

CA3793: SYSTEM MODELLING FOR ARCHITECTURAL ENGINEERING

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

System Modelling for Architectural Engineering

Subject Code

CA - Civil and Architectural Engineering

Course Number

3793

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

CA3791 Computer Aided Design Practices

Exclusive Courses

Nil

Part II Course Details

Abstract

The course aims to introduce the fundamental theories of different modelling techniques to the students for the design of different architectural engineering systems and to allow students to realize the critical design parameters of the systems.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Describe the theories of different modelling approaches for architectural engineering systems	40	x		
2	Enumerate the design parameters required to model the architectural engineering systems	10	x		
3	Develop system modelling approaches to evaluate the performances of the architectural engineering systems	30			x
4	Using the system modelling approaches to optimize the designs of the architectural engineering systems	20		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.

Teaching and Learning Activities (TLAs)

TLAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts and modelling techniques for different architectural engineering systems	1, 2, 3, 4	2 hours/week
2	Tutorial	Clarify the students' questions and reinforce the knowledge delivered in lectures.	1, 2, 3, 4	1 hour/week

Assessment Tasks / Activities (ATs)

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

- 1.1 ABILITY to DESCRIBE the theories of different modelling approaches for architectural engineering systems
- 1.2 ABILITY to ENUMERATE the design parameters required to model the architectural engineering 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

Assignments

Criterion

- 2.1 ABILITY to ENUMERATE the design parameters required to model the architectural engineering systems
- 2.2 ABILITY to DEVELOP system modelling approaches to evaluate the performances of the architectural engineering systems
- 2.3 ABILITY to USE the system modelling approaches to optimize the designs of the architectural engineering 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 ABILITY to DESCRIBE the modelling techniques for architectural engineering systems

3.2 ABILITY to APPLY the modelling technique to evaluate the performance of the architectural engineering 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

Part III Other Information**Keyword Syllabus**

Computational fluid dynamics, transport equation, Navier-Stokes equations, discretization, zone model, basic fire dynamics, mass-momentum-energy conservation equations, basic photometry, ray tracing techniques, heat transfer in buildings, cooling load temperature difference method (CLTD), cooling load factor method (CLF), ventilation, compartment fire, daylighting, artificial lighting, building thermal load, building energy analysis.

Reading List**Compulsory Readings**

	Title
1	Drysdale, D. (1999) Introduction to fire dynamics, Chichester: John Wiley & Sons (QD516.D79 1999)
2	Versteeg, H.K. and Malalasekera, W. (2007) An introduction to computational fluid dynamics - the finite volume method, Pearson: Prentice Hall (QA911 .V47 2007)
3	Sansoni, P., Mercatelli, L. and Farini, A. (2015) Sustainable indoor lighting, Springer London. (electronic resources in CityU)
4	CIBSE (1998) Building energy and environmental modelling, CIBSE: London (TH6021.A66 1998)

Additional Readings

	Title
1	Nil