

Module DDM 4207 - Advanced Materials Technology

1	Module Number 4207	Study Programme DDM	Semester 2	Offered in <input type="checkbox"/> WS <input checked="" type="checkbox"/> SS	Duration 1 Semester	Module Type compulsory	Workload (h) 180	ECTS Points 6
2	Courses		Teaching and Learning Forms		Contact Time		Self-Study Time	Language
					(SWS)	(h)	(h)	English
	a)	Advanced Engineering Materials	Lecture		2	30	90	
	b)	Surface Technology	Lecture		2	30		
	c)	Composite Materials	Lecture		2	30		
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"> • Understand the structure, mechanical and surface properties of modern metallic and composite materials and understand the connections within the material technology. • Describe the strengthening mechanism of advanced metallic and composite materials • Recognize the significance of advanced materials technology. <p>Use, Application and Generation of Knowledge</p> <p><i>Use and Transfer</i></p> <ul style="list-style-type: none"> • Take different perspectives and points of view on a given situation, weigh them up against each other and select suitable materials. • Design components by using the knowledge of modern advanced materials and basic material science. • Select suitable materials considering the mechanical and surface properties, also considering the interactions between different materials in mixed construction. <p><i>Scientific Innovation</i></p> <ul style="list-style-type: none"> • Independently develop approaches for new concepts and assess their suitability. • Develop concepts for the optimization of technical applications. <p>Communication and Cooperation</p> <ul style="list-style-type: none"> • Interpret the results of evaluation and optimisation processes and draw admissible conclusions for material selection. • Use the learned knowledge, skills and competences to evaluate material selection and interpret them considering the boundary conditions. • Communicate and cooperate within a team in order to find adequate solutions for the optimal metallic and composite materials. <p>Scientific Self-Conception/ Professionalism</p> <ul style="list-style-type: none"> • Derive recommendations for decisions regarding material selection on the basis of the analyses and evaluations made. • Justify the material selection theoretically and methodically. • 							

4	<p>Contents</p> <p>a) Advanced Engineering Materials: Car Body Technology: Car Body Parts, Deep Drawing, Cutting, Hemming, Extruding, Integrated Approach Sheet Materials: Strengthening, Production of Sheet Materials, Properties High Strength Steel Sheets: Phases, Mild Steels, IF-Steels, BH-Steels, Micro Alloyed Steels, Multiphase Steels, Press Hardening Steels, Recent Developments Aluminium Sheets: Wrought Alloys, Strengthening Mechanism, Naturally Hard Alloys (5xxx), Precipitation Hardenable Alloys (6xxx), Superplasticity, Aluminium/Steel-Mix Bodywork Tailored Components: Tailored Blanks, Partial Press Hardening, Multilayer Sheets, Fusion Sheets Plastic Behaviour: Characteristic Values, Anisotropy, Yield Locus, Plastic Behaviour, Forming Limits, Wrinkle Formation Method Planning: Material Flow, Process Chains, Derivation of Method from Component Geometry, Drawing Method</p> <p>b) Surface Technology: Basics in corrosion, thermal coating, CVD, PVD, electrochemical deposition, corrosion protection of stainless steel and light metals, leak, sealing, dip coating, design of the corrosion protection for all the components of passenger cars, testing methods</p> <p>c) Composites materials: Understanding polymers, molecule structure, model-free reaction kinetics, classification, thermal and mechanical properties, reinforced polymers, fibre materials, laminate properties, testing composite materials, designing with polymers and reinforced materials</p>
5	<p>Participation Requirements</p> <p>Compulsory: Basic knowledge in the nature, behaviour and processing of construction materials and in material science: metals and alloys, especially steels and polymers Recommended: NA</p>
6	<p>Examination Forms and Prerequisites for Awarding ECTS Points</p> <p>Written exam, 120 minutes, graded</p>
7	<p>Further use of Module</p> <p>NA</p>
8	<p>Module Manager and Full-Time Lecturer</p> <p>Responsible: Prof. Dr.-Ing. Stefan Wagner Lecturer: Prof. Dr.-Ing. Stefan Wagner, Prof. Dr.-Ing. Matthias Deckert Dr.-Ing. Regis Lallement</p>
9	<p>Literature</p> <p>Lecture documents, assignment documents, Power point presentations Ashby, Michael F., Jones, David R. H.: Engineering Materials 1 and Engineering Materials 2 Askeland, Donald R., The Science and Engineering of Materials Ashby, Michael F. : Materials Selection in Mechanical Design</p>
10	<p>Last Updated</p> <p>08.06.2021</p>