College of Engineering

Department of Civil Engineering

CE 565 Theory of Plates and Shells

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective for a MSCE degree
Course Description	Stresses and deformations in a plate element. Theory of thin elastic plates. Classical solution of rectangular and circular plates. Numerical techniques of Rayleigh-Ritz. Large deflection theory of plates. Stresses and deformations in a shell element. Membrane and bending theories of thin shells.
Prerequisites or Co-requisites	None
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	*Related Program Outcomes*
CLO1: Recognize the behavior of plates and concepts of shells under different types of loading and boundary conditions; formulate equilibrium equations.	**K1**
CLO2: Recognize large deflection theory, buckling of plates, membrane and bending theories for circular cylindrical, conical and spherical shells	**K1**
CLO3: Apply energy and approximate numerical techniques to plates and shells.	**S1**
CLO4: Idealize and solve problems involving plates and shells under different types of loading and boundary conditions, using approximate numerical techniques; e.g. Rayleigh-Ritz method to obtain solutions to various plate problems.	**S1**
CLO5: Solve problems involving cylindrical and spherical dome structures	**S1**
CLO6: Use appropriate numerical techniques for static and stability analysis of plates	**S1**

	CLO7: Apply available finite element software to model and analyze real plate and shell structure, interpret and present analysis results clearly — **S1**
Student Outcomes related to this Course	**K1**. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems. **S1**. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues.
Topics Covered	

List of Topics	Related CLOs
1. Fundamentals of small-deflection plate bending theory	CLO1
2. Bending of rectangular plates	CLO1
3. Bending of circular plates	CLO1
4. Bending of plates of various shapes	CLO1
5. Approximate numerical techniques	CLO3
6. The Finite element method (FEM)	CLO4
7. Computer Applications	CLO7
8. Large-deflection theory of thin plates-Buckling of plates	CLO2
9. Vibration of plates	CLO6
10. Membrane and bending theories of thin shells.	CLO5

Textbook(s) and Other Required Material	• Eduard Ventsel and Theodor Krauthammer, "Thin Plates and Shells - Theory, Analysis, and Applications", Marcel Dekker, Inc. 2001
Grading System	Assignments and Homework 15% Presentation of Project 10 % Two Midterm Exams 35% Final Exam 40%
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Date of Review	February, 2021