CA8007: THEORY OF PLATES AND SHELLS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Theory of Plates and Shells

Subject Code
CA - Civil and Architectural Engineering
Course Number
8007

Academic Unit
Architecture and Civil Engineering (CA)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
R8 - Research Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
BC8007 Theory of Plates and Shells

Exclusive Courses
Nil

Part II Course Details

Abstract
The course provides enhanced knowledge in solid mechanics and advanced structural mechanics.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	discover and exploit various modelling avenues for structural engineering components and obtaining exact and/or approximate solutions;		x	x	
2	enrich research capability in plates and shells; and			x	x
3	apply the theory of plates and shells in engineering designs.				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	Introducing theory, concepts and problem solving	1, 2, 3	
2	Tutorials	Introducing theory, concepts and problem solving	1, 2, 3	

Additional Information for LTAs

Semester Hours: 3 hours per week

Lecture/Tutorial/Laboratory Mix:

- Lecture (Mix); Tutorial (Mix); Laboratory (-)
- 3 hrs per week including lectures and tutorials

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests and /or assignments	1, 2, 3	100	

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task
Tests and /or assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
CAPACITY for SELF-DIRECTED LEARNING to understand the principles of plates and shells

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 (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
CAPACITY for SELF-DIRECTED LEARNING to understand the principles of plates and shells

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus
Variational principles: strain energy, Lagrange method, Ritz method, Galerkin method, Levy’ s method, Kantorovich method.
Rectangular plates: bending of plates, simply supported plates, Navier solution, clamped plates, vibration and buckling of plates. Circular plates: plates in polar coordinates, simply supported and clamped circular plates, vibration and buckling of circular plates. Theory of shells, cylindrical shells, shallow and deep shells.

Symplectic method for plates and shells.

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	A.C. Ugural, Stresses in Plates and Shells, McGraw-Hill International Edition, 1999. ISBN: 0-07-116793-5.
2	S. Timoshenko and S. Woinowsky-Kreiger, Theory of Plates and Shells, McGraw-Hill Education, 1969, ISBN: 0070858209.
3	J.S. Rao, Dynamics of Plates, Narosa Publishing House, 1999, ISBN: 81-7319-250-2.