CA4737: FIRE SCIENCE AND MODELLING

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Fire Science and Modelling

Subject Code
CA - Civil and Architectural Engineering
Course Number
4737

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
CA3732 Fire Engineering and Piped Services

Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to provide students with in-depth theoretical base for fire science, fire dynamics and fire modelling and to further the study on the fire properties of materials in building technology.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	develop the in-depth knowledge in pyrolysis of solid, ignition phenomena, combustion mechanism, fire science and fire dynamics;				
2	investigate the fire characteristics and fire resistance properties of building material;				
3	apply the advanced development and researches in fire engineering to building fires;				x
4	apply the mathematical models to predict fire scenarios.				

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.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures and class tests	Develop the in-depth knowledge fundamentals in fire science and fire dynamics, fire characteristics and materials fire properties; and apply models for the fire research and engineering	1, 2, 3, 4	
2	Tutorials	Tutorials to assistant teaching sessions for above	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Mid-term Test	1, 2	20	
2	Assignments	1, 2, 3, 4	30	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

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

Criterion

Ability to appreciate and apply CILO 1 to 2

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal level

Assessment Task

Assignments

Criterion

Ability to appreciate CILO 1 to 4

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal level

Assessment Task
Examination

Criterion
Ability to appreciate and apply CILO 1 to 4

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal level

Part III Other Information

Keyword Syllabus
Fire processes. Thermochemistry. Premixed and diffused flames. Thermal decomposition. Combustion. Compartmental fires. Building fire modeling. Use of computing models and computational fluid dynamic to simulate the fire and smoke behaviour.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Drysdale, D.D., An Introduction to Fire Dynamics, John Wiley & Sons.
2	Karlsson, B. and Quintiere, J.G., Enclosure Fire Dynamics, CRC Press.

3	G.H. Yeoh and K.K. Yuen - Computational Fluid Dynamics in Fire Engineering: Theory, Modelling and Practice, Edition 1, 2008, Elsevier.
4	Fire Dynamic Simulator: FDS-SMV official site: http://www.fire.nist.gov/fds/