

Module description: Materials and Chemistry	
Module Code	t.BA.MT.WTC.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IMPE
Module Coordinator	Martin Winkler
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3b 2 lecture lessons per semester week and class+ 4 lab bi-weekly lessons per semester and half-class
Module Description	Students acquire the ability to analyse and understand technological problems of importance for mechanical engineering using models and tools from materials science and chemistry. They acquire knowledge of the key properties of materials.
Module Content	<p>Relationships between atomic structure, chemical bonding and properties of materials (metals, ceramics, plastics).</p> <ul style="list-style-type: none"> • Metals, ceramic materials, plastics <p>Mass and energy balances in chemical reactions</p> <p>Rate of chemical reactions</p> <ul style="list-style-type: none"> • Activation energy • Catalysts <p>Important types of chemical reactions</p> <ul style="list-style-type: none"> • Acid-Base-reactions • Redox reactions <p>Applications of electrochemistry in mechanical engineering</p> <ul style="list-style-type: none"> • Batteries • Fuel cells • Corrosion and corrosion protection of metals <p>plastics - polymer materials</p> <ul style="list-style-type: none"> • structure of polymers • Molecular weight distributions • Mechanical and thermal properties of plastics • Processing of plastics
Prerequisite Knowledge	None, except chemistry basics from school (BMS level)

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Learning Objectives (Competences)	Students...		Competencies	Taxonomies	
	You are familiar with and understand the structure and production methods of polymers and are therefore able to assess their mechanical and thermal properties.		F, M	K2, K3, K4	
	You are familiar with the most important processing methods for plastics.		F	K2	
	You will understand the importance of redox and electrochemistry in terms of energy storage and the basic processes involved in the corrosion of metals.		M, F	K1, K2, K3, K4	
	You will implement these fundamentals in a practical course by working in a team.		SO, M, SE	K2, K3	
	You know the acid-base concept and its significance for material selection and the environment.		M, F	K2, K3, K4	
	You are able to calculate the mass, charge and energy balances of simple chemical reactions and therefore you understand the processes in relevant industrial processes such as combustion engines and fuel cells.		F, M	K2, K3	
	You know concepts for chemical bonding and can apply them to the individual material classes.		M, F	K1, K2	
	On the basis of model concepts from materials science and chemistry, you are able to assess the properties of components.		F, M	K4, K5	
You practice documenting experiments, evaluating them and reflecting on the results.		M, F, SE	K3, K4, K6		
Performance Assessment	End-of-module exam	Assessment	Length (min.)	Weighting	Form
	written exam	Grade	90	70	acc. to module agreement
	Performance assessment during the semester		Assessment	Length (min.)	Weighting
Moodle Tests <i>12 Multiple choice tests before and one week after the labcourse each to check the preparation and follow-up work</i>		Grade		30	acc. to module agreement
Classroom Attendance Requirement	None				
Learning material	<ul style="list-style-type: none"> • Kickelbick, G. (2016). Chemie für Ingenieure. 2. Edition. Pearson. ISBN 978-3-86894-272-9 • Wawra, E. & Dolznig, H. & Müllner, E. (2009). Chemie verstehen. 5. Edition. utb. ISBN 978-33-82528-205-9. 				
Comments					