

SEE8126: EXPERIMENTAL TECHNIQUES IN ENERGY AND ENVIRONMENT

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Experimental Techniques in Energy and Environment

Subject Code

SEE - School of Energy and Environment

Course Number

8126

Academic Unit

School of Energy and Environment (E2)

College/School

School of Energy and Environment (E2)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

SEE6101 Energy Generation and Storage Systems

Equivalent Courses

SEE6119 Experimental Techniques in Energy and Environment

Exclusive Courses

Nil

Part II Course Details

Abstract

The course aims to equip students with the experimental skills and further practical appreciation on the various energy and environmental technologies. Being an experimental-based course, the course will also impart essential skills in data collection, 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.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-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 analyse relevant experimental data; apply good practice in report writing.	25		x	
2	Apply the theory of renewable energy conversion systems, such as photovoltaic solar cells, fuel cells and biofuel conversion; collect and analyse relevant experimental data; apply good practice in report writing.	25		x	
3	Apply the theory of environmental abatement techniques in air and wastewater purification; collect and analyse relevant experimental data; apply good practice in report writing.	25		x	
4	Apply good practice in verbal presentation of experimental findings.	25		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.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts and principles behind each experimental module	1, 2, 3	0.5 hr/week
2	Lab-based experiment and oral presentation	Hands-on lab session to acquire and analyze data; present experimental findings	1, 2, 3, 4	2.5 hr/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Lab report, lab quiz	1, 2, 3	85	-	No
2	Oral presentation	4	15	-	No

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

0

Additional Information for ATs

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

- obtain at least 30% of the total marks allocated towards coursework (combination of in-class exercises, case study, oral presentation, if applicable);
- obtain at least 30% of the total marks allocated towards final examination (if applicable); and
- meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)**Assessment Task**

Lab report, lab quiz (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to understand the objectives of the experiments, set up the experiments, acquire and analyze data, and draw conclusions based on the findings

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

Oral presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to orally present the key information related to the experiments

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

Lab report, lab quiz (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to understand the objectives of the experiments, set up the experiments, acquire and analyze data, and draw conclusions based on the findings

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate to Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Oral presentation (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to orally present the key information related to the experiments

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate to Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Energy efficiencies:

- 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 in wastewater treatment
- Treatment of wastewater

Reading List**Compulsory Readings**

	Title
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 transfer, 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.

Additional Readings

	Title
1	Nil