

CA2668: DIGITALISATION IN ARCHITECTURE, SURVEYING AND ENGINEERING

New Syllabus Proposal

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

Digitalisation in Architecture, Surveying and Engineering

Subject Code

CA - Civil and Architectural Engineering

Course Number

2668

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

Nil

Exclusive Courses

Nil

Additional Information

Nil

Part II Course Details

Abstract

The course aims to provide students with essential knowledge of emerging digital technologies relevant to architecture, surveying, and engineering while promoting critical thinking and adaptability in a technology-driven world.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the core principles and functionalities of emerging digital technologies.		x	x	
2	Discuss practical applications of these technologies in construction and engineering projects.		x	x	x
3	Describe the benefits, challenges, and ethical implications of integrating digital tools into construction		x	x	x
4	Identify the impact of digitalisation on sustainability, efficiency, and innovation in architecture and engineering workflows.		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 formal lectures to gain knowledge about basic principles in digitalisation in architecture, surveying and engineering and their applications in construction projects.	1, 2, 3, 4	2 hours/week

2	Tutorial/ Assignment	Student will engage in tutorial activities and coursework to extend their knowledge in digitalisation in architecture, surveying and engineering and their applications in construction projects.	1, 2, 3, 4	1 hour/week
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Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignment	1, 2, 3, 4	30	-	Yes
2	Mid-term test/quiz	1, 2, 3, 4	20	-	No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

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**

Assignment

Criterion

Evaluating students' ability to apply one or more digital technologies to practical architecture or engineering problems

Excellent (A+, A, A-)

Exceptional

Good (B+, B, B-)

High

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not reaching marginal level

Assessment Task

Mid-term test/quiz

Criterion

Assessing students' basic understanding of key concepts, definitions, and applications of emerging technologies covered in the course.

Excellent (A+, A, A-)

Exceptional

Good (B+, B, B-)

High

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not reaching marginal level

Assessment Task

Examination

Criterion

Evaluating students' comprehensive knowledge of digitalisation in architecture, surveying, and engineering through a combination of essay and problem-solving questions.

Excellent (A+, A, A-)

Exceptional

Good (B+, B, B-)

High

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not reaching marginal level

Part III Other Information

Keyword Syllabus

Artificial Intelligence (AI); Generative AI (GenAI); Computer Vision; Machine Learning; Big Data; Extended Reality (XR); Internet of Things (IoT); Laser Scanning; Point Cloud Data; Digital Twins; Building Information Modelling (BIM)

Reading List

Additional Readings

Title	
1	Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2018). BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, and Contractors. Wiley.
2	Kensek, K. M. (2014). Building Information Modeling. Routledge.
3	Marr, B. (2018). Big Data in Practice: How 45 Successful Companies Used Big Data Analytics to Deliver Extraordinary Results. Wiley.
4	Wang, X., & Schnabel, M. A. (Eds.). (2016). Mixed Reality in Architecture, Design, and Construction. Springer.
5	Picon, A. (2010). Digital Culture in Architecture: An Introduction for the Design Professions. Birkhäuser.
6	Mitchell, W. J. (1996). City of Bits: Space, Place, and the Infobahn. MIT Press.
7	Russell, S., & Norvig, P. (2020). Artificial Intelligence: A Modern Approach (4th ed.). Pearson.
8	Whyte, J. (2019). Virtual Reality and the Built Environment (2nd ed.). Routledge.
9	Lu, W., Lai, C. C., & Tse, T. (2019). BIM and Big Data for Construction Cost Management. Routledge
10	Pan, L., & Zhang, L. (Eds.). (2021). Artificial Intelligence in Construction Engineering and Management. Springer.
11	Vagale, K., & Panagopoulos, G. (Eds.). (2023). Artificial Intelligence and Machine Learning Techniques for Civil Engineering. IGI Global.
12	Bilal, M., Oyedele, L. O., & Akinade, O. (2021). Big Data Analytics in Construction: Concepts, Tools, and Applications. CRC Press.