

**City University of Hong Kong**  
**Course Syllabus**

**offered by Department of Materials Science and Engineering**  
**with effect from Semester A 2022/23**

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**Part I Course Overview**

**Course Title:** **Electronic Packaging and Materials**

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**Course Code:** **MSE6171**

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**Course Duration:** **One semester**

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**Credit Units:** **3**

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**Level:** **P6**

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**Medium of Instruction:** **English**

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**Medium of Assessment:** **English**

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**Prerequisites:**  
*(Course Code and Title)* **Nil**

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**Precursors:**  
*(Course Code and Title)* **Nil**

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**Equivalent Courses:**  
*(Course Code and Title)* **AP6171 Electronic Packaging and Materials (From the old curriculum)**

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**Exclusive Courses:**  
*(Course Code and Title)* **AP8171 Electronic Packaging and Materials (From the old curriculum)**

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## Part II Course Details

### 1. Abstract

This course provides students with the basic understanding of electronic packaging. It also introduces the important issues relating to materials behaviour in electronic packaging.

### 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.	Recognize the basic principles of packaging architectures, package designs, reliability and failure analysis.		✓		
2.	Discover the common failure modes and reliability issues.			✓	
3.	Demonstrate the choice of common packaging materials.			✓	
4.	Demonstrate the effect of operation parameters on the behaviour of common packaging materials during their life cycles.			✓	
5.	Create appropriate reliability testing models for electronic packages.				✓
		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	5		
Lecture	To cover basic concepts of electronic packaging, materials and reliability.	✓	✓					2 hours/week
Discussion (internet)	Through technical communication, reinforce the learning of various topics of electronic packaging, materials and reliability.	✓	✓	✓	✓	✓		1 hour/week for 5 weeks
Oral presentation	Present the ideas relating to the discussion.	✓	✓	✓	✓	✓		1 hour/week for 5 weeks

### 4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4	5			
Continuous Assessment: 50 %								
Discussion (internet)	✓	✓	✓	✓	✓		25%	
Oral presentation	✓	✓	✓	✓	✓		25%	
Examination (duration: 1.5 hours)	✓	✓	✓	✓	✓		50%	
							100%	

## 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)
1. Discussion (internet)	CAPACITY for SELF-DIRECTED LEARNING to research on electronic packaging, materials and reliability	High	Moderate	Basic	Not even reaching marginal levels
2. Oral presentation	ABILITY to EXPLAIN in DETAIL and with ACCURACY aspects of electronic packaging	High	Moderate	Basic	Not even reaching marginal levels
3. Examination	ABILITY to EXPLAIN the technical details of electronic packaging	High	Moderate	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)
1. Discussion (internet)	CAPACITY for SELF-DIRECTED LEARNING to research on electronic packaging, materials and reliability	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Oral presentation	ABILITY to EXPLAIN in DETAIL and with ACCURACY aspects of electronic packaging	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examination	ABILITY to EXPLAIN the technical details of electronic packaging	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**

- Introduction to electronic packaging (10 hours)  
Semiconductors and microelectronic devices. Wafer level packaging. Integrated circuits, packaging and assembly. Sealing and encapsulation. Board assembly. Packaging and electronic products, introduction to thermal and mechanical reliability.
- Packaging materials and processes (8 hours)  
The role of materials in electronic packaging. Packaging materials and properties. Material processes. Future trends.
- Package reliability (6 hours)  
Thermal and mechanical reliability. Failure modes and mechanisms. Reliability qualifications. Failure analysis. Experimental methods and tools for reliability analysis.

**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.)*

N/A

**2.2 Additional Readings**

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

1.	Rao R Tummala, “Fundamentals of Microsystems Packaging”, McGrawHill, New York, 2001. (CityU Lib Cat No TK7870.15 .F86 2001)
2.	Michael G Pecht et al, “Electronic packaging materials and their properties”, Boca Raton : CRC Press, c1999. (CityU Lib Cat No TK7870.15 .E4222 1999)
3.	Deborah D L Chung, editor, “Materials for electronic packaging”, Boston: Butterworth-Heinemann c1995. (CityU Lib Cat No TK7870.15 .M38 1995)
4.	Journals: IEEE Transactions on Advanced Packaging IEEE Transactions on Components and Packaging Technologies IEEE Transactions on Electronics Packaging Manufacturing Journal of Electronic Materials Journal of Materials Research ASME J Electronic Packaging