CIVL 2120 – Mechanics of Materials

School:	**School of Engineering**
Subject Area:	**Civil and Environmental Engineering**
Course Credit:	**3**
Instructor:	**HU Thomas**
Pre-requisite/co-requisite:	**Details Here**

Notes:

- The syllabi provided here is for reference only and may be subject to changes and adjustments as determined by the course instructors.

The Hong Kong University of Science and Technology

CIVL2120 Course Outline

Course Title: Mechanics of Materials

Course Code: CIVL 2120

No. of Credits: 3

Pre-requisite: a pass in CIVL 2110 (or equivalent statics course)

Name: Dr. Thomas W.C. HU

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Office Hours: Tuesdays, 6pm – 7pm in 3585

Course Description

This course will start with a statics Review and introduction to concepts of stress and Strain. The main topics that follow are axial and torsional loading, review of shear and bending moment diagrams, pure bending, beam analysis with singularity functions, analysis and design of beams considering shearing and bending stresses, followed by beam deflection calculations. Transformation of stress and strain will also be discussed, with applications to principal stresses under given loadings.

- Lectures: June 17 – Aug. 7, 2025, every Tue & Thu, 3:00PM - 5:50PM in Room 3207 (CIVL PC Lab)
- Tutorials: June 17 – Aug. 7, 2025, every Wed, 4:00PM - 5:50PM in Room 3207 (CIVL PC Lab)

Intended Learning Outcomes (ILOs)

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

1. understand basic concepts of stress, strain and their relations based on linear elasticity
2. calculate stresses and deformation in axially loaded members
3. calculate stresses and deformation in a torsional bar
4. produce shear and moment diagrams of a beam
5. calculate normal and shear stresses in beams
6. select appropriate beam cross-sections for given loading conditions
7. calculate beam deflections using various methods such as superposition and direct ODE solving utilizing singularity functions
8. use Mohr's circle to find principal stresses and angles for plane stress
9. determine principal stresses under combined loadings
10. understand stability and buckling phenomena for slender members in compression (if time permits)

Assessment and Grading

One Midterm (30%) (closed book; one A4 formula sheet allowed)

- Midterm coverage: Ch. 1 - 3 (these 3 chapters will not be covered again on final exam)

One Final exam (50%) (closed book; two A4 formula sheets allowed)

- Final coverage: Ch. 4 - end of course except Ch. 9

One project (20%)

- Project will mainly concern Ch. 9 (and beyond, such as advanced problems from CIVL3310 to be simplified using our new singularity functions approach), applying CAS + singularity functions methods from this course to expedite beam analysis.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Mid-Term	30%	July 9, 2025 in tutorial (TBC)
Project	20%	In Aug, details TBA
Final examination	50%	In Aug, details TBA

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

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Midterm exam	ILO1, ILO2, ILO3	Midterm will cover up to and including Ch. 3 of Beer's textbook, addressing basic stress and strain, axially loaded members and torsion.
Final exam	ILO4, ILO5, ILO6, ILO8, ILO9	Final will cover mainly beam topics, from basic shear and bending moment diagrams to design for bending and shear stress. Mohr's circle and principal stresses under combined loads will also be covered.
Project	ILO7	Project will demonstrate student's mastery of the revolutionary approach for beam analysis using singularity functions, focusing on more advanced problems in beam deflection.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Course overall mark >= 90%
B	Good Performance	65% <= Course overall mark < 90%
C	Satisfactory Performance	50% <= Course overall mark < 65%
D	Marginal Pass	40% <= Course overall mark < 50%
F	Fail	Course overall mark < 40%

Course AI Policy

- TI nspire CAS computer software will be allowed on all assessments
- Symbolic computation (e.g., running Mathematica/Wolfram Alpha as a ChatGPT plug-in) will be the only allowed form of AI to be used in this course

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Detailed solutions will be provided. Students who have further questions about the feedback including marks should consult the grader(s) within five working days after the feedback is received.

Resubmission Policy

For any missed midterm or final exam due to illness, sick leave certificate must be presented in order to be considered for possible make-up exams.

Required Texts and Materials

Lecture notes (required)

Reference (recommended): Beer, Mechanics of Materials (newest), McGraw-Hill

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.