

The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title] Statics

[Course Code] CIVL2110

[No. of Credits] 3

[Any pre-/co-requisites] PHYS 1112 OR PHYS 1312 Corequisite(s): MATH 1014 OR MATH 1020 OR MATH 1024

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Office Hours: [Wednesday 14:30 am - 16:30 pm; RM2455]

Course Description

Topics to be covered: introduction to mechanics and vectors; application of Newton's laws to engineering problems; statics of particles; rigid bodies; equivalent systems of forces; equilibrium of rigid bodies; distributed forces; centroids; moments of inertia; parallel-axis theorem and rotation; analysis of truss & frame structures; axial, shear, and bending moment diagrams.

Intended Learning Outcomes (ILOs)

On successful completion of this course, students are expected to be able to:

- ILO-1. Simplify a loaded structure to a model, i.e., creating proper free-body diagrams (FBD) of the structure or the parts in it.
- ILO-2. Examine the stability of this structure, and classify a stable structure as statically determinate or indeterminate.
- ILO-3. Perform static analysis of a statically indeterminate structure, e.g., truss or certain frames.
- ILO-4. Calculate and sketch the internal force in a structural member, e.g., axial force, shear force, and bending moment.
- ILO-5. Identify the structural analysis that is NOT covered in this course, and what future courses (e.g., mechanics of materials, structural analysis), will cover the relevant topics.

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 (tentative)
Attendance/quizzes	5%	-
Assignment 1	5%	28/09/2026
Assignment 2	5%	21/10/2026
Assignment 3	5%	13/11/2026
Assignment 4	5%	09/12/2026
Mid-term exam	25%	30/10/2026
Final exam	50%	tbd

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class Q&A and quizzes about the fundamental knowledge and engineering principles	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	Review and consolidate fundamental knowledge and principles in mathematics and engineering science required for this course, such as the basics of mechanics, vectors, free-body diagrams, and Newton's Laws. Learn to investigate the stability and static indeterminacy of structures. Recognize more advanced topics not covered in this course, and what future courses can be learned to address these topics.
Hand calculation practice through Assignment 1, Assignment 2, Assignment 3, and Assignment 4.	ILO-1, ILO-2, ILO-3, ILO-4	Acquire an ability to apply engineering philosophies and principles to solve equilibrium equations for trusses and frames, draw internal force diagrams, and calculate reaction forces.
Integrated problem-solving in mid-term and final exam.	ILO-1, ILO-2, ILO-3, ILO-4	Develop an integrated ability to identify and formulate civil engineering problems, and propose feasible hand-based solutions with an appreciation of their underlying assumptions and constraints. Develop technical competency and solid foundation to study future courses on more advanced structural analysis.

Grading Rubrics

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

Ratings Components	Exemplary (5)	Competent (3)	Needs Work (1)
define the problem: Idealize civil engineering structures into simplified free-body diagrams (suitable for structural analysis)	Understands completely the applicability and the limitations of the key modeling assumptions and support conditions. Idealizes correctly a civil engineering structure into a free-body diagram. Is able to choose between truss and frame members for problem solving at hand.	Understands partially the key modeling assumptions and support conditions. Can idealize a civil engineering structure into a simplified free-body diagram correctly if the structure is not complex.	Does not understand the key modeling assumptions and support conditions. Cannot idealize civil engineering structure into a free-body diagram correctly.
solve the problem: Establish and solve the equilibrium equations for structures under different loading conditions	Shows competency in establishing and solving equilibrium equations in order to obtain the internal forces and reactions for a structure under different types of loading. Can analyze trusses using joint methods and section methods. Can analyze frames and drawing axial force diagrams, shear force diagrams, and bending moment diagrams.	Can establish and solve equilibrium equations for relatively simple trusses, beams, columns, or frame structures. Only partially understand how to draw internal force diagrams for trusses and frames	Is not able to establish and solve equilibrium equations for structures under loads. Cannot draw internal force diagrams for trusses and frames.
solve the problem: Calculate section properties and derive the related theorems.	Master the calculations of centroids and moments of inertia. Be able to derive and apply parallel-axis theorem and rotation for representative sections used in common structural members	Can calculate the centroids and moments of inertia for relatively simple sections. Can only apply parallel-axis theorem and rotation, but cannot derive them.	Is not able to calculate section properties or derive the related theorems.
assess the procedure: Outcome prediction and evaluation	Shows a deep understanding of the static behavior of a civil engineering structure (e.g., buildings, truss bridges). Can estimate a priori qualitatively the response (e.g. tension or compression, bending on the top or bottom side). Tests for errors in reasoning or calculation, using physical arguments.	Understands partially the static or dynamic behavior of a civil engineering structure (building or bridge). Estimates a priori qualitatively the response and the order of magnitude of the critical magnitudes (e.g. bending moments) with minor errors. Tests for errors in reasoning or calculation.	Does not understand the static or dynamic behavior of a civil engineering structure (building or bridge). Cannot estimate a priori qualitatively the response and the order of magnitude of the critical magnitudes (e.g. bending moments). Does not test for errors in reasoning or calculation.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	[Example: 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	[Example: 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	[Example: 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	[Example: 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	[Example: 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

Students may use generative artificial intelligence tools to assist the learning process, such as lecture comprehension and practice of additional problem sets beyond the lecture content. However, the students are required to develop the ability to independently solve problems given in lectures and assignments without the use of generative artificial intelligence tools.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the graded marks should consult the instructor and TAs within five working days after the feedback is received.

Resubmission Policy

N/A

Required Texts and Materials

Beer, Johnston, Mazurek & Eisenberg “Vector Mechanics for Engineers: Statics, 10th edition in SI Units”, McGraw-Hill, 2013.

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.

[Optional] Additional Resources

Coursera course: “Mastering Statics” Instructed by Prof. Lambros Katafygiotis