Syllabus

Descrizione corso

Titolo insegnamento	Dynamics of Mechanical Systems
Codice insegnamento	47561
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	IIND-02/A
Lingua	Inglese
Corso di Studio	Corso di laurea magistrale in Ingegneria Industriale Meccanica
Altri Corsi di Studio (mutuati)	
Docenti	dr. Veit Gufler, Veit.Gufler@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38756
Assistente	
Semestre	Secondo semestre
Anno/i di corso	1
CFU	5
Ore didattica frontale	28
Ore di laboratorio	18
Ore di studio individuale	79
Ore di ricevimento previste	
Sintesi contenuti	Understanding and knowledge of the fundamentals for both the theoretical as well as the experimental sides of mechanical vibrations. This includes the mathematical modeling of dynamical problems, the solving of these derived mathematical models and understanding of the results. Furthers, the students will gain practical experience of mechanical vibrations in a laboratory environment.
Argomenti dell'insegnamento	1) Dynamics of vibrating systems with one degree of freedom: • Modeling

	• Free response • Harmonic excitation and frequency response • Forced response to impulse, step forces • Response to base excitation and isolation 2) Dynamics of vibrating systems with more degrees of freedom • Modeling • Modal analysis • Forced response 3) Continuous systems • Basic models and relations 4) Laboratory experiences • Introduction to data acquisition and sensors for dynamic measurements • Numerical and experimental applications.
Parole chiave	dynamic systems, mechanical vibrations, modal analysis, resonance, frequency response
Prerequisiti	
Insegnamenti propedeutici	Fundamentals of mechanics and mathematics learned in bachelor's degree studies of mechanical engineering.
Modalità di insegnamento	Frontal lectures, hand calculation exercises, computer exercises, laboratory exercises.
Obbligo di frequenza	Not mandatory but strongly recommended.
Obiettivi formativi specifici e risultati di apprendimento attesi	The learning outcomes need to refer to the Dublin Descriptors: 1. Knowledge and understanding: Knowledge and understanding of the fundamentals of vibration mechanics. 2. Applying Knowledge and understanding: Applying knowledge and understanding to analyze dynamical components, structures, and systems. 3. Making judgments: The structural mechanical design under consideration of dynamical considerations including vibrations requires understanding and ability to make judgments based on theory and experiments. 4. Communication skills:

	Communication skills to convey and transfer understanding of mechanical vibrations. Communication skills to explain results of dynamical analysis and their consequences to structural mechanical design. 5. Learning skills Learning skills to independently study the specific fields of mechanical vibrations for applications beyond this lecture.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	- Formative assessment: In class exercises: during the course; ILOs assessed: 1, 2, 3, 4; - Summative assessment: 100% written exam: 2 hours; ILOs assessed: 1, 2, 3, 4.
Criteri di valutazione	The written exam includes numerical exercises, theoretical questions and questions related to the laboratory activities (no books or own notes are allowed during the exams). Exercises and questions will show ability to solve problems of mechanical vibrations as well as knowledge-based questions to show understanding of the material.
Bibliografia obbligatoria	• Lecture slides • Notes taken during lecture
Bibliografia facoltativa	• S. G. Kelly. Mechanical vibrations: Theory and applications. Stamford: Cengage, 2012 • T. L. Schmitz and K. S. Smith. Mechanical vibrations: Modeling and measurement. Cham: Springer, 2021. https://doi.org/10.1007/978-3-030-52344-2
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità, Innovazione e infrastrutture, Energia rinnovabile e accessibile