City University of Hong Kong
Course Syllabus

offered by
Department of Mechanical Engineering
with effect from Semester A 2023/2024

Part I Course Overview

Course Title:	Sustainable Engineering Practice
Course Code:	MNE6129
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)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The course aims to equip students with the quintessential experimental skills and further practical appreciation on the various sustainable engineering technologies. Being an experimental-based course, the course will also impart key skills in data collection and critical analysis of experimental data to good practice in report writing. Through this course, students will grow appreciation in bridging theoretical knowledge with experimental practice.

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.	Apply the theory of thermodynamics and heat transfer, to systems of energy efficiencies, for instance refrigeration cycle and heat exchanger design; collect and analyze relevant experimental data; apply good practice in report writing.			✓	
2.	Apply the theory of renewable energy conversion systems, such as photovoltaic solar cells, fuel cells and biofuel conversion; collect and analyze relevant experimental data; apply good practice in report writing.			✓	
3.	Apply the theory of environmental abatement techniques in air and wastewater purification; collect and analyze relevant experimental data; apply good practice in report writing.			✓	
4.	Apply good practice in verbal presentation of experimental findings.			✓	
		N.A.			

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	4	
Lecture	Explain key concepts and principles behind each experimental module.	✓	✓	✓		1 hr/week
Lab-based experiment and oral presentation	Hands-on lab session to acquire and analyze data; present experimental findings.	✓	✓	✓	✓	2 hrs/week

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		
Continuous Assessment: 100%						
Lab report	✓	✓	✓		85%	
Oral presentation				✓	15%	
Examination: 0%						
					100%	

To pass a course, a student must do the following:

Obtain at least 30% of the total marks allocated to each coursework component of lab reports and oral presentation.

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-) 75%-100%	Good (B+, B) 65%-74%	Marginal (B-, C+, C) 50%-64%	Failure (F) <50%
1. Lab report	Ability to explain the methodology and procedure and analyze the experimental data and discuss the experimental findings.	Strong evidence of critical thinking; good organization, capacity to analyze and synthesize; superior grasp of subject matter; evidence of extensive knowledge of the experimental matters concerned.	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with experiment.	Student who is profiting from the laboratory class; understanding of the subject; ability to develop solutions to concerning the experiment.	Little evidence of familiarity with the laboratory class materials; weakness in critical and analytic skills; limited, or irrelevant use of data.
2. Oral presentation	Ability to orally present the key information related to the experiments.	Strong ability to orally present the key information related to the experiments.	Good ability to orally present the key information related to the experiments.	Some ability to orally present the key information related to the experiments.	Not even reaching marginal levels.

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-) 75%-100%	Good (B+, B, B-) 60%-74%	Fair (C+, C, C-) 45%-59%	Marginal (D) 40%-44%	Failure (F) <40%
1. Lab report	Ability to explain the methodology and procedure and analyze the experimental data and discuss the experimental findings.	Strong evidence of critical thinking; good organization, capacity to analyze and synthesize; superior grasp of subject matter; evidence of extensive knowledge of the experimental matters concerned.	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with experiment.	Student who is profiting from the laboratory class; understanding of the subject; ability to develop solutions to concerning the experiment.	Sufficient familiarity with the laboratory content to enable the student to move onto other laboratory materials.	Little evidence of familiarity with the laboratory class materials; weakness in critical and analytic skills; limited, or irrelevant use of data.
2. Oral presentation	Ability to orally present the key information related to the experiments.	Strong ability to orally present the key information related to the experiments.	Good ability to orally present the key information related to the experiments.	Some ability to orally present the key information related to the experiments.	Marginal ability to orally present the key information related to the experiments.	Not even reaching marginal levels.

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.)

Energy efficiency:
Refrigeration cycle
Heat exchanger design

Renewable energy conversion:
Solar cells assembly and assessment
Fuel cells assembly and assessment
Waste to biofuel conversion

Environmental abatement
Advanced oxidation techniques
Treatment of wastewater

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.)

Nil

2.2 Additional Readings

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

1.	Cengel, Y.A., Boles, M.A., Thermodynamics: An Engineering Approach, McGraw-Hill, 2006.
2.	Incropera, F.P., DeWitt, D.P., Bergman, T.L., Lavine, A.S., Fundamentals of heat and mass trasnfer, John Wiley & Sons, New York, 2011.
3.	Hagfeldt, A., Boschloo, G., Sun, L., Kloo, L., Pettersson, H., Dye-sensitized solar cells, Chem. Rev. 2010, 110, 6595.
4.	O'Hayre, R., Cha, S.-W., Colella, W., Prinz, F.B., Fuel Cell Fundamentals, John Wiley and Sons, New York, 2006.
5.	Tchobanoglous, G., Burton, F., David Stensel, H., Wastewater Engineering: Treatment and Reuse, Metcalf and Eddy, McGraw-Hill, 2002.
6.	Burch, R., Knowledge and know-how in emission control for mobile applications, Catal. Rev.-Sci. Eng., 2004, 46, 271.