

# CA3633: STRUCTURAL ANALYSIS

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## Effective Term

Semester A 2024/25

## Part I Course Overview

### Course Title

Structural Analysis

### Subject Code

CA - Civil and Architectural Engineering

### Course Number

3633

### 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

CA3632 Mechanics of Structural and Materials

Students must have attempted (including class attendance, coursework submission, and examination) the precursor course(s) so identified.

### Equivalent Courses

BC3633/BC3633P Structural Analysis

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The course provides the knowledge about the physical nature of structural determinacy and the basic techniques used for solving structural problems, and the conceptual understanding of structural behaviour. It deals with analysis of planar statically determinate and indeterminate structures by various methods.

### Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe and identify the appropriate formulas for calculating the determinacy for various structures (e.g. truss, beam and frame);	20		x	
2	Evaluate and decide the appropriate approaches for calculating the reaction and internal forces, moments, and displacements of statically determinate and indeterminate structures under a variety of loading conditions;	50	x	x	x
3	Identify and explain the importance of the structural analysis approaches and their differences	15	x		x
4	Identify the appropriate formulas for solving the problems about the deflections, rotations and influence lines of various structures.	15		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	Students will engage in lectures to gain the knowledge about the principles and formulations	1, 2, 3, 4	2 hours/week
2	Tutorial	Students will engage in tutorials to extend their use of knowledge during discussions on tutorial questions	1, 2, 3, 4	1 hour/week

### Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test	1, 2, 3, 4	20	
2	One quiz	1, 2, 3, 4	10	
3	Two assignments	1, 2, 3, 4	20	

**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**

Test

**Criterion**

ABILITY to USE the math techniques in solving structural analysis problems

ABILITY to Explain the importance of the structural analysis approaches

**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**

Quiz

**Criterion**

ABILITY to USE the math techniques in solving structural analysis problems

ABILITY to Explain the importance of the structural analysis approaches

**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

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**Assessment Task**

Assignment

**Criterion**

ABILITY to USE the math techniques in solving structural analysis problems

ABILITY to Explain the importance of the structural analysis approaches

**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

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**Assessment Task**

Examination

**Criterion**

ABILITY to USE the math techniques in solving structural analysis problems

ABILITY to Explain the importance of the structural analysis approaches

**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

Concept of indeterminacy, principle of superposition. Method of consistent deformations. Slope deflection method. Moment distribution method. Stiffness (displacement) matrix method. Lack-of-fit, support settlement, temperature effects. Modern approaches to structural analysis of frameworks. Influence line. Classical approaches to structural analysis of beams/frames.

### Reading List

#### Compulsory Readings

Title	
1	Aslam Kassimali, Matrix Analysis of Structures
2	Kenneth M. Leet Fundamentals of Structural Analysis
3	Harry H. West and Louis F. Geschwindner Fundamentals of Structural Analysis

#### Additional Readings

Title	
1	J. D. Todd, Structural Theory and Analysis
2	T. H. G. Megson Structural and Stress Analysis
3	C. K. Wang Intermediate Structural Analysis