

CA5201: ADVANCED ARCHITECTURAL DESIGN STUDIO: DIGITAL ARCHITECTURE

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Advanced Architectural Design Studio: Digital Architecture

Subject Code

CA - Civil and Architectural Engineering

Course Number

5201

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

6

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

Recently, with the rapid development of Stable Diffusion and its series of control plugins, Artificial Intelligence (AI) has undergone a qualitative mutation in the field of architectural design. In this course, we will use the latest generative AI techniques, train and practice creative AI models for architectural design. We will start with the theoretical introduction and literature interpretation of artificial intelligence combined with design, covering architecture, cities, structures, art design, and other fields. At the same time, we will introduce the computer theory of AI and feature engineering to expand students' knowledge systems. Next, we will introduce the training and application of generative AI models for the deployment of Stable Diffusion, LoRA, and ControlNET. Finally, students will work on a personal design and research project to train and test AI models with specific architectural design topics.

Course Intended Learning Outcomes (CILOs)

| CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|--|--------|--------|--------|
| 1 | be aware of the future design trends of advanced design techniques combining with digital design concepts | x | | |
| 2 | master advanced artificial intelligence techniques and the applications in architectural design | | x | |
| 3 | design a complete architecture project using digital design tools such as artificial intelligence platform and scripting | | x | x |
| 4 | prepare professional presentation and documentation of a design project | | 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 | Design Studio | Demonstrate an understanding of digital design techniques in architecture; Using digital design methods to develop an architectural or urban design project; Practicing advanced architectural representation of the design project. | 1, 2, 3, 4 |

Additional Information for LTAs

Semester Hours: 6 hours per week

Lecture/Tutorial/Laboratory Mix: Lecture (0); Tutorial (0); Laboratory (6*)
*Studio

Assessment Tasks / Activities (ATs)

| ATs | CILO No. | Weighting (%) | Remarks (e.g. Parameter for GenAI use) | |
|-----|-------------|---------------|--|----------------|
| 1 | Assignments | 1, 2, 3, 4 | 100 | Design project |

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task

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

Criterion

Attitude to demonstrate an understanding of digital design and artificial intelligence;
Ability to use digital design methods and techniques to develop a project on architectural and urban design;
Ability to prepare high-quality design representation with diagrams and renderings.

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base

Good

(B+, B, B-) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues

Fair

(C+, C, C-) Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material

Marginal

(D) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills

Assessment Task

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

Criterion

Attitude to demonstrate an understanding of digital design and artificial intelligence;
Ability to use digital design methods and techniques to develop a project on architectural and urban design;
Ability to prepare high-quality design representation with diagrams and renderings.

Excellent

(A+, A, A-) Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base

Good

(B+, B,) Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues

Marginal

(B-, C+, C) Sufficient familiarity with the subject matter to enable the student to progress without repeating the course

Failure

(F) Little evidence of familiarity with the subject matter; weakness in critical and analytic skills

Part III Other Information**Keyword Syllabus**

Architectural design, Design studio, Digital design, Artificial intelligence, Architectural representation and documentation.

Reading List**Compulsory Readings**

| Title | |
|-------|-----|
| 1 | Nil |

Additional Readings

| Title | |
|-------|--|
| 1 | Caneparo L, Cerrato A. Digital fabrication in architecture, engineering and construction[M]. Springer Netherlands, 2014. |
| 2 | Williams K. Digital Fabrication[M]//Digital Fabrication. Birkhäuser, Basel, 2012: 407-408. |
| 3 | Iwamoto L. Digital fabrications: architectural and material techniques[M]. Princeton Architectural Press, 2013. |
| 4 | Dunn N. Digital fabrication in architecture[M]. Laurence King Publishing, 2012. |
| 5 | Terzidis K. Algorithmic architecture[M]. Routledge, 2006. |
| 6 | Architectural Design 0403 emergences |
| 7 | Architectural Design 0602 Mophogenetic Design |
| 8 | Agkathidis A. Generative design[M]. Hachette UK, 2016. |