CA4174: SUSTAINABILITY AND BUILDING SYSTEMS INTEGRATION

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Sustainability and Building Systems Integration

Subject Code
CA - Civil and Architectural Engineering
Course Number
4174

Academic Unit
Architecture and Civil Engineering (CA)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

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

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The course aims at developing student's understanding of the principles of sustainable design, and the strategies and technologies to improve the sustainability and performance of buildings in relation to environmental impact.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the concepts of sustainable development, building sustainability audits relevance to architecture.		x		
2	Identify the strategies of environmental sustainability and their applications in the design of buildings and their environmental control systems.			x	
3	Explore the practice of sustainable building design and construction, including the design of building services systems to enhance environmental control in buildings.			x	
4	Comprehend the implementation of various assessment tools for green buildings and its effect on building systems integration design.			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	Students will be engaged with key principles, theories and standards for Sustainable Architectural Design and Development.	1, 2, 3, 4	
2	Tutorial	Students will be engaged in more detailed discussions on the lecture materials and/ or assessment tasks in a tutorial.	3, 4	

3	Seminar	Students will discuss, clarity and debate selected topics relating to the integrated studio or the various subject area courses.	2, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3, 4	60	
2	Mid-term test	1, 2	20	

Continuous Assessment (%)

80

Examination (%)

20

Examination Duration (Hours)

1.5

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

Assignments

Criterion

1.1 Thorough explanation on the concepts of sustainable development, building sustainability and its relevance to architecture.
1.2 Ability to identify the strategies of environmental sustainability and their applications in the design of buildings and their environmental control systems.
1.3 Thorough exploration of the practice of sustainable building design and construction; and skilful incorporation of the design of building services systems to enhance environmental control in buildings.
1.4 Thorough comprehension of the implementation of various assessment tools for green buildings and its effect on building systems integration design.

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

Mid-term test

Criterion

2.1 Thorough explanation on the concepts of sustainable development, building sustainability and its relevance to architecture.
2.2 Ability to identify the strategies of environmental sustainability and their applications in the design of buildings and their environmental control systems.

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

Examination

Criterion

3.1 Thorough exploration of the practice of sustainable building design and construction; and understanding on the design of building services systems to enhance environmental control in buildings.
3.2 Thorough comprehension of the implementation of various assessment tools for green buildings and its effect on building systems integration design.

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

Part III Other Information

Keyword Syllabus

- Principles of building sustainability: sustainable development; environmental sustainability; carbon footprint; energy efficiency; urban heat island; bio-diversity; embodied energy; renewable/regional materials; recycling; adaptive reuse; indoor environmental quality; material and water conservation.
- Assessments: air ventilation assessment; OTTV; life cycle cost and assessment; green building assessment.
- Building services: Types and systems; plant requirement and primary sizing; plant arrangement and space planning implications; services coordination; innovative building systems for sustainability.
- Intelligent buildings: Concept of intelligent buildings; energy efficiency; vertical transportation systems; communication systems; security systems; building automation and lighting systems.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Bauer, M., Mösle, P. and Schwarz, M. (2009) Green building: Guidebook for sustainable architecture, New York: Springer, 2009.
2	Berge, B. (2001) The ecology of building materials, Oxford: Architectural Press.
3	Drake, S. (2007) The third skin: Architecture, technology and environment, New South Wales: UNSW Press.
4	Feireiss, K. and Feireiss, L. (2008) Architecture of change: Sustainability and humanity in the built environment, Berlin: Gestalten.
5	Hong Kong Green Building Council (2011) "Hong Kong report on the state of sustainable building 2011", World Sustainable Building Conference 2011, Helsinki, Finland.
6	Kibert, C. J. (2007) Sustainable construction: Green building design and delivery, 2nd Edition, Hoboken: Wiley.
7	Kwok, A. and Grondzik, W. (2007) The green studio handbook: Environmental strategies for schematic design, Burlington: Architectural Press.
8	Steele, J. (1997) Sustainable architecture: Principles, paradigms, and case studies, New York: McGraw.
9	Williams, D. E. (2007) Sustainable design: Ecology, architecture, and planning, Hoboken: Wiley.
10	Code of Practice for Overall Thermal Transfer Value in Buildings 1995, Hong Kong: Building Authority.
11	PNAP on OTTV https://www.bd.gov.hk/doc/en/resources/codes-and-references/practice-notes-and-circular-letters/pnap/APP/APP156.pdf