The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title] Prestressed Concrete Design

[Course Code] CIVL4340

[No. of Credits] 3 Credit

[Prerequisites] CIVL 3320

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Office Hours: by email appointment and via zoom

Course Description

Outline

Design and detailing of prestressed concrete members are covered in this course though the lectures, tutorials, literature research assignments. It includes:

(1) Design philosophy and structural behavior of pre-tensioning, post-tensioning, partially prestressing, bonded, and unbonded tendons.
(2) The Load balancing approach as a general procedure in the flexural analysis of statically determined structures.
(3) The effects of shrinkage, creep and relaxation on loss of prestressing and redistribution of forces.
(4) Crack width control in partially prestressed members
(5) Importance and method of prestressing system protection
(6) The ultimate moment and shear resistance capacity design.
(7) Anchorage detailing.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

(ILO1) understand and predict the behavior of prestressed concrete members.
(ILO2) demonstrate the influence of time dependent effects on loss of prestressing of forces.
(ILO3) design an appropriate prestressing system in a structural concrete member.
(ILO4) propose general arrangement and provide detailing of proposed prestressing system.
(ILO5) understand the importance and method of prestressing protection.

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Tutorial problem	10%	End of each tutorial
Assignment 1	10%	Tentative 17/03/2026 *
Assignment 2	10%	Tentative 22/04/2026 *
Mid-term	35%	07/04/2026
Course Project	35%	12/05/2026

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Tutorial problem	ILO1, ILO2	This task assesses students' ability to understand various theory and design background (ILO1), evaluate their implications (ILO2).
Assignment 1	ILO1, ILO2, ILO3	This task assesses students' ability to understand the theory and design background (ILO1, ILO2), evaluate their ability to apply the formula for design (ILO3).
Assignment 2	ILO5	This task assesses students' ability to do literature review and understand the importance of prestressing protection (ILO5).
Mid-term	ILO1, ILO2, ILO3, ILO4	This task assesses students' ability to understand various theory and design background (ILO1, ILO2, ILO3), evaluate their ability to apply them to design problem (ILO4).
Course project	ILO1, ILO2, ILO3, ILO4, ILO5	This task assesses students' ability to apply all the information discussed in the lectures in a design project (ILO1, ILO2, ILO3, ILO4, ILO5).

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

The use of Generative AI is permitted to assist students with brainstorming, drafting, and writing their papers.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Required Texts and Materials

Textbooks

(1) Gilbert, R.I. and Mickleborough, N.C., Design of Prestressed Concrete
(2) Kong & Evans, Reinforced and Prestressed Concrete
(3) T. Y. Lin and Ned H. Burns, Design of Prestressed Concrete Structures

Reference Books:

(1) Robert Benaim, The Design of Prestressed Concrete Bridges
(2) Menn, Prestressed Concrete Bridges

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.