

# SEE3103: ENERGY EFFICIENCY FOR BUILDINGS

---

## Effective Term

Semester A 2023/24

## Part I Course Overview

### Course Title

Energy Efficiency for Buildings

### Subject Code

SEE - School of Energy and Environment

### Course Number

3103

### Academic Unit

School of Energy and Environment (E2)

### College/School

School of Energy and Environment (E2)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

SEE2101 Engineering Thermofluids I

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims to provide the students with the knowledge of our energy demands, major energy consumers and effective demand side management for efficient use of energy.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Analyse energy demand and predict future growth for both local and world markets.	20	x		
2 Evaluate energy efficiency of major energy consumers.	40		x	
3 Practise energy audit and demand side management to save energy, with innovative and creative solutions.	40		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 Lectures/Tutorials	Effective engineering and management methods to achieve high energy efficiency	1, 2, 3	
2 Project	In-depth understanding of building energy consumption and saving	1, 2, 3	

### Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1 Assignments Students show their ability to analyse energy demand, evaluate energy efficiency of major energy consumers, conduct energy audit and apply demand side management methods to save energy for buildings.	1, 2, 3	20	

2	Project Students demonstrate their ability to describe knowledge and innovation for building energy consumption and saving, including energy demand, energy efficiency, energy analysis and demand side management.	1, 2, 3	20	
---	--	---------	----	--

**Continuous Assessment (%)**

40

**Examination (%)**

60

**Examination Duration (Hours)**

2

**Additional Information for ATs****Examination:**

Students show their ability to determine energy consumption, energy saving, energy efficiency of major building energy consumers and demand side management methods.

Examination duration: 2 hrs

Percentage of coursework, examination, etc.: 40% by coursework; 60% 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 assignments, pop quizzes, term paper, lab reports and/ or quiz, 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.

**Assessment Rubrics (AR)****Assessment Task**

1. Assignments

**Criterion**

Ability to solve practical problems related to energy efficiency

**Excellent (A+, A, A-)**

Excellent performance in analysing energy consumption and saving; and applying energy engineering knowledge

**Good (B+, B, B-)**

Good performance in analysing energy consumption and saving; and applying energy engineering knowledge

**Fair (C+, C, C-)**

Medium performance in analysing energy consumption and saving; and applying energy engineering knowledge

**Marginal (D)**

Adequate performance in analysing energy consumption and saving; and applying energy engineering knowledge

**Failure (F)**

Poor performance in analysing energy consumption and saving; and applying energy engineering knowledge

---

**Assessment Task**

2. Project

**Criterion**

Ability to do independent critical thinking

**Excellent (A+, A, A-)**

Excellent performance in practising innovation for energy saving

**Good (B+, B, B-)**

Good performance in practising innovation for energy saving

**Fair (C+, C, C-)**

Medium performance in practising innovation for energy saving

**Marginal (D)**

Adequate performance in practising innovation for energy saving

**Failure (F)**

Poor performance in practising innovation for energy saving

---

**Assessment Task**

3. Examination

**Criterion**

Ability to apply engineering knowledge and skills to solve problems related to energy efficiency

**Excellent (A+, A, A-)**

Excellent performance in applying energy engineering knowledge and technical skills to improve energy efficiency

**Good (B+, B, B-)**

Good performance in applying energy engineering knowledge and technical skills to improve energy efficiency

**Fair (C+, C, C-)**

Medium performance in applying energy engineering knowledge and technical skills to improve energy efficiency

**Marginal (D)**

Adequate performance in practising innovation for energy saving

**Failure (F)**

Poor performance in practising innovation for energy saving

---

## Part III Other Information

**Keyword Syllabus**

Energy end-use data; Benchmark data; Demand side management; Energy audit; Energy management opportunities (EMO); Energy-saving economic analysis; Electrical power quality; Power factor; Harmonics; Energy-efficient lighting; Light-emitting diode (LED); Heating, ventilating and air conditioning (HVAC); Refrigeration; Heat pumps; Cogeneration; Heat recovery.

**Reading List****Compulsory Readings**

Title	
1	Albert Thumann, Terry Niehus and William J. Younger, Handbook of Energy Audits, 9th ed., Fairmont Press, 2012.
2	Brian S. Elliott, Compressed Air Operations Manual: An Illustrated Guide to Selection, Installation, Applications, and Maintenance, New York : McGraw-Hill, 2006.
3	Richard Vaillencourt, Simple Solutions to Energy Calculations, Lilburn, 3rd ed.GA: Fairmont Press, 2001.
4	Barney L. Capehart et al., Guide to Energy Management, 7th ed., Fairmont Press and CRC Press Talyor & Francis, 2012.

**Additional Readings**

Title	
1	2021 ASHRAE Handbook – Fundamentals, ASHRAE (IP), 2021.
2	Code of Practice for Energy Efficiency of Building Services Installation, EMSD, HKSAR Government, 2018.