

CE 568 Structural Dynamics

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)														
Required, or Elective	Required														
Course Description	Vibrations and dynamic response of structures; free and forced vibration, response to foundation excitation. Response spectrum concept. Single-degree & multi-degree of freedom systems with lumped and consistent mass. Seismic design load.														
Prerequisites or Co-requisites	None														
Course Learning Outcomes	<p>Students completing this course successfully will be able to:</p> <table> <thead> <tr> <th>Course Learning Outcomes (CLOs)</th><th>Related Student Outcomes (SO)</th></tr> </thead> <tbody> <tr> <td>CLO1. Recognize the dynamic properties of structures idealized as single-degree-of Freedom system with lumped and consistent mass. K1</td><td>SO1</td></tr> <tr> <td>CLO2. Identify the dynamic properties of structures idealized as multi-degree-of Freedom systems. K1</td><td>SO1</td></tr> <tr> <td>CLO3. Analyze free and forced vibration response of single-degree-of freedom systems. S1</td><td>SO2</td></tr> <tr> <td>CLO4. Analyze free and forced vibration response of multi-degree-of freedom systems. S1</td><td>SO2</td></tr> <tr> <td>CLO5. Analyze dynamic response of structures using advanced computer programs, and compare their results with analytical solutions. S1</td><td>SO2</td></tr> <tr> <td>CLO6. Demonstrate. professional engineering and ethical values in assigned projects and assignments with high academic integrity.</td><td>SO6</td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	CLO1. Recognize the dynamic properties of structures idealized as single-degree-of Freedom system with lumped and consistent mass. K1	SO1	CLO2. Identify the dynamic properties of structures idealized as multi-degree-of Freedom systems. K1	SO1	CLO3. Analyze free and forced vibration response of single-degree-of freedom systems. S1	SO2	CLO4. Analyze free and forced vibration response of multi-degree-of freedom systems. S1	SO2	CLO5. Analyze dynamic response of structures using advanced computer programs, and compare their results with analytical solutions. S1	SO2	CLO6. Demonstrate. professional engineering and ethical values in assigned projects and assignments with high academic integrity.	SO6
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Student Outcomes related to this Course	<p>SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.</p> <p>SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.</p> <p>SO 6 Demonstrate scientific integrity, ethical responsibility, and academic values in scientific publications, research projects, and thesis work.</p>														
Topics Covered	<table> <thead> <tr> <th>List of Topics</th><th>Related CLOs</th></tr> </thead> <tbody> <tr> <td>1. Vibrations and dynamic response of structures</td><td>CLO 1, CLO2</td></tr> <tr> <td>2. Free and forced vibration</td><td>CLO 3</td></tr> <tr> <td>3. Response to foundation excitation</td><td>CLO 3</td></tr> <tr> <td>4. Response spectrum concept</td><td>CLO 3</td></tr> <tr> <td>5. Single-degree of freedom systems with lumped and consistent mass</td><td>CLO 3, CLO6</td></tr> <tr> <td>6. Multi-degree of freedom systems with lumped and consistent mass</td><td>CLO4, CLO 5, CLO 6</td></tr> </tbody> </table>	List of Topics	Related CLOs	1. Vibrations and dynamic response of structures	CLO 1, CLO2	2. Free and forced vibration	CLO 3	3. Response to foundation excitation	CLO 3	4. Response spectrum concept	CLO 3	5. Single-degree of freedom systems with lumped and consistent mass	CLO 3, CLO6	6. Multi-degree of freedom systems with lumped and consistent mass	CLO4, CLO 5, CLO 6
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	7. Seismic design load	CLO 4, CLO 5, CLO 6
Textbook(s) and Other Required Material	• Dynamics of Structures: Theory and Applications to Earthquake Engineering by Anil K. Chopra, 5th SI Edition, Pearson-Prentice Hall, 2020	
Grading System	Assignments	20%
	Lecture Attendance	--
	Mini project and/or seminar	10%
	Mid-term exam	30%
	Final Exam	40% %
Instructors	Prof. Hussein Elsanadedy, Office 1A56, Email: helsanadedy@ksu.edu.sa Dr. Ahmet Tuken, Office: 2A 90, E-mail: atuken@ksu.edu.sa	
Date of Review	March, 2025	