

CA5314: SUSTAINABLE FIRE SAFETY TECHNOLOGIES AND BUILDING MATERIALS

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

Sustainable Fire Safety Technologies and Building Materials

Subject Code

CA - Civil and Architectural Engineering

Course Number

5314

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

This course introduces the fundamental principles of fire safety and provides practical insights into fire safety systems and sustainable green flame retardant materials for building and construction. The course explores the environmental challenges posed by traditional flame-retardant materials and focuses on innovative, eco-friendly alternatives. Through interactive lectures, assignments, and assessments, students will gain knowledge of sustainable fire safety systems, green building certifications, and the integration of fire-resistant materials into modern construction practices. The course covers key topics such as fire dynamics, green flame retardants, fire performance testing and standards and building codes. By integrating fire safety with environmental responsibility, the course prepares students to address modern challenges in creating buildings that are safe, sustainable, and compliant with environmental standards.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the fundamental principles of fire safety, combustion and thermal degradation and the main mechanisms and synthesis methods for developing flame retardant materials		x	x	
2	Assess the fire performance of flame retardant materials and their environmental impacts and effects on building performance and sustainability development;		x	x	
3	Apply knowledge of sustainable fire safety materials to design environmentally friendly and safe building systems.		x	x	x
4	Explain the emerging trends in sustainable fire safety technologies and green building certifications.		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	Students will engage in lectures on fire safety fundamentals, flame retardants, and sustainable technologies.	1, 2, 3, 4	

2	Tutorial	Students will participate in class discussions and activities focused on designing sustainable fire safety systems and evaluating case studies.	2, 3, 4	
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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	Individual 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 fire safety principles and material retardant mechanisms

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

Individual assignments

Criterion

ABILITY to DESIGN and ANALYSE sustainable fire safety solutions to solve a fire engineering problem

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 fire safety principles and material retardant mechanisms

Excellent (A+, A, A-)

High

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Significant

Fair (C+, C, C-)

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Failure (F)

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Part III Other Information

Keyword Syllabus

Fire Safety, Combustion, Thermal Degradation, Fire Safety Systems, Green Flame Retardants, Material Fire Testing, Fire Safety Standards, Green Building Certifications

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	A. E. Cote - Fire Protection Handbook, 2002, National Fire Protection Association, Quincy, Mass.
2	Philip J. DiNenno et al. - SFPE Handbook of Fire Protection Engineering, 2015, Society of Fire Protection
3	Horrocks, A.R., Price, D. and Price, D. eds., 2001. Fire retardant materials. Woodhead Publishing.
4	Fire Services Department - Codes of Practice for Minimum Fire Service Installations and Equipment. 2005, Fire Safety Department, Hong Kong
5	Fire Services Department - Code of Practice for Fire Safety in Buildings 2011, Fire Safety Department, Hong Kong
6	Song, P., Zhang, Y. and Wen, X. eds., 2023. Green Fire Retardants for Polymeric Materials (No. 82). Royal Society of Chemistry.