

GE2306: ENERGY AND TECHNOLOGY

Effective Term

Summer Term 2023

Part I Course Overview

Course Title

Energy and Technology

Subject Code

GE - Gateway Education

Course Number

2306

Academic Unit

Materials Science and Engineering (MSE)

College/School

College of Engineering (EG)

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

Energy and environment is the topic that should be of concern to everybody, irrespective of the field of profession. This course will introduce some basic concepts to the topic. It is expected that irrespective of the major that the students are pursuing, they can understand the roles that they can play in the energy problems. The assessments for students consist of reading assignment, field trip reporting, group project, mid-term test, and final examination. Students will also be invited to present, both orally and in writing, their assignments.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Demonstrate the capacity for self-directed learning on topics related to energy and technology.	x		
2	Explain the basic methodologies and techniques for the harvesting of energy from different sources and in different forms.		x	
3	Demonstrate critical analytical skills by comparing the operating principles of alternative sources of energy and their current status of development.		x	
4	Interpret information and numerical data by calculating the efficiencies for energy conversion from the different sources.		x	
5	Demonstrate the ability to work effectively in a team by showing active participation on assigned group report.	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	Lecture and seminar	To introduce/discuss some technical concepts.	2, 3, 4	3* hours per week
2	Reading	Students will be given weekly a number of reading, which may cover book chapters or journal/magazine articles.	1, 2	Students are expected to spend 2 hours per week on reading.

3	Group field trip report & presentation	A field trip will be arranged to groups (consist of 5 students) in which to visit power generation or heavy power usage facilities in Hong Kong or the Pearl River Delta. Students will be asked to pay special attention on to the related measures adopted by the company/organization for pollution control. Examples for the trip will be: Langham Place Hotel Mongkok, Hong Kong Science Museum. Group report will be conducted after the field trip. Then, each group will give a 15 minutes presentation of the report, and 5 minutes will be reserved for other groups to ask questions.	1, 2, 3, 4, 5	Students are expected to make a 4 hours field trip in the semester.
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Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)	
1	Group Field Trip Report & Presentation	1, 2, 3, 4, 5	30	Each student group needs to prepare a report after the field trip visit, followed by a presentation. Marks will be given for the presentation as well as the response to questions raised by instructor(s) or other students. Each group member will be asked to rate on the participation for all other group members. Course leader will investigate if some students have problems. For students performed poorly to participate in the group report, marks will be deducted accordingly.
2	Take-home Assignments	1, 2	10	Students need to submit 2 take-home assignments.

3	Mid-term Test	2, 3, 4	10	Questions in the mid-term test and examination will be based on the lecture notes and reading assignments.
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Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)**Assessment Task**

1. Group Field Trip Report & Presentation

Criterion

Good presentation skills and good English pronunciations are expected.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Mid-term test

Criterion

Answer questions professionally.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

3. Examination

Criterion

Answer questions professionally.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- History of energy consumption. Global patterns in energy production and consumption. Fossil fuel current reserves.
- Geology and nature of fossil fuels. Formation and properties of coal, oil and gas. Pollution control techniques. The main pollutants from fossil fuels and the current status of technology to reduce emissions of sulphur, NOx and particulate emissions from power plants and cars.
- Energy flow of the Earth. Introduction to alternative sources of energy. The operating principles, current status of the technology and environmental impacts of alternative energy sources:
 - Nuclear power.
 - Solar power.
 - Wind power.
 - Hydroelectric power, tidal power. Wave power, ocean thermal energy conversion.
 - Geo-thermal power and biomass.
 - The hydrogen economy. Hydrogen combustion and fuel cells.
 - Nanotechnology and energy.

Reading List

Compulsory Readings

Title	
1	Alternative Energy Sources, Efstathios Michaelides, online access from SpringerLink, CityU Library

Additional Readings

Title	
1	Energy: Its Use and the Environment, Fourth Edition, Hinrichs & Kleinbach, Thomson (TJ163.9 .H55 2013)
2	Scientific American, e-journal, online access from CityU Library

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

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

2

PILO 3: Demonstrate critical thinking skills

3

PILO 4: Interpret information and numerical data

4

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

5

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 field trip report