

Module DDM 4210 - Vibration and Acoustics 2

1	Module Number 4210	Study Programme DDM	Semester 2	Offered in <input type="checkbox"/> WS <input checked="" type="checkbox"/> SS	Duration 1 Semester	Module Type compulsory	Workload (h) 120	ECTS Points 4
2	Courses		Teaching and Learning Forms	Contact Time		Self-Study Time	Language	
	a) Vibrations		Lecture	(SWS)	(h)	(h)	English	
	b) NVH in Automotive Systems		Lecture	2	30	60		
	c) Computer-Aided Vibration Analysis		Virtual Lab	1	15			
3	<p>Learning Outcomes and Competences Once the module has been successfully completed, the students can...</p> <p>Knowledge and Understanding</p> <ul style="list-style-type: none"> Explain the basic procedure of the setup of multiple degree of freedom (MDOF) models and understand the connections to NVH behaviour of automotive systems. Understand and explain the calculation of MDOF modal properties and mode shapes and the modal superposition method on example of MDOF Frequency Response Functions; fundamentals of plain wave and spherical wave models in acoustics with special focus to sound intensity. <p>Use, Application and Generation of Knowledge</p> <p><i>Use and Transfer</i></p> <ul style="list-style-type: none"> Apply matrix calculation methods to calculate modal properties and mode shapes; apply experimental modal analysis methods; apply CAE and CAT methods on MDOF systems. Analyse MDOF models by computational and experimental methods; analyse sound intensity of a sound field Calculate MDOF models with Matlab and Finite Elements. <p><i>Scientific Innovation</i></p> <ul style="list-style-type: none"> Develop concepts for the optimization of NVH behaviour of automotive components by computational and experimental modal methods. <p>Communication and Cooperation</p> <ul style="list-style-type: none"> Interpret the results of modal analyses and draw admissible conclusions. Present results of modal analyses and discuss them. Communicate and cooperate within the group in order to find adequate solutions for the task at hand. <p>Scientific Self-Conception/ Professionalism</p> <ul style="list-style-type: none"> Justify the solution theoretically and methodically. Reflect and assess one's own abilities in a group comparison. 							
4	<p>Contents</p> <p>c) Vibrations: Introduction to the basic theory of vibrations; practical application to typical structural noise and shake problems; principles of Fourier analysis and order tracking; multiple degree of freedom systems.</p> <p>d) NVH In Automotive Systems: Definition of NVH; acoustic and vibration problems in vehicle systems.</p> <p>e) Computer-Aided Vibration Analysis: Simulation of practical vibration problems (CAT).</p>							
5	<p>Participation Requirements</p> <p>Compulsory: Basic knowledge in dynamics. Mathematics: Linear differential equations. 4204 Vibrations and Acoustics 1. Recommended: Vibrations and Acoustics 1 exam passed</p>							
6	<p>Examination Forms and Prerequisites for Awarding ECTS Points</p> <p>Written exam, 90 minutes, graded Laboratory reports and tests, not graded</p>							

7	Further use of Module NA
8	Module Manager and Full-Time Lecturer Prof. Dr.-Ing. Joachim Berkemer
9	Literature Lecture Documents; Ewins, D.J.: Modal Testing. Theory and Practice. New York: John Wiley and Sons. Argyris, J.; Mlejnek, H.-P.: Computerdynamik der Tragwerke. Braunschweig, Wiesbaden: Friedr. Vieweg Verlag Further textbook references will be given in the lecture
10	Last Updated 02.04.2019