

MNE8113: APPLIED ENGINEERING MECHANICS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Applied Engineering Mechanics

Subject Code

MNE - Mechanical Engineering

Course Number

8113

Academic Unit

Mechanical Engineering (MNE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Bachelor level Statics, Dynamics and Mechanics of Materials

Equivalent Courses

MNE6116 Applied Engineering Mechanics

Exclusive Courses

Nil

Part II Course Details

Abstract

The course teaches the students who are seeking a degree of Doctor of Philosophy advanced knowledge of applied engineering mechanics which allows the students to apply more in-depth mechanics principles and theories into advanced

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.

Course Intended Learning Outcomes (CILOs)

| CILOs | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|--|--------|--------|--------|
| 1 | Describe the concepts of engineering mechanics and their impacts on the development of mechanical applications. | x | x | |
| 2 | Identify mechanics related mechanical engineering problems, analyse the problems based on mechanics theories with property mathematical and numerical methods. | | x | |
| 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. | | x | |
| 4 | Conduct laboratory work under guidance, analyse the experimental results obtained in the laboratory to evaluate the corresponding mechanical behavior of solid materials, discuss results, and conclude the work with critical thinking. | | x | x |

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 real-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.

Learning and Teaching Activities (LTAs)

| LTAs | Brief Description | CILO No. | Hours/week (if applicable) | |
|------|-------------------|---|----------------------------|-------------------------|
| 1 | Lecture | Take place in classroom which consists of lectures on different engineering mechanics concepts and applications. | 1, 2, 3 | 2 hrs/week for 13 weeks |
| 2 | Tutorial | Take place in classroom which consists of tutorials and student activities on learning different engineering mechanics concepts and applications. | 1, 2, 3 | 1 hr/week for 13 weeks |

| | | | | |
|---|----------------------------------|--|---|------------------------|
| 3 | Laboratory assisted mini project | Students are asked to work on laboratory exercises, summarize and discuss the results obtained from the experiments. | 4 | 3 hrs/week for 2 weeks |
|---|----------------------------------|--|---|------------------------|

Assessment Tasks / Activities (ATs)

| | ATs | CILO No. | Weighting (%) | Remarks ("- " for nil entry) | Allow Use of GenAI? |
|---|---------------------------|----------|---------------|------------------------------|---------------------|
| 1 | Test/Assignment | 1, 2 | 30 | - | Yes |
| 2 | Mini projects/lab reports | 3, 4 | 30 | - | Yes |

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

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

Assessment Rubrics (AR)**Assessment Task**

Examination/ Test/Assignment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

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.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Mini-project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to conduct effective literature survey, analyse the problem with been taught concepts and theories, and demonstrate the idea with a mini-project.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Laboratory Report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Attendance of the lab session; Ability to explain the methodology and procedure and analyse the lab data/phenomena.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Examination/ Test/Assignment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

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.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

Mini-project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to conduct effective literature survey, analyse the problem with been taught concepts and theories, and demonstrate the idea with a mini-project.

Excellent

(A+, A, A-) High

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Assessment Task

Laboratory Report (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Attendance of the lab session; Ability to explain the methodology and procedure and analyse the lab data/phenomena.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

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

Reading List

Compulsory Readings

| Title | |
|-------|--|
| 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." |

Additional Readings

| Title | |
|-------|--|
| 1 | Students are encouraged to seek out related research publication to widen their scope in the subjects. |