CA3632: MECHANICS OF STRUCTURES AND MATERIALS

Effective Term
Semester B 2025/26

Part I Course Overview

Course Title
Mechanics of Structures and Materials

Subject Code
CA - Civil and Architectural Engineering
Course Number
3632

Academic Unit
Architecture and Civil Engineering (CA)

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
Nil

Precursors
CA2673 Engineering Mechanics and CA2674 Construction Materials. Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

Equivalent Courses
BC3632/BC3632P Mechanics of Structural & Materials

Exclusive Courses
Nil

Part II Course Details

Abstract

The course provides fundamental knowledge of structural mechanics and materials as the foundation for students to take more advanced course in structural mechanics and analysis.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Discover fundamental principles of mechanics of structures including statically determinate and simple indeterminate structures;	25	x		
2	Apply Mohr's circle, stress and strain transformation, unsymmetrical bending theory, normal and shear stresses in solid and thin-walled sections;	25		x	
3	Discover and apply column buckling, torsion of circular rods and tubes, deflection of beams, frames and trusses; and	25		x	
4	Apply theories and principles to model basic engineering structural problems and further to obtain analytical or approximate solutions.	25		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	Lectures/Tutorials	Students will engage with theory, concepts and problem solving	1, 2, 3, 4	
2	Experiments	Students will apply theory and concepts into practice	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Laboratory Reports	1, 2, 3, 4	10		No
2	Tests and/or assignments	1, 2, 3, 4	40		No

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%.

Assessment Rubrics (AR)

Assessment Task

Laboratory Reports

Criterion

1.1 ABILITY to USE/APPLY the methodology and procedure with ACCURACY in using the experimental techniques

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

Tests and/or assignments

Criterion

2.1 CAPACITY for SELF-DIRECTED LEARNING to understand the principles of mechanics of structures and materials

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
3.1 ABILITY to UNDERSTAND the taught methodology and procedures in using the modelling and calculation techniques
3.2 ABILITY to APPLY the scientific techniques in solving theoretical and application problems in mechanics of structures and materials

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

Part III Other Information

Keyword Syllabus

- Statics: moments and force resultants, equilibrium, compatibility.
- Mechanics of materials: stress-strain, generalized Hooke's law, Mohr's circle, transformation of stress and strain. Engineering applications: axial loaded members, torsion of circular rods and tubes, bending and shear stresses in beams, biaxial bending, unsymmetrical bending, combined stresses, shear centre. Deflection of beams, frames and trusses by the virtual work method.

Reading List

Compulsory Readings

	Title
1	Ferdinand P. Beer, E. Russell Johnston, John T. DeWolf and David F. Mazurek, Mechanics of Materials, 6th edition, McGraw-Hill, New York, 2012, ISBN: 978-0-07-131439-8

Additional Readings

	Title
1	James M. Gere and Barry J. Goodno, Mechanics of Materials, 8th edition, Cengage Learning, USA, 2013, ISBN-13: 978-1-111-57774-2
2	R.C. Hibbeler, Mechanics of Materials, 3rd ed., Prentice Hall, New Jersey, 1997, ISBN: 0-13-008181-7.