City University of Hong Kong
Course Syllabus

offered by Department of Architecture and Civil Engineering
with effect from Semester A 2023/24

Part I Course Overview

Course Title:	Energy Management for Building Sustainability
Course Code:	CA5249
Course Duration:	1 Semester (Some courses offered in Summer Term may start a few weeks earlier than the normal University schedule. Please check the teaching schedules with CLs before registering for the courses.)
Credit Units:	3
Level:	P5
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

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.

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.	understand building energy efficiency and conservation significance		✓		
2.	understand developments of the building energy management system, their major functions and features		✓		
3.	apply building system controls, and assess building energy performance and occupant behaviour impacts			✓	
4.	understand and apply technologies enhancing building energy performance		✓	✓	
5.	understand smart building future developments and challenges		✓		
		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	4	5	
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.	✓	✓	✓	✓	✓	2
Tutorials	Explore and discuss the control strategies and building energy performance improvement, hand-on exercises and case studies.	✓	✓	✓	✓	✓	1

Semester Hours:	3 hours per week
Lecture/Tutorial/Laboratory Mix:	Lecture (2); Tutorial (1); Laboratory (0)

4. Assessment Tasks/Activities
(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks / Activities	CILO No.					Weighting	Remarks
	1	2	3	4	5		
Continuous Assessment: 50%							
Mid-term test	✓	✓	✓			25%	
Assignment	✓	✓	✓	✓	✓	25%	
Examination: 50% (duration: 2 hour(s))							
Examination						50%	
						100%	

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%

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)
Mid-term test	1. ABILITY to RECOGNIZE and EXPLAIN the key concepts, factors, mechanisms, and concerns of building energy management.	High	Significant	Basic	Not even reaching marginal levels
Assignment	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.	High	Significant	Basic	Not even reaching marginal levels
Examination	1. ABILITY to EXPLAIN and DISCUSS the key concepts, mechanisms, and concerns of building energy efficiency and conservation.	High	Significant	Basic	Not even reaching marginal 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)
Mid-term test	1. ABILITY to RECOGNIZE and EXPLAIN the key concepts, factors, mechanisms, and concerns of building energy management.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Assignment	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.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	1. ABILITY to EXPLAIN and DISCUSS the key concepts, mechanisms, and concerns of building energy efficiency and conservation.	High	Significant	Moderate	Basic	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.)

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.

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.)

1.	Nil

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

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.