PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation

1, 2, 3, 4, 5, 6

B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task

Group project: Through group project, students are required to analyse innovative technologies related to energy generation and/or conservation.

Related CILO(s): CILO 1-6
Related GE PILO(s): PILO 1-10 (except 8)