City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester B 2022/23

Part I Course Overview

Course Title:	**Advanced Thermosciences for Energy Engineering**
Course Code:	**SEE6122**
Course Duration:	**One Semester**
Credit Units:	**3**
Level:	**P6**
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)*	**SEE8130 Advanced Thermosciences for Energy Engineering**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

This course aims to introduce the concept of thermosciences (including but not limited to thermodynamics and heat transfer) and applies them to a wide range of engineering technologies related to energy. These principles will help the students to build a strong foundation for further innovative studies of energy engineering. Problems-solving in energy engineering would be explored and the skills in critical thinking would be developed.

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 and apply principles of thermosciences in the context of energy engineering (including but not limited to thermodynamics and heats transfer)	40%	☑	☑	
2.	Analyse the energy production and consumption processes through case studies in processes and advanced/smart engineering devices.	40%	☑	☑	
3.	Apply the principles to problem-solving and designing of new energy systems (not limited to energy generation, utilisation and storage). Use a systems approach to simplify a complex problem.	20%		☑	
** If weighting is assigned to CILOs, they should add up to 100%.*		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 self-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. Teaching and Learning Activities (TLAs)

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

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Lecture	A format of two-third lectures and one-third tutorials will be used to help the students to understand and explore key issues, their underlying theory and the selection of case studies.	☑	☑	☑	2 hours/week
Tutorial	Topic-related tutorials will give the students an opportunity to practice. Mathematical-based and conceptual-based exercises will be used in a blended manner.	☑	☑	☑	1 hour/week
Presentations (optional)	The oral presentation is designed to develop information literacy skills and to acquire depth of knowledge on selected topics (depends on class condition)	☑	☑	☑	

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		
Continuous Assessment: _60___%					
In-class quizzes (two quizzes)	☑	☑	☑	30%	
Assignments (individual/group-based)		☑	☑	30%	
Examination: __40__% (duration: 2 hours , if applicable)					
** The weightings should add up to 100%.*				100%	

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, 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 in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. In-class quizzes	Ability to analyse and solve mathematical-based and conceptual-based problems	High	Significant	Basic to Moderate	Not even reaching basic levels
2.Assignment (Individual/group based)	It is a formative assessment on technical content (knowledge, comprehension, application, analysis) and the ability to engage in a structured way with the course materials.	High	Significant	Basic to Moderate	Not even reaching basic levels
3.Final Examination	Summative assessment on the technical accuracy of calculations and clarity of conceptual understanding of topics.	High	Significant	Basic to Moderate	Not even reaching basic levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. In-class quizzes	Ability to analyse and solve mathematical-based and conceptual-based problems	High	Significant	Moderate	Basic	Not even reaching basic levels
2.Assignment (Individual/group based)	It is a formative assessment on technical content (knowledge, comprehension, application, analysis) and the ability to engage in a	High	Significant	Moderate	Basic	Not even reaching basic levels

	structured way with the course materials.					
3.Final Examination	Summative assessment on the technical accuracy of calculations and clarity of conceptual understanding of topics.	High	Significant	Moderate	Basic	Not even reaching basic levels

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

1. Keyword Syllabus

- Advanced Thermodynamics
- Heat Transfer in reactions, devices etc.
- Energy Production and Consumption Process
- Thermal Reaction Engineering
- Separation and Equilibrium

2. Reading List

2.1 Compulsory Readings

1. B. R. Munson, D. F. Young, T. H. Okiishi, W. W. Huebsch, Fundamentals of Fluid Mechanics (any edition), Wiley.
2. Y. A. Cengel, J. M .Cimbala, R. H. Turner, Fundamentals of Thermal-Fluid Sciences (any edition), McGraw Hill Education.
3. P. Atkins, J. de Paula, Physical Chemistry: Thermodynamics, Structure, and Change (any edition), W. H. Freeman and Company New York.

2.2 Additional Readings

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

1.	H. Scott Fogler, M. Nihat Gurmen, Elements of Chemical Reaction Engineering (any edition), Wiley
2.	L. Theodore, Heat Transfer Applications for Practicing Engineer, Wiley.
3.	S. K. Agrawal, Applied Thermosciences: Principles and Applications, Anshan.
4.	Additional Notes from lectures