CA5018: MODELLING AND COMPUTATIONAL TECHNIQUES FOR BUILT ENVIRONMENT

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Modelling and Computational Techniques for Built Environment

Subject Code
CA - Civil and Architectural Engineering
Course Number
5018

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
BC5018 Modelling and Computational Techniques for Built Environment

Exclusive Courses
Nil

Part II Course Details

Abstract

The course provides the knowledge about the theories and computer implementations of the modeling and computational techniques. It allows students to appreciate the application of computational techniques to model problems in built environment and the use of commercial software packages.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand and apply the modeling techniques and computer software packages to solve problems related to engineering researches				
2	Discover and explain the properties of different modeling techniques			x	
3	Explore the significance and limitations of empirical approach, and the use of simulation models for engineering research problems				

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	Lectures and class tests	Understand and apply the modeling techniques and computer software packages to solve problems related to engineering researches, the properties of different modeling techniques, Explore the significance and limitations of empirical approach, and the use of simulation models for engineering research problems	1, 2, 3	
2	Tutorials	Tutorials to assistant teaching sessions for above	1, 2, 3	

Additional Information for LTAs

Semester Hours: - hours per week

Lecture/Tutorial/Laboratory Mix: Lecture (Mixed); Tutorial (Mixed); Laboratory (Mixed)

39 contact hours

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3	30	formative assessment	Yes
2	Class tests	1	20	summative assessment	No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

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 (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to appreciate and apply CILO 1 to 3

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

Class tests (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to appreciate CILO 1

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 (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to appreciate and apply CILO 1 to 3

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 (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to appreciate and apply CILO 1 to 3

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Class tests (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to appreciate CILO 1

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Examination (Applicable to students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to appreciate and apply CILO 1 to 3

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus
Finite element method, finite difference method, finite volume method, numerical optimization algorithm, system dynamics, Artificial Neural Network (ANN), fuzzy logic.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Reddy, J.N. (2005) An Introduction to the Finite Element Method, third edition
2	Stasa, F.L. (1995) Applied finite element analysis for engineers
3	Epton, J. (1994) Expert System and Optimisation, Aldershot, Hants, England, Avebury Technical.
4	Harvey, R.L., (1994) Neural Network Principles, Englewood Cliffs, Prentice Hall.
5	Stauffer, D. (1993) Computer Simulation and Computer Algebra: Lectures for Beginners, 3rd Edition, Berlin, Springer-Verlag.
6	Coyle R.G. (1996) System Dynamics Modeling: A Practical Approach, Chapman & Hall, London.