Modulname	**Fundamentals of Vibration Engineering**	
Modulverantwortlicher/ Modulverantwortliche	Prof. Dr.-Ing. habil. Carsten Behn	
Qualifikationsziele	This course is an introduction to the dynamics and vibrations of lumped-parameter models of mechanical systems, i.e., mechanical vibration systems with finite degrees of freedom. Starting with several descriptions to govern the equations of motion for systems of particles and rigid bodies in planar motion, students will become familiar with the Lagrangian Equations of the 2nd kind, with the D'Alembert's principle, and Newton-Euler mechanics (Principles of Linear and Angular Momentum). Having these tools at hand, the following topics cover several vibration systems with a single degree of freedom, their analytical treatment and the development of substitution models for complex (nonlinear) systems. The lecture proceeds in introducing free undamped and damped systems, forced undamped and damped systems (from the general case to the harmonic one). After this course, students are able to evaluate free and forced vibration of linear/linearized mechanical systems and to determine the main characteristics of such systems in context to their vibration behavior.	
Modulinhalte	1. Introduction 2. Modeling Aspects 3. Fundamental Laws from Dynamics (Newton-Euler, D'Alembert, Lagrange) 4. Classification of Vibration Systems and Modeling 5. Free undamped Vibrations with DoF=1 6. Free damped Vibrations with DoF=1 7. Forced undamped Vibrations with DoF=1 (general case to harmonic one) 8. Forced damped Vibrations with DoF=1 9. Outlook to subsequent systems: DoF=n, DoF=∞ Optional Add-On: - Practical courses including setting up a report - Programming in Maple / MatLab	
Lehrformen	Vorlesung (4 SWS)	
Voraussetzungen für die Teilnahme	Kinematics, Dynamics	
Literatur/multimediale Lehr- und Lernprogramme	• R.C. Hibbeler: Engineering Mechanics: Dynamics, 12th edtion, Pearson • K. Zimmermann, I. Zeidis, C. Behn: Mechanics of Terrestrial Locomotion, Springer • J.P. Den Hartog: Mechanical Vibrations, Dover	
Lehrbriefautor	keiner	
Verwendbarkeit	Pool International (English Lectures for Contact students) F MB PI	
Arbeitsaufwand/Gesamtworkload	Präsenzzeit 60 h + Vorbereitung 90 h = 150 Stunden = 5.0 Credit Punkte	
ECTS und Gewichtung der Note in der Gesamtnote	5	1
Leistungsnachweis	written examination: 120min	
Semester	1. Fachsemester	
Häufigkeit des Angebots	annually in the winter semester	

Dauer	1 Semester
Art der Lehrveranstaltung (Pflicht, Wahl, etc.)	anually in winter semester
Besonderes	