CA5312: GREEN BUILDING MATERIALS AND SUSTAINABLE PRACTICE

Effective Term
Semester A 2026/27

Part I Course Overview

Course Title
Green Building Materials and Sustainable Practice

Subject Code
CA - Civil and Architectural Engineering
Course Number
5312

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

Additional Information
Nil

Part II Course Details

Abstract

The construction industry is at the forefront of the global push toward sustainability, with a critical need to balance infrastructure development with environmental responsibility. This course is structured to provide students with a comprehensive understanding of advanced green building materials and sustainable practices. The curriculum focuses on cutting-edge building materials such as low-carbon concrete, recycled/renewable composites, alkali-activated materials, advancements in nanotechnology, and smart materials. The course also emphasizes sustainable practices in construction materials, including life cycle assessment, circular economy principles, and energy-efficient techniques, to minimize the environmental footprint of the industry. Through interactive lectures, collaborative projects, and assessments, students will gain practical experience in evaluating, selecting, and designing sustainable building material solutions. By bridging engineering principles with sustainability practices, this course prepares students to lead transformative efforts in creating innovative, green, and more resilient infrastructure.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the fundamental principles of various innovative green building materials including low-carbon concrete, recycled cementitious materials, alkali-activated materials, and advancements in nanotechnology and smart materials, within the context of sustainable building design;		x	x	
2	Assess the potential impacts and effectiveness of different sustainable practices and policies in building materials;		x	x	
3	Apply material science and engineering principles to design and assess low-carbon and energy-efficient building materials that align with current environmental standards.		x	x	x
4	Demonstrate the ability to critically analyse and contribute to future developments in sustainable construction practices.		x	x	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	Student will engage in lecture activities about the topics closely related to green building materials and sustainable practices.	1, 2, 3, 4	
2	Tutorial	Students will participate in class discussions and activities focused on solving issues related to the design and evaluation of advanced green building materials and sustainable construction practices.	2, 3, 4	

Assessment Tasks / Activities (ATs)

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

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Assessment Rubrics (AR)

Assessment Task

Mid-term Test

Criterion

ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to green building materials.

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
ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to green building materials and sustainable practices.

Excellent (A+, A, A-)
High

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Part III Other Information

Keyword Syllabus
Green Building Materials, Sustainability in Construction, Nanotechnology, Smart Materials, Recycled and Renewable Materials, Lifecycle Assessment, Circular Economy, Modern Construction Techniques

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Spiegel, R., & Meadows, D. (2010). Green building materials: a guide to product selection and specification. John Wiley & Sons.
2	Das, B. B., & Neithalath, N. (2018). Sustainable construction and building materials. ICSCBM 2018. Springer. ISBN: 978-981-13-3317-0
3	Khatib, J. (2016). Sustainability of construction materials. Woodhead Publishing.

4	Curran, M. (2012). Life cycle assessment handbook: a guide for environmentally sustainable products. John Wiley & Sons.
5	Kibert, C. J. (2016). Sustainable construction: green building design and delivery. John Wiley & Sons.
6	Keitsch, M. M. (2015). Sustainable design: concepts, methods and practices. In Routledge International Handbook of Sustainable Development. Routledge.
7	Huseien, G. F., Khalid, N. H. A., & Mirza, J. (2022). Nanotechnology for smart concrete. CRC Press.
8	Lazar, P. (2024). High-performance Sustainable Materials and Structures: Processing, Evaluation and Applications. Springer Nature.
9	Ghosh, S. K. (2009). Self-healing materials: fundamentals, design strategies, and applications. Weinheim: Wiley-vch.
10	Sanjayan, J. G., Nazari, A., & Nematollahi, B. (2019). 3D concrete printing technology: construction and building applications. Butterworth-Heinemann.