MNE2109: ENGINEERING MECHANICS

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Engineering Mechanics

Subject Code
MNE - Mechanical Engineering
Course Number
2109

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
PHY1101 Introductory Classical Mechanics or
AP1201/PHY1201 General Physics I AND
MA1201 Calculus and Basic Linear Algebra II/
MA1301 Enhanced Calculus and Linear Algebra II

Precursors
For students who are exempted from the prerequisites, you are advised to check whether you have sufficient calculus and algebra skill set to study this course beforehand. Please consult the course leader if necessary.

Equivalent Courses
Nil

Exclusive Courses
Nil

Additional Information

#Prerequisites which are not part of the Major Requirement are waived for students admitted with Advanced Standing.

Part II Course Details

Abstract

This course provides basic knowledge of engineering mechanics covering the topics including statics of particles, equilibrium of rigid bodies, distributed forces, analysis of structures, kinematics and kinetics of particles, system of particles, kinematics of rigid bodies, plane motion of rigid bodies, kinetics of rigid bodies in three dimensions and single-degree-of-freedom vibration systems.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the fundamental concepts of engineering mechanics and their impacts on the static and dynamic behaviour of structures subject to forces or displacements.			x	
2	Solve a problem of engineering mechanics which involves loading and motion using given principles.			x	
3	Select relevant principles to obtain the solutions for mechanical problems.			x	
4	Present analyses and results of experiments in a proper format of a written report such that a technically-qualified person can follow and obtain similar findings.			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 includes typical lectures on different topics of engineering mechanics and applications accompanied by in-class activities.	1, 2, 3	3 hrs/week

2	Laboratory	Students work on laboratory exercises on different topics of experimental techniques and applications, summarize and discuss the results obtained from the experiments.	3, 4	3 hrs/week for 3 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test and Assignments	1, 2, 3	20	Mostly in-class quizzes
2	Laboratory Reports	3, 4	20	3 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

1. Test and Assignments

Criterion

Apply concepts of engineering mechanics to solve problems.

Excellent (A+, A, A-)

75%-100%

Good (B+, B, B-)

60%-74%

Fair (C+, C, C-)

45%-59%

Marginal (D)

40%-44%

Failure (F)

<40%

Assessment Task

2. Laboratory Reports

Criterion

Ability to explain the methodology and procedure and analyse the experimental data and discuss the experimental findings.

Excellent (A+, A, A-)

Strong evidence of critical thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge of the experimental matters concerned.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with experiment.

Fair (C+, C, C-)

Student who is profiting from the laboratory class; understanding of the subject; ability to develop solutions to concerning the experiment.

Marginal (D)

Sufficient familiarity with the laboratory content to enable the student to move onto other laboratory materials.

Failure (F)

Little evidence of familiarity with the laboratory class materials; weakness in critical and analytic skills; limited, or irrelevant use of data.

Assessment Task

3. Examination

Criterion

Describe the fundamental concepts of engineering mechanics and apply them to solve the problems that involve loading and motion.

Excellent (A+, A, A-)

Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good (B+, B, B-)

Significant evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with course matter.

Fair (C+, C, C-)

Student is profiting from the university experience; understanding of the mechanics; ability to develop solutions to simple problems in the course.

Marginal (D)

Basic familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; very limited demonstration of correct use knowledge in mechanics.

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

Statics of Particles; Rigid Bodies; Equivalent Systems of Forces; Distributed Forces; Centroids and Moment of Inertia; Equilibrium of Rigid Bodies; Friction; Kinematics and Kinetics of Particles; Newton’ s Second Law; Energy and Momentum Method; Systems of Particles; Plane Motion of Rigid Bodies; Kinetics of Rigid Bodies in Three Dimensions; Mechanical Vibrations

In addition to the examination and in-class quizzes, students are required to learn through collaborative lab sessions 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	Ferdinand P. Beer, E. Russell Johnston, David F. Mazurek, Phillip J. Cornwell, Vector Mechanics for Engineers: Statics and Dynamics, McGraw-Hill.

Additional Readings

	Title
1	J.L. Meriam, L.G. Kraige, Engineering Mechanics: Dynamics, John Wiley & Sons, Inc.
2	Russell C. Hibbeler, Engineering Mechanics: Statics & Dynamics, Prentice Hall.