

CA29503: TECHNICAL STUDIES - DESIGN DEVELOPMENT

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Technical Studies - Design Development

Subject Code

CA - Civil and Architectural Engineering

Course Number

29503

Academic Unit

Architecture and Civil Engineering (CA)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

A1, A2 - Associate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

BST21053 Technical Studies - Design Development; or BST21253 Technical Studies 3 and BST21254 Technical Studies 4

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to provide an opportunity for you to reinforce your understanding of the integration of structural, material and other technical considerations for the design development of complex and multi-use high-rise building projects.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain various types of foundation systems and their suitability for use in high-rise building design under different conditions.		x		
2	Outline the functional requirements for common structural components for a high-rise building, including transfer plate, outrigger, shear wall and other long-span structural member.		x		
3	Incorporate principles of buildability and prefabrication in the design of a high-rise building.			x	
4	Discover the technical design principles and techniques for a high-rise building.			x	
5	Develop technical solutions and a set of general details for a high-rise building including external works.			x	
6	Design a high-rise building with a concrete and/or steel structure in relation to its external appearance and spatial layout.				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	Consists of oral presentations by instructors intended to present information on a particular subject. Other forms of teaching and learning activities will also be used to stimulate students' participation during a lecture.	1, 2, 3, 4, 5, 6
2	Tutorial	Activity complementary to the lecture classes to provide more opportunities for student-instructor and student-student interaction. Students will be engaged in more detailed discussions on the lecture materials and/or assessment tasks in a tutorial.	2, 3, 4, 5, 6
3	Seminar	Consists of oral presentations by instructors and/or external guests, which focuses on a selected topic relating to the integrated studio or the various subject area courses.	5, 6
4	Design Project	Engages students in the production of an integrated proposal for a building in response to a set of constraints and requirements. Teaching and learning are conducted through regular studio classes in which students will develop their design proposals with a studio tutor.	2, 3, 4, 5, 6

5	Problem Case	Engages students in the solving of a building-related problem. Teaching and learning are conducted through individual research and regular problem classes, in which students will discuss and share information found on a problem under the facilitation of a studio tutor.	2, 3, 4, 5, 6	
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Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments	1, 2, 3, 4, 5, 6	30	
2	Quiz	1, 2, 3, 4, 5, 6	20	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)**Assessment Task**

Assignments

Criterion

1.1 Consistent and thorough incorporation of the principles of buildability and prefabrication in the design of a high-rise building.

1.2 Excellent discovery of the technical design principles and techniques for a high-rise building. Thorough incorporation in the design project.

1.3 Insightful development of technical solutions for a high-rise building. Thorough attempt to produce a comprehensive set of general details for a high-rise building.

1.4 Outstanding and innovative design of a high-rise building with a concrete and/or steel structure. Thorough consideration of the relationship of the structure to its external appearance and spatial layout.

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

Quiz

Criterion

2.1 Thorough and correct explanation of various types of foundation systems and their suitability for use in high-rise building design under different conditions.

2.2 Clear and comprehensive outline of the functional requirements for the common structural components for a high-rise building. Insightful attempt to apply the understanding in the solving of project and problem solutions.

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

3.1 Thorough and correct explanation of various types of foundation systems and their suitability for use in high-rise building design under different conditions.

3.2 Clear and comprehensive outline of the functional requirements for the common structural components for a high-rise building. Insightful attempt to apply the understanding in the solving of project and problem solutions.

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

- Foundation design for high-rise buildings: Foundation techniques; piled foundation and piling systems; pile construction process and testing.
- Structural systems for high-rise buildings: Column; beam; transfer plate; outrigger; shear wall.
- Long-span structure: Frame; arch; girder; truss; space frame; folded-plate structures; shell structures; tension roof structures.
- Buildability: Principles of buildability; modularity; coordination.
- Prefabrication: Principles; prefabrication; on-site prefabrication; semi-prefabrication; site construction; frame system; panel system; modular system; concrete facade systems; prefabricated wall elements; windows; doors; stairs and slabs
- Advanced curtain wall design: Construction methods; connections; fixing; jointing; glazing; detailing.
- Interior components: System partitions; flooring and ceiling systems; furnishing and equipment.
- Site works: External and landscape works; external work details.

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Day, R.W. (2010) Foundation engineering handbook: design and construction with the 2009 international building code. (2nd ed.) New York: McGraw-Hill
2	Gaventa, S. (2001) Concrete design. London: Mitchell Beazley
3	Iwamoto, L. (2009) Digital fabrications: architectural and material techniques. New York: Princeton Architectural Press.
4	Murray, S. (2009) Contemporary curtain wall architecture. New York: Princeton Architectural Press.
5	Spence, W. P. , Kultermann, E. (2011) Construction materials, methods and techniques. Building for a sustainable future. New York: Delmar, Cengage Learning
6	Smith, B.S. , Coull, A. (1991) Tall Building Structures - Analysis and Design. New York: John Wiley & Sons.
7	Staib, G., Doerrhoefer, S., Rosenthal, M. (2008) Components and systems: modular construction: design, structure, new technologies. Basel: Birkhaeuser
8	Taranath, B.S.(1998) Steel, concrete and composite design of tall buildings. New York: McGraw Hill.