

**City University of Hong Kong
Course Syllabus**

**offered by Department of Architecture and Civil Engineering
with effect from Semester A 2022/23**

Part I Course Overview

| | |
|--|---|
| Course Title: | Advanced Topics in Structural and Material Design |
| Course Code: | CA5696 |
| 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: | P5 |
| Medium of Instruction: | English |
| Medium of Assessment: | English |
| Prerequisites: <i>(Course Code and Title)</i> | Nil |
| Precursors: <i>(Course Code and Title)</i> | Nil |
| Equivalent Courses: <i>(Course Code and Title)</i> | Nil |
| Exclusive Courses: <i>(Course Code and Title)</i> | Nil |

Part II Course Details

1. Abstract

This course aims to introduce and let students explore the strengths and limitations of different structural and non-structural materials and their associated systems, including concrete, steel, timber, masonry, and other new materials and construction methods. The course emphasizes the student's ability to formulate special study areas in structural and material design and conduct case studies or special studies of the subject matter.

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. | Describe the advantages and disadvantages of various types of materials and structural systems | | | ✓ | |
| 2. | Delineate the structural design concepts specific to different materials and structural systems | | | ✓ | |
| 3. | Select appropriate construction materials to fulfill the functional and aesthetic requirements of an architectural design project | | | ✓ | |
| 4. | Develop sustainable and innovative material and system applications | | ✓ | | ✓ |
| | | 100% | | | |

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 | Characteristics and behaviors of different construction materials; advantages and disadvantages of various types of structural systems | ✓ | ✓ | ✓ | | |
| Tutorials | Selection of construction materials to fulfill the functional and aesthetic requirements of an architectural design project; development of healthy and effective spatial systems | | | ✓ | ✓ | |

| | |
|----------------------------------|---|
| Semester Hours: | 3 hours per week |
| Lecture/Tutorial/Laboratory Mix: | Lecture (-); Tutorial (-); Laboratory (-) |
| | Mixed lecture and tutorial sessions |

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: 100% | | | | | | |
| Assignments | ✓ | ✓ | ✓ | ✓ | 100% | |
| Examination: 0% | | | | | | |
| | | | | | 100% | |

5. Assessment Rubrics

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

Applicable to students admitted in Semester A 2022/23 and thereafter

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B) | Marginal (B-, C+, C) | Failure (F) |
|-----------------|---|-----------------------------|-----------------|----------------------------|-----------------------------------|
| Assignments | <p>Ability to describe the advantages and disadvantages of various types of materials and structural systems;</p> <p>Ability to delineate the structural design concepts specific to different materials and structural systems;</p> <p>Ability to select appropriate construction materials to fulfill the functional and aesthetic requirements of an architectural design project</p> <p>Develop sustainable and innovative material and system applications</p> | High | Significant | Basic | Not even reaching marginal levels |

Applicable to students admitted before Semester A 2022/23

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D) | Failure (F) |
|-----------------|---|-----------------------------|------------------------|------------------------|-----------------|----------------------------------|
| Assignments | <p>Ability to describe the advantages and disadvantages of various types of materials and structural systems;</p> <p>Ability to delineate the structural design concepts specific to different materials and structural systems;</p> <p>Ability to select appropriate construction materials to fulfill the functional and aesthetic requirements of an architectural design project</p> <p>Develop sustainable and innovative material and system applications</p> | High | Significant | Moderate | Basic | Not even reaching marginal level |

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.)

Construction materials; structural systems; architectural expressions; concrete material and structures; steel material and structures; timber systems; brick material and masonry structures, advancement in material and technology

2. Reading List

2.1 Compulsory Readings

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

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|----|-----|
| 1. | Nil |
|----|-----|

2.2 Additional Readings

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

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|----|---|
| 1. | AISC (2010). Steel Construction Manual. AISC. ISBN: 1564240606 |
| 2. | Charleson (2005). Structure as Architecture - A Source Book for Architects, Elsevier. ISBN: 0 7506 6527 0 |
| 3. | Chopra (2010). Dynamics of Structure - Theory and Applications to Earthquake Engineering, 4th edition. Pearson. ISBN: 0-13-285803-7 |
| 4. | FEMA 454 (2006). Designing for Earthquakes - A Manual for Architects, FEMA. |
| 5. | Hibbeler (2010). Mechanics of Materials, 8th Edition. Pearson. ISBN: 0-13-602230-8 |
| 6. | Nilson, Darwin and Dolan (2003). Design of Concrete Structures, 13th edition. McGraw-Hill. ISBN: 0072483059 |
| 7. | Schierle (2008). Structure and Design, Cognella. ISBN: 978-1-93426-937-4 |
| 8. | Taly (2010). Design of Reinforced Masonry Structures. McGraw Hill. ISBN: 978-0-07-159367-0 |
| 9. | Viljakainen (1999). The Open Timber Construction System - Architectural Design. ISBN: 952-15-0184-7 |