MNE3118: MECHANICS OF MATERIALS

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Mechanics of Materials

Subject Code
MNE - Mechanical Engineering
Course Number
3118

Academic Unit
Mechanical Engineering (MNE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MNE2109/BME2109 Engineering Mechanics

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course provides basic knowledge of mechanics of solid materials including analysis of stress and strain, axial forces, torsion of a circular shaft and beam bending, etc. It' s the fundamental knowledge for mechanical design of versatile engineering products.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the fundamental concepts of mechanics of materials and their impacts on the behavior of solid materials subject to forces or displacements.			x	
2	Identify the materials related mechanical engineering problems, explain the problems with critical thinking generated from mechanics concepts, and calculate the problems with mechanics theory.			x	
3	Apply the mechanics knowledge to explain structural and functional behavior of solid materials such as metals, ceramics, polymers and composites.			x	x
4	Interpret the experimental results obtained in the laboratory sessions to evaluate the mechanical behavior of solid materials.		x	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	This activity includes typical lectures on different topics of mechanics of materials and applications accompanied by in-class student activities.	1, 2, 3	3 hrs/week for 13 weeks

2	Laboratory	Students are asked to work on laboratory exercises on different topics of experimental techniques and applications. They are requested to conduct laboratory experiments on the measurement of materials with different instruments and techniques, and then summarize, discuss and record the results obtained from the experiments.	3, 4	3 hrs/week for 4 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests/Assignments	1, 2, 3	20	
2	Laboratory Reports	3, 4	20	3-4 reports to be submitted

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

3

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

Tests/Assignments

Criterion

Describe the fundamental concepts of 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
Laboratory Reports

Criterion
Attendance of the lab/demo session; ABILITY to EXPLAIN the methodology and procedure and ANALYSE the lab data.

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

Criterion
Describe the fundamental concepts of 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

Additional Information for AR

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

Part III Other Information

Keyword Syllabus

Tension, Compression and Shear, Axially Loaded Members, Torsion, Shear Forces and Bending Moments, Stresses in Beams, Analysis of Stress and Strain, Plane Stress, Plan Strain, Deflections of Beams, Membranes and Columns, etc.

In addition to the examination and in-class test, students are required to learn through collaborative lab sessions in order to improve their understanding on strategic thinking, problem solving, team working processes, the relationships and interactions between the fields of knowledge that they have learnt in this and other courses.

Reading List

Compulsory Readings

	Title
1	“Mechanics of materials”, Barry J. Goodno and James M. Gere, 9th ed., SI Version, Cengage Learning, 2018

Additional Readings

	Title
1	R. C. Hibbeler, Mechanics of Materials, 9 ed., Prentice Hall, 2013
2	Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 3rd ed. Tata McGraw Hill Education Private Limited, 2012
3	Dowling, N. E. Mechanical Behavior of Materials. 4th ed. Prentice Hall, 2012