

CA3632: MECHANICS OF STRUCTURES AND MATERIALS

Effective Term

Semester A 2024/25

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 (e.g. Parameter for GenAI use)
1	Laboratory Reports	1, 2, 3, 4	10	
2	Tests and/or assignments	1, 2, 3, 4	40	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

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.