

**The University of Jordan
School of Engineering**



Department	Course Name	Course Number	Semester
Mechanical Engineering	Mechanical Vibrations	0934411	

2019 Course Catalog Description

Simple harmonic motion. Elements of vibratory systems. Systems with single degree of freedom and applications, damped free vibration, rotating and reciprocating unbalance, vibration isolation and transmissibility, and period excitation, systems with multiple degrees of freedom and applications, methods of finding natural frequencies.

Instructors

Name	E-mail	Sec	Office Hours	Lecture Time

Text Books

Title	Mechanical Vibrations
Author(s)	Singiresu S. RAO
Publisher, Year, Edition	Addison-Wesley Publishing Company, 2010, 5th Edition.

References

Books	1. Graham Kelly “Mechanical Vibrations; Theory and Applications”, Cengage Learning. 2. S. Graham Kelly “Fundamentals of Mechanical vibrations”, McGraw-Hill Book Company. 3. W. T. Thomson and M. D. Dahleh “Theory of Vibration with application”. 4. Leonard Meirovitch “Elementary of Vibration Analysis”, McGraw-Hill Book Company.
Journals	Sound and Vibration, Shock and Vibration
Internet links	

Prerequisites

Prerequisites by topic	Dynamics, Strength of materials, Differential Equations (ODEs & PDEs)
Prerequisites by course	Dynamics 0904222 + Engineering Math I 0301202
Co-requisites by course	-
Prerequisite for	System Dynamics and Control 0904418

Topics Covered

Week	Topics	Chapter in Text	Sections
1, 2	Fundamentals of Vibration	1	1-11
3, 4, 5	Free vibration of Degree of Freedom systems	2	1-6, 9-11
6, 7,8	Harmonically Excited Vibration	3	1-10
9, 10, 11	Vibration Under General Forcing Conditions	4	1-5, 8-10
12, 13	Two Degree of Freedom Systems	5	1-8

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
1	1. Derive the equation of motion of single-degree-of freedom system using Newton's second law and energy method 2. Solve the damped and un-damped free vibration response of SDOF system 3. Formulate the equations of motion of two-degree-of-freedom systems 4. Determine the forced vibration under harmonic excitation of two-degree-of-freedom systems

2	5. Design mechanical vibration system such as vibration isolation system and select its parameters.						
Evaluation							
Assessment Tools		Expected Due Date					Weight
Midterm Exam							30%
Assignments							20%
Final Exam							50 %
Contribution of Course to Meet the Professional Components							
Simple harmonic motion. Elements of vibratory systems. Systems with single degree of freedom and applications; damped free vibration, rotating and reciprocating unbalance, vibration isolation and transmissibility, and period excitation, systems with multiple degrees of freedom and applications, methods of finding natural frequencies.							
Relationship to Student Outcomes							
SOs	1	2	3	4	5	6	7
Availability	X	X					
Relationship to Mechanical Engineering Program Objectives (MEPOs)							
MEPO1	MEPO2		MEPO3		MEPO4		MEPO5
ABET Student Outcomes (SOs)							
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics						
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						
3	An ability to communicate effectively with a range of audiences						
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						
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						
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions						
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies						
Updated by ABET Committee, 2024							