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

**offered by**
**Department of Mechanical Engineering**
**with effect from Semester B 2023/24**

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## Part I Course Overview

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|---|---|
| **Course Title:** | Applied Engineering Mechanics |
| **Course Code**: | MNE6116 |
| **Course Duration:** | 1 semester |
| **Credit Units**: | 3 credits |
| **Level**: | P6 |
| **Medium of Instruction:** | English |
| **Medium of Assessment:** | English |
| **Prerequisites**: *(Course Code and Title)* | Nil |
| **Precursors**: *(Course Code and Title)* | Bachelor level Statics, Dynamics and Mechanics of Materials |
| **Equivalent Courses**: *(Course Code and Title)* | MBE6116/MNE8113 Applied Engineering Mechanics |
| **Exclusive Courses**: *(Course Code and Title)* | Nil |

## Part II Course Details

### 1. Abstract

The course teaches the students who are seeking a degree of Master of Science advanced knowledge of engineering mechanics and encourage the students to apply more in-depth mechanics principles and theories into research and development applications. The content include selected topics such as elasticity and plasticity, viscoelasticity, tribology, contact mechanics, failure theories, fracture and fatigue and so on.

### 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. | Describe the fundamental concepts of engineering mechanics and their impacts on the development of mechanical applications. | | ✓ | ✓ | |
| 2. | Identify mechanics related mechanical engineering problems and calculate the problems with mechanics theories. | | | ✓ | |
| 3. | Conduct literature survey to a mechanics related research and development problem, analysis the problem with critical thinking generated from the mechanics concepts and demonstrate the idea with a mini-project. | | | ✓ | |
| 4. | Conduct laboratory work under guidance and interpret the experimental results obtained in the laboratory to evaluate the corresponding mechanical behavior of solid materials. | | | ✓ | ✓ |
| | | N.A. | | | |

*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 | Take place in classroom which consists of lectures on different engineering mechanics concepts and applications. | ✓ | ✓ | ✓ | | 2 hrs/week for 13 weeks |
| Tutorial | Take place in classroom which consists of tutorials and student activities on learning different engineering mechanics concepts and applications. | ✓ | ✓ | ✓ | | 1 hr/week for 13 weeks |
| Laboratory assisted mini project | Students are asked to work on laboratory exercises, summarize and discuss the results obtained from the experiments. | | | | ✓ | 3 hrs/week for 1 week |

## 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 | | |
| Continuous Assessment: 50% | | | | | | |
| Test/Assignment | ✓ | ✓ | | | 30% | |
| Mini projects/lab reports | | | ✓ | ✓ | 20% | |
| Examination: 50% (duration: 2 hours) | | | | | | |
| Examination | ✓ | ✓ | | | 50% | |
| | | | | | 100% | |

**For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.**

## 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) |
|---|---|---|---|---|---|
| Examination/ Test/Assignment | Describe the fundamental concepts of applied mechanics and apply them to explain mechanical behavior of solid materials; Analyse and calculate the problems with mechanics theory. | High | Significant | Moderate | Not even reaching marginal levels |
| Mini-project | Ability to conduct effective literature survey, analyse the problem with been taught concepts and theories, and demonstrate the idea with a mini-project. | High | Significant | Moderate | Not even reaching marginal levels |
| Laboratory Report | Attendance of the lab session; Ability to explain the methodology and procedure and analyse the lab data/phenomena. | High | Significant | Moderate | 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) |
|---|---|---|---|---|---|---|
| Examination/ Test/Assignment | Describe the fundamental concepts of applied mechanics and apply them to explain mechanical behavior of solid materials; Analyse and calculate the problems with mechanics theory. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Mini-project | Ability to conduct effective literature survey, analyse the problem with been taught concepts and theories, and demonstrate the idea with a mini-project. | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Laboratory Report | Attendance of the lab session; Ability to explain the methodology and procedure and analyse the lab data/phenomena. | 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.)*

Elasticity and plasticity, viscoelasticity, tribology, contact mechanics, failure theories, fracture and fatigue, etc.

## 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.)*

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| 1. | "Mechanics of Materials", Ferdinand Beer, E. Johnston, John DeWolf and David Mazurek, 8th ed., SI Version, The McGraw-Hill, 2020. |
| 2. | "Mechanics of Materials", Russell Hibbeler, 11th ed., Pearson, 2022. |
| 3. | Mechanics of materials", Barry J. Goodno and James M. Gere, 9th ed., SI Version, Cengage Learning, 2018. |
| 4. | "Shigley's Mechanical Engineering Design", Richard G Budynas and Keith J Nisbett, 10th ed., McGraw-Hill Higher Education, 2014. |
| 5. | "Fundamentals of Machine Elements", Steven R. Schmid, Bernard J. Hamrock, Bo. O. Jacobson, 3rd ed., SI Version, CRC Press, 2014. |
| 6. | "Mechanical Properties of Engineered Materials", Wolé Soboyejo, 1st ed., CRC Press, 2002. |
| 7. | "Materials Science and Engineering", William D. Callister Jr. and David G. Rethwisch, 9th ed., SI Version, John Wiley & Sons, 2014. |
| 8. | "Elasticity", James R. Barber, 3rd ed., Dordrecht: Springer Netherlands, 2010. On-line version available through CityU library. |

### 2.2 Additional Readings

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

Students are encouraged to seek out related research publication to widen their scope in the subjects.