

MENG 331 – Mechanical Vibrations				
Eastern Mediterranean University - Faculty of Engineering				
Department: Mechanical Engineering				
Program Code: 23	Program: Mechanical Engineering		Year/Semester: 2025-2026 FALL	
Course Code: MENG331	Course Title: Mechanical Vibrations	Credit hours		
		Lec.	Tut/Lab	Total
		4	1	4
Categorization of Course: <input checked="" type="checkbox"/> Engineering or Area Core <input type="checkbox"/> Engineering Course offered by other programs <input type="checkbox"/> Engineering Area Elective <input type="checkbox"/> Mathematics and Basic Sciences <input type="checkbox"/> General Education		Categorization of Credits: Mathematics & Basic Science: Engineering Topics: 4 General Education: Major Engineering Design:		
Instructor Name: Prof. Dr. Qasim Zeeshan		Office no: ME141	Office Tel: 6301361 6305555	
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Course Web Page: https://staff.emu.edu.tr/qasimzeeshan/en/teaching/meng-331				
Textbook(s): Mechanical Vibrations by Singiresu Rao (5th Edition), 2011, Pearson.				
Indicative Basic Reading List :				
<ul style="list-style-type: none"> Design of Machinery by Robert L. Norton (5th Edition), 2012, McGraw Hill. Kinematics and Dynamics of Machinery by Robert L. Norton SI Edition, 2008, McGraw Hill. 				
Catalog Description: Discretized Lumped Parameter Modeling of systems. Free and forced vibrations of single degree-of-freedom systems. Multi degree-of-freedom systems. Determination of natural frequencies and Mode Shapes. Continuous systems. Finite Element Analysis. Vibration Measurement and Control. Balancing of rotating machinery and reciprocating engines. Modal Analysis, Frequency-Response Analysis				
Prerequisite(s)	(MENG233 or MENG231) and (MATH207 or MATH241)			
Type of Course	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Selected Elective <input type="checkbox"/> Elective			
Student Outcomes				
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics			<input checked="" type="checkbox"/>
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			<input type="checkbox"/>
3	an ability to communicate effectively with a range of audiences			<input type="checkbox"/>
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			<input type="checkbox"/>
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			<input checked="" type="checkbox"/>
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			<input checked="" type="checkbox"/>
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.			<input checked="" type="checkbox"/>

Course Learning Outcomes		Student Outcomes							Assessments and Percentages
		1	2	3	4	5	6	7	
1	Model and analyze of dynamic systems as discretized lumped parameters	X					X		Midterm Exam: 20% Final Exam: 40% Project: 20% Lab Works: 20% * Labs Report and Project are group submissions, however, viva voce/ oral examination will be conducted (for each group member individually) during the project Presentations.
2	Perform Vibration analysis of Single DOF systems	X					X		
3	Understand Harmonically excited vibration	X							
4	Perform Vibration analysis of Multi DOF systems	X						X	
5	Perform Vibration analysis of damped systems	X					X		
6	Determine Natural Frequencies and Mode Shapes	X				X	X	X	
7	Understand Vibration control techniques	X							
8	Understand Balancing of machinery	X					X		
Weight of Student Outcomes		H				L	M	L	

Topics Covered and Class Schedule:	
Week 1	Fundamentals of Vibration
Week 2	Discretized Lumped Parameter Modeling
Week 3	Discretized Lumped Parameter Modeling – Contd.
Week 4	Free Vibration of Single Degree of Freedom Systems
Week 5	Forced Vibrations of Single Degree of Freedom Systems
Week 6	Two degree-of-freedom systems
Week 7	Multi degree-of-freedom systems
Week 8	Midterm Examination
Week 9	Midterm Examination
Week 10	Determination of Natural Frequencies and Mode Shapes
Week 11	Introduction to Finite Element Analysis
Week 12	Introduction to Continuous Systems
Week 13	Vibration Measurement and Control
Week 14	Balancing of Rotating Machinery
Week 15	Balancing of Reciprocating Engines
Week 16	Final Examination

Laboratory Experiments				
No.	Experiment Title and Equipment Used	CLO	SO	Percentage
1	Title: Modeling a Spring Mass Damper System Equipment: MATLAB Software.	1, 2	6	2.5%
2	Title: Damped & Undamped Free vibration response Equipment: Universal Vibration Apparatus – TM16.	5	6	2.5%
3	Title: Frequency-Response Analysis of MIMO System Equipment: MATLAB Software	6	6	2.5%
4	Title: Mode shape analysis of cantilever beam Equipment: ANSYS software	6	6	2.5%
5	Title: Modal Analysis of a Flexible Flying Wing Aircraft Equipment: MATLAB Software	6	6	2.5%
6	Title: Modal Analysis of a Simulated System and a Wind Turbine Blade Equipment: MATLAB Software	6	6	2.5%
7	Title: Balancing of Rotating Machines Equipment: TM102 – Static & Dynamic Balancing Apparatus	8	6	2.5%
8	Title: Vibration Analysis of Rotating Machinery Equipment: MATLAB software	8	6	2.5%