City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	**Energy, Environment and Sustainable Development**
Course Code:	**SEE5114**
Course Duration:	**One semester**
Credit Units:	**3 credits**
Level:	**P5**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**SEE8114 Energy, Environment and Sustainable Development**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

This course aims to develop the ability to examine and appraise the key characteristics, prospects, and challenges associated with contemporary energy choices, their environmental impacts, and comprehend them in relation to global decarbonization efforts and sustainable development goals. It focuses on raising the students' understanding of the basic principles and approaches to assess the technical, economic, environmental, and societal aspects of energy options.

The course is designed with an emphasis on interdisciplinary reflection, systems thinking and sharing of students' own experience. The teaching/learning will be supported by video presentations, seminars, web-based resources, site visit and team-based learning activities.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Describe issues relevant to the evolving energy landscapes in the wider economic, social and environmental contexts	20	√		√
2.	Evaluate economic viability of the processes	20	√		√
3.	Identify and assess environmental impacts of processes	20	√	√	√
4.	Recognise the interplays between the water and energy sectors and compute water footprints of products and processes	20		√	√
5.	Describe the basic principles of green energy technologies	20	√	√	√
		100%			

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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	**5**	
Lecture	**Lectures** on contemporary and emerging energy systems, energy-environment nexus, environmental impact assessment, energy economics, and case studies	√	√	√	√	√	2.5 hours/week

In-class exercises	**In-class exercises** will be given to students to assess students' concepts and grasp of knowledge taught in class	√	√	√	√	√	
Reading exercises	**Reading exercises** including reference books, journal papers and related online materials will be provided to students to facilitate self-directed learning.	√	√	√	√	√	
Quizzes	**Quizzes** will be arranged to assess students' understanding and ability to apply subject-related knowledge learned in class, textbooks and required reading materials.	√	√	√	√	√	
Final Examination	**Final Examination** will be arranged to assess students' understanding and ability to apply subject-related knowledge learned in class, textbooks and required reading materials.	√	√	√	√	√	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.					Weighting	Remarks
	1	2	3	4	5		
Continuous Assessment: 75%							
In-class exercises Students need to complete in-class exercises and participate actively in discussing these exercises to facilitate their understanding of knowledge taught in class.	√	√	√	√	√	5%	
Case study and oral presentation Students will work in groups, prepare and deliver oral presentation on energy-environment nexus	√	√	√	√		20%	
Assignments One assignment on Technoeconomic Study and Life Cycle Assessment to demonstrate their understanding of concepts One assignment on Integrated Bioprocess Design to demonstrate their understanding of concepts	√	√	√	√	√	20%	
Reading exercises Reference books, journal papers and online materials related to the 'Case study' will be provided to students via an online platform. Students are required to post sensible questions after reading the materials to demonstrate their understanding of the topics.	√	√	√	√		5%	
Quizzes Students will be assessed via the examination their understanding of concepts learned in class, textbooks, reading materials and their ability to apply subject-related knowledge.	√	√	√	√	√	25%	
Examination: 25% (duration: 2 hours, if applicable)							
						100%	

Examination duration: 2 hrs
Percentage of coursework, examination, etc.: 75% by coursework; 25% 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 coursework (combination of in-class exercises, case study, oral presentation, 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.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Case study and oral presentation	Ability to identify and analyse a problem in an energy system or a process, and propose possible solutions	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. In-class exercises	Ability to apply concepts and theories to sustainable design of processes in practice	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Assignments	Ability to analyse and calculate practical problems in sustainable processes	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Reading exercises	Ability to evaluate and make sensible comments on reading materials related to the 'Case study' topic.	High	Significant	Moderate	Basic	Not even reaching marginal levels
5. Quizzes	Ability to analyse and calculate practical problems in energy, environment and sustainability-related issues.	High	Significant	Moderate	Basic	Not even reaching marginal levels
6. Final examination	Ability to analyse and calculate practical problems in energy, environment and sustainability-related issues.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Case study and oral presentation	Ability to identify and analyse a problem in an energy system or a process, and propose possible solutions	High	Significant	Moderate	Low

2. In-class exercises	Ability to apply concepts and theories to sustainable design of processes in practice	High	Significant	Moderate	Low
3. Assignments	Ability to analyse and calculate practical problems in sustainable processes	High	Significant	Moderate	Low
4. Reading exercises	Ability to evaluate and make sensible comments on reading materials related to the ‘Case study’ topic.	High	Significant	Moderate	Low
5. Quizzes	Ability to analyse and calculate practical problems in energy, environment and sustainability-related issues.	High	Significant	Moderate	Low
6. Final examination	Ability to analyse and calculate practical problems in energy, environment and sustainability-related issues.	High	Significant	Moderate	Low

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

- Global energy outlook
- Physics of energy conversion
- Sustainable energy systems
- Water-energy nexus
- Water footprint accounting
- Life cycle assessment
- Energy economics

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Richard Wolfson. Energy, environment, and climate. WW Norton & Company, 2017
2.	Jefferson Tester et al. Sustainable energy: choosing among options. MIT press, 2012.
3.	Charles F Kutscher, Jana B. Milford, and Frank Kreith. Principles of sustainable energy systems. CRC Press, 2018.

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Ibrahim Dincer, Marc A Rosen **Exergy: Energy, Environment and Sustainable Development,** Elsevier**,** 2020 (3rd Edition)
2.	John Michael Armstrong, **The Future of Energy**: **The 2021 guide to the energy transition**
3.	David JC MacKay, **Sustainable Energy –without the hot air,** 2008.
4.	Annual energy reports published by McKinsey, BP, Shell, and IEA
5.	Lin, C.S.K., Kaur, G., Li, C., Yang, X. (2021) Waste Valorisation: Rethinking Waste streams in a Circular Economy. John Wiley & Sons Inc., New York, United States.