

**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:	Fracture Mechanics
Course Code:	CA6246
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:	P6
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 provides the student with an understanding of fundamental concepts including linear-elastic fracture mechanics, elastic-plastic fracture mechanics and various fracture mechanisms; and also application covering both the experimental and computational aspects.

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.	Explain the linear-elastic fracture mechanics concept and the relationship between stress intensity factor and fracture energy;			✓	
2.	Explain the elastic-plastic fracture mechanics and understand the meaning of the J contour integral;			✓	
3.	Explain the fracture mechanism in different types of materials including metals, polymers and ceramics;			✓	
4.	Apply the fracture mechanics concept in designing fracture-related experiments and the corresponding modeling work.				✓
		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	
Lecture	On topics related to fracture mechanics	✓	✓	✓	✓	2 hours per week
Tutorial	In class discussions and activities on problems related to lecture themes	✓	✓	✓	✓	1 hour per week

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

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: 50%						
Assignment	✓	✓	✓	✓	30%	
Quiz	✓	✓	✓	✓	20%	
Examination: 50% (duration: 3 hour(s))						
Examination					50%	
					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

(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)
Assignment	CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in various topics of fracture mechanics	High	Significant	Basic	Not even reaching marginal levels
Quiz	ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to fracture mechanics	High	Significant	Basic	Not even reaching marginal levels
Examination	ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to fracture mechanics	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	CAPACITY to EXPLORE, INVESTIGATE, and ORGANIZE knowledge and ideas in an independent fashion in various topics of fracture mechanics	High	Significant	Moderate	Basic	Not even reaching marginal levels
Quiz	ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to fracture mechanics	High	Significant	Moderate	Basic	Not even reaching marginal levels
Examination	ABILITY to UNDERSTAND and APPLY theories and knowledge to topics related to fracture mechanics	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

(An indication of the key topics of the course.)

Fracture mechanics, linear-elastic, elastic-plastic, fracture mechanism, stress intensity factor, fracture energy, J-integral.

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.)

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

2.2 Additional Readings

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

1.	T.L. Anderson, "Fracture Mechanics, Fundamentals and Applications", 2nd edition, CRC Press, 1994
2.	S. Suresh, "Fatigue of Materials", 2nd edition, Cambridge University Press, 1998