City University of Hong Kong
Course Syllabus

offered by Department of Architecture and Civil Engineering with effect from Semester A 2021/22

Part I Course Overview

Course Title:	Innovations in Construction Technology
Course Code:	CA3171
Course Duration:	1 Semester (Some courses offered in Summer Term may start a few weeks earlier than the normal University schedule. Please check the teaching schedules with CLs before registering for the courses.)
Credit Units:	3
Level:	B3
Proposed Area: *(for GE courses only)*	[] Arts and Humanities [] Study of Societies, Social and Business Organisations [] Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	CA3618 Construction Technology / CA3703 Construction Methods and Equipment

Part II Course Details

1. Abstract

(A 150-word description about the course)

The course fosters students' understanding of the relationship between architecture and construction through the study of recent developments in materials, design and construction technologies. An overview of the assembly/construction principles using conventional building materials and the construction methods for various types of structural elements, interior components, and site work will be provided. Contemporary advances in materials, design and construction techniques such as the issues pertinent to emergent materials, environmental concerns, sustainable design, digital manufacturing, digital fabrication, smart construction materials and technology, and the applications of 3D-printing, virtual and augmented reality techniques in construction will also be presented. The course stimulates students to reflect on the relationship between architecture and construction and how architecture differs from mere construction.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs [#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Depict the assembly/construction principles for common building materials (e.g., concrete, masonry, steel and timber) and how it affects the decision-making in architectural design;			✓	
2.	Describe the construction methods of various types of structural elements, interior components, and site work;			✓	
3.	Enumerate the emerging issues in contemporary building construction and explain how to address the issues in architectural design;		✓	✓	
4.	Illustrate the advancements in digital techniques and potential applications and/or integration of the techniques in architecture and construction.		✓	✓	
** If weighting is assigned to CILOs, they should add up to 100%.*		100%			

[#] *Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.*

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 self-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.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.				Hours / week (if applicable)
		1	2	3	4	
Lectures	Oral presentations delivered by the instructors covering various subjects related to material choices, construction methods, emerging issues, new technology, and pertinent architectural design considerations	✓	✓	✓	✓	
Tutorial, laboratory demonstration, and site visit	Case studies; demonstration of the digital techniques and construction technology in the laboratory or at actual construction sites		✓	✓	✓	

Semester Hours:	3 hours per week
Lecture/Tutorial/Laboratory Mix:	Lecture (2); Tutorial / Laboratory / Site visit mix (1)

4. Assessment Tasks/Activities

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks / Activities	CILO No.				Weighting*	Remarks
	1	2	3	4		
Continuous Assessment: 80%						
Mid-term test	✓	✓	✓		20%	
Assignments	✓	✓	✓	✓	60%	
Examination: 20% (duration: 1.5 hour(s))						
Examination	✓	✓	✓		20%	
* The weightings should add up to 100%.					100%	

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%

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)/ Pass (P) on P/F basis	Failure (F)

Mid-term Test	1.1 Demonstrate understandings in the assembly/construction principles for common building materials (e.g., concrete, masonry, steel and timber) and how it affects the decision-making in architectural design. 1.2 Ability to explain the construction methods of various types of structural elements, interior components, and site work; 1.3 Ability to enumerate the emerging issues in contemporary building construction and explain how to address the issues in architectural design.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Assignments	2.1 Demonstrate understandings in the assembly/construction principles for common building materials (e.g., concrete, masonry, steel and timber) and how it affects the decision-making in architectural design. 2.2 Ability to explain the construction methods of various types of structural elements, interior components, and site work; 2.3 Ability to enumerate the emerging issues in contemporary building construction and explain how to address the issues in architectural design. 2.4 Ability to illustrate the advancements in digital techniques and potential applications and/or integration of the techniques in architecture and construction	High	Significant	Moderate	Basic	Not even reaching marginal levels

Examination	3.1 Demonstrate understandings in the assembly/construction principles for common building materials (e.g., concrete, masonry, steel and timber) and how it affects the decision-making in architectural design. 3.2 Ability to explain the construction methods of various types of structural elements, interior components, and site work; 3.3 Ability to enumerate the emerging issues in contemporary building construction and explain how to address the issues in architectural design.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Building materials (concrete, masonry, steel, and timber); Construction methods (foundations, beams and columns, slabs and walls, roofs, stairs, openings, façade systems, and connections/joints); Interior components (flooring and ceiling systems, furnishing and equipment); Site works (external and landscape works);

Modularity; Prefabrication; Environmental concerns and challenges; New materials; Introduction to sustainable design;

Recent development of digital technologies (digital architecture, digital manufacturing, and digital fabrication); Smart construction; 3D-printing; Virtual reality and augmented reality.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of ebooks, e-journals available from the CityU Library.)

1.	Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Andres, C.K. and Smith, R.C., *Principles and Practices of Heavy Construction*, Prentice Hall, 1998.

2.	Barry, R., *Construction of Buildings*, Vol. 2-5, Oxford, Blackwell Science Inc, 1996.
3.	Branko Kolarevic, *Architecture in the Digital Age: Design and Manufacturing*, Taylor & Francis, 308 p.p., 2005
4.	Coduto. D.P., *Foundation Design: Principles and Practrices*, 2nd Edition, Prentice Hall, New Jersey, 2001.
5.	Dastbaz, M., Gorse, C., and Moncaster, A., *Building Information Modelling, Building Performance, Design and Smart Construction*, Springer International Publishing, 326 p.p., 2017.
6.	Doran, D. K. and Cather, B., *Construction Materials Reference Book*, Second Edition, Butterworth-Heinemann, 768 p.p., 2012.
7.	Geotechnical Control Office (GCO), *Geoguide 2: Guide to Site Investigation*, The Government of Hong Kong Special Administration Region, Hong Kong, 1987.
8.	Geotechnical Engineering Office (GEO), *Geoguide 6: Guide to Reinforced Fill Structure and Slope Design*, Government of Hong Kong Special Administration Region, Hong Kong, 1993
9.	Johannes Wild, *3D Printing 101: The Ultimate Beginners Guide*, Independently Published, 2019
10.	Lin, Michael C.H., *Construction Technology for Tall Buildings*, World Scientific, 1999.
11.	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.J., *Construction Planning, Equipment, and Methods*, Fifth Edition, The MacGraw-Hill Companies, Inc., 1996.
12.	Rodrigues, H., Gaspar, F., Fernandes, P., and Mateus, A, *Sustainability and Automation in Smart Constructions*, Springer International Publishing, 563 p.p., 2020.
13.	tom Dieck, M. C. and Jung, T., *Augmented Reality and Virtual Reality*, Springer International Publishing, 335 p.p., 2019