

# CA5249: ENERGY MANAGEMENT FOR BUILDING SUSTAINABILITY

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Energy Management for Building Sustainability

### Subject Code

CA - Civil and Architectural Engineering

### Course Number

5249

### Academic Unit

Architecture and Civil Engineering (CA)

### College/School

College of Engineering (EG)

### Course Duration

One Semester

### Credit Units

3

### Level

P5, P6 - Postgraduate Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims to provide students with knowledge of building energy management. It will include the major issues of building energy efficiency and conservation significance, building energy management system, building system operation and control, occupant behavior impacts, building energy benchmarking and performance analysis, building energy performance enhancement technologies, application case studies of building energy management, smart building future developments, etc.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	understand building energy efficiency and conservation significance	x		
2	understand developments of the building energy management system, their major functions and features	x		
3	apply building system controls, and assess building energy performance and occupant behaviour impacts		x	
4	understand and apply technologies enhancing building energy performance	x	x	
5	understand smart building future developments and challenges	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	Lectures; seminars	Introduce the essential concepts and principles of building energy management, building system control, building performance benchmarking, building performance enhancement technologies and smart building developments	1, 2, 3, 4, 5 2 Hours/week

2	Tutorials	Explore and discuss the control strategies and building energy performance improvement, hand-on exercises and case studies	1, 2, 3, 4, 5	1 Hour/week
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**Additional Information for LTAs**

Semester Hours: 3 hours per week

Lecture/Tutorial/Laboratory Mix: Lecture (2); Tutorial (1); Laboratory (0)

**Assessment Tasks / Activities (ATs)**

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Mid-term test	1, 2, 3	25	nil	No
2	Assignment	1, 2, 3, 4, 5	25	nil	Yes

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

2

**Minimum Continuous Assessment Passing Requirement (%)**

30

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

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

Mid-term test (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 &amp; thereafter)

**Criterion**

ABILITY to RECOGNIZE and EXPLAIN the key concepts, factors, mechanisms, and concerns of building energy management.

**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

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**Assessment Task**

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

**Criterion**

1. CAPACITY to INQUIRE and ANALYSE the issues and relevant information and references with respect to given scenarios and context.
2. ABILITY to PRODUCE and ARTICULATE rational, substantiated and original discussion and/or suggestion.

**Excellent**

(A+, A, A-) High

**Good**

(B+, B, B-) Significant

**Fair**

(C+, C, C-) Moderate

**Marginal**

(D) Basic

**Failure**

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**Assessment Task**

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

**Criterion**

ABILITY to EXPLAIN and DISCUSS the key concepts, mechanisms, and concerns of building energy efficiency and conservation.

**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

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**Assessment Task**

Mid-term test (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

ABILITY to RECOGNIZE and EXPLAIN the key concepts, factors, mechanisms, and concerns of building energy management.

**Excellent**

(A+, A, A-) High

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**Assessment Task**

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**Part III Other Information****Keyword Syllabus**

Building energy efficiency, building energy conservation, building energy management system, building system control, building energy benchmarking, energy audit, retro-commissioning, maintenance, occupant behavior change, building energy storage technologies, building cluster-level energy management, smart building, etc.

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

Title	
1	Nil

**Additional Readings**

Title	
1	Control with a building energy management system, written by G.J. Levermore. Berkshire: Building Energy Management Systems Centre, BSRIA, c1988
2	Building energy management systems: the basics, written by G.J. Levermore. Berkshire: Building Energy Management Systems Centre, BSRIA, c1988
3	Building energy management systems: an application to heating and control, G.J. Levermore. London: E & FN Spon, 1992
4	Building control systems, Vaughn Bradshaw; illustrated by Kenneth E. Miller. 2nd ed. New York: Wiley, c1993
5	Modeling and Control of Complex Building Energy Systems. 2018
6	Sustainable thermal storage systems: planning, design, and operations, Lucas B. Hyman. New York: McGraw-Hill, 2011
7	A new methodology for building energy benchmarking: An approach based on clustering concept and statistical models.
8	Regression Tree-Based Methodology for Customizing Building Energy Benchmarks to Individual Commercial Buildings
9	Smart Buildings, Smart Communities and Demand Response
10	Development Trends in Building Services Engineering
11	Code of Practice for Building Energy Audit. 2021. Electrical and Mechanical Services Department, HKSAR Government