City University of Hong Kong
Course Syllabus

offered by
Department of Architecture and Civil Engineering
with effect from Semester A 2022 / 2023

Part I Course Overview

Course Title:	Elasticity
Course Code:	CA8025
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:	R8
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)*	Nil

Part II Course Details

1. Abstract

The course intends to provide students with knowledge on Linear-elastic fracture mechanics, fundamental concepts of viscoelasticity with applications, elastic-viscoelastic analogies, variational principles, thick-walled cylinders under pressure and vibration of bars, plates and shells.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs #	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	learn and discover fundamental principles of elastic solids to analyze and design structural members under axial load, shear load, bending moment and torsional moment	25%	✓		
2.	model and analyze the elastic behavior of structural components subjected to various loading and support conditions based on principles of equilibrium and material constitutional relationships	25%		✓	
3.	discover appropriate approximate solutions in linear elasticity to solve practical boundary-value problems of structures	25%		✓	
4.	discover the advanced topics in elastic dynamics, viscoelasticity with applications, variation principles, thick-walled cylinders under pressure, propagation of viscoelastic waves, nonlinear viscoelastic stress-strain laws, creep rupture, and nonlinear analysis of plates and shells	25%		✓	
** If weighting is assigned to CILOs, they should add up to 100%.*		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)

TLA	Brief Description	CILO No.				Hours / week (if applicable)
		1	2	3	4	
Lecture	Address the basic principles and theories for elastic plates and shells.	✓	✓	✓	✓	2 hours/week
Tutorial	Explain how to get the solutions of elastic plates and shells.	✓	✓	✓	✓	1 hour/week

Semester Hours:	3 hours per week
Lecture/Tutorial/Laboratory Mix:	Lecture (2); Tutorial (1); Laboratory (0)

4. Assessment Tasks/Activities

Assessment Tasks / Activities	CILO No.				Weighting*	Remarks
	1	2	3	4		
Continuous Assessment: 50%						
Assignment	✓	✓	✓	✓	30%	
Mid-term test		✓			20%	
Examination: 50% (duration: 2 hour(s))						
Examination					50%	
* 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

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)
Assignment	ABILITY to USE suitable techniques to solve an engineering problem.	High	Significant	Basic	Not even reaching marginal levels
Mid-term test	ABILITY to APPLY the basic principle and the scientific techniques in solving the Elastic problems of structures.	High	Significant	Basic	Not even reaching marginal levels
Examination	CAPACITY to UNDERSTAND the mathematical theories and USE them in solving an engineering problem.	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)
Assignment	ABILITY to USE suitable techniques to solve an engineering problem.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Mid-term test	ABILITY to APPLY the basic principle and the scientific techniques in solving the Elastic problems of structures.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	CAPACITY to UNDERSTAND the mathematical theories and USE them in solving an engineering problem.	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

Linear-elastic fracture mechanics: Introduction, Griffith's approach, Stress intensity factor, and Energy release rate; finite-element method for two- and three-dimensional boundary-value problems in linear elasticity; fundamental concepts of viscoelasticity with applications: elastic-viscoelastic analogies, creep and relaxation functions, Poisson's ratio, thermomechanical reciprocity relations, variational principles, model fitting, shear center motion, thick-walled cylinders under pressure and inertia loads with material annihilation, sandwich plates, propagation of viscoelastic waves, vibration of bars, plates and shells, nonlinear elastic-viscoelastic analogy, properties of nonlinear viscoelastic stress-strain laws, creep rupture, and torsion of nonlinear bars and shells.

2. Reading List

2.1 Compulsory Readings

1.	Gould, PL 2013, Introduction to linear elasticity, 3rd edn, Springer, New York.
2.	Bhavikatti, SS 2012, Theory of plates and shells, New Age International, New Delhi.

2.2 Additional Readings

1.	Thomas, JR, Hughes & Hinton, E 1986, Finite element methods for plate and shell structures, Pineridge, Swansea.