

Modulbezeichnung: Stundenplankürzel: (Title)	CHEMISTRY and MATERIALS
Modulverantwortliche(r): (Module responsibility)	Prof. Dr. rer. nat. Karlheinz Trebesius
Dozent(in): (Course teachers)	Chemistry: Prof. Dr. rer. nat. Karlheinz Trebesius Lecturer  Materials: Prof. Dr.-Ing. Stefan Raber Prof. Dr.-Ing. Sebastian Pflaum Lecturer
Sprache: (Language of instruction)	English
Zuordnung zum Curriculum: (Degree programme)	Bachelor Engineering and Management, Pflichtmodul, Semester 1
Lehrform/SWS: (Teaching method / Hours per week (SWS))	Seminar-like lecture, Exercises, 3 SWS
Arbeitsaufwand: (Workload)	Attendance time: 45 hours Private study, exam preparation: 75 hours
Kreditpunkte: (Number of ECTS credits)	4 ECTS
Voraussetzungen: (Prerequisites)	none
Verwendbarkeit: (Usability)	The module has no prerequisites. The module is open for all three bachelor programs of the FK 09 as well as for exchange students. The content of the module is the basis for the module Werkstofftechnik and the modules Molecular Biology, and other modules of study programm bio- and environmental technology.
Lernziele/Kompetenzen: (Course objective)	Chemistry: Competence Level 2 „Understand“: <ul style="list-style-type: none"> <li>The students are able to explain the molecular structure of matter and understand transformation of matter and energy in chemical reactions</li> </ul> Competence Level 3 „Apply“: <ul style="list-style-type: none"> <li>The students know fundamentals of stoichiometry and are familiar with different stoichiometric calculations</li> </ul> Competence Level 4 „Analyse“: <ul style="list-style-type: none"> <li>The students can categorise functions of materials in terms of their molecular structure and prevailing bonding types</li> </ul> Competence Level 5 „Assess“: <ul style="list-style-type: none"> <li>The students are able to predict the impact of different environmental variables on an equilibrium state of a chemical reaction</li> </ul>

	<p>Materials:</p> <p>Competence Level 2 „Understand“:</p> <ul style="list-style-type: none"> <li>• The students explain important fundamentals of materials (technical terminology, PSE, bonds, etc.).</li> <li>• The students explain the fundamentals of technical ceramics in their own words.</li> <li>• The students explain the fundamentals of polymers in their own words.</li> </ul> <p>Competence Level 3 „Apply“:</p> <ul style="list-style-type: none"> <li>• The students formulate situational statements about materials clearly and use the correct technical terminology.</li> </ul> <p>Competence Level 4 „Analyse“:</p> <ul style="list-style-type: none"> <li>• The students independently reflect on essential and inessential aspects of technical materials questions.</li> </ul>
<p>Inhalt: (<i>Course content</i>)</p>	<p>Chemistry:</p> <ul style="list-style-type: none"> <li>• Atomic structure and Periodic table</li> <li>• Chemical bonds</li> <li>• Stoichiometry and chemical thermodynamics</li> <li>• Chemical equilibrium</li> </ul> <p>Materials:</p> <ul style="list-style-type: none"> <li>• Basics of Materials Science (technical terminology, periodic system, bonds, material classes, determining material properties)</li> <li>• Polymers</li> <li>• Technical Ceramics</li> </ul>
<p>Prüfungsform: (<i>Assessment method</i>)</p>	<p>Written exam Duration: 90 minutes</p> <p>The module exam consists of the two parts chemistry and materials. A grade is determined for each of these parts of the exam. The overall grade of the module is calculated based on the individual grades, whereby chemistry is weighted 2x and materials is weighted 1x. To pass the module, at least the grade 4.0 must be achieved in each individual part of the exam.</p>
<p>Literatur: (<i>Recommended reading</i>)</p>	<p>Chemistry: (literature in english language, these or newer editions): BROWN, Theodore L., LEMAY, H. Eugene, BURSTEN, Bruce E., MURPHY, Catherine J., WOODWARD, Patrick M., STOLTZFUS, Matthew W. C, 2018. <i>Chemistry-The Central Science</i>. 14<sup>th</sup> Edition. Harlow (United Kingdom): Pearson Education. ISBN-13: 978-1-292-22122-9. ATKINS, Peter W. and JONES, Loretta, 2006. <i>Chemical Principles –The Quest of insight</i>. 7<sup>th</sup> Edition. Ney York (U.S.A.): W.H. Freeman and Company. ISBN-13 978-1-4641-8395-3.</p> <p>Chemistry:</p>

(literature in german language, these or newer editions):  
MORTIMER, Charles E. und MÜLLER, Ulrich, 2015. *Chemie - Das Basiswissen für Chemie*. 12. Auflage. Stuttgart: Thieme Verlag . ISBN 9783134843125  
HOINKIS, Jan und LINDNER, Eberhard, 2007. *Chemie für Ingenieure*. 13. Auflage. Weinheim: Wiley-VCH Verlag. ISBN 978-3-527-31798-1

Materials:

Lecture notes (script)

Literature in english language, these or newer editions:

SHACKELFORD, James F., 2015. *Introduction to Materials Science for Engineers*. Eighth Edition. München: Pearson Studium Verlag. ISBN 978-0-273-79340-3

KALPAKJIAN, Serope et al., 2014. *Manufacturing Engineering & Technology*. München: Pearson StudiumVerlag. ISBN 978-981-06-9406-7

ASHBY, Michael F. und David R. H. JONES, 2011. *Engineering Materials 1*. 4th Edition. Butterworth Heinemann. ISBN 9780080966656

ASHBY, Michael F. und David R. H. JONES, 2012. *Engineering Materials 2*. 4th Edition. Butterworth Heinemann. ISBN 9780080966687

Materials:

Unterlagen zur Lehrveranstaltung (deutsches Skript)

Literature in german language, these or newer editions:

SEIDEL, Wolfgang, 2018. *Werkstofftechnik*. 11. Auflage. München: Carl Hanser Verlag. ISBN 978-3-446-45415-6

WEISSBACH, Wolfgang, 2012. *Werkstoffkunde: Strukturen, Eigenschaften, Prüfung*. 18. Auflage.

Wiesbaden: Vieweg & Sohn Verlag. ISBN 978-3-8348-1587-3

BARGEL, Hans-Jürgen und Günter SCHULZE, Hrsg., 2012. *Werkstoffkunde*. 11. Auflage. Berlin Heidelberg: Springer Verlag. ISBN 978-3-642-17716-3

BERGMANN, Wolfgang, 2013. *Werkstofftechnik 1*. 7. Auflage. München: Carl Hanser Verlag. ISBN 978-3-446-43536-0

BERGMANN, Wolfgang, 2009. *Werkstofftechnik 2*. 4. Auflage. München: Carl Hanser Verlag. ISBN 978-3-446-41711-3

SHACKELFORD, James F, 2007. *Werkstofftechnologie für Ingenieure*. 6. Auflage. München: Pearson Studium Verlag, ISBN 978-3-8273-7303-8

ASHBY, Michael F. und David R. H. JONES, 2006. *Werkstoffe 1: Eigenschaften, Mechanismen und Anwendungen*. 3. Auflage. München: Elsevier GmbH (Spektrum Akademischer Verlag). ISBN 978-3-8274-1708-4

	<p>ASHBY, Michael F. und David R. H. JONES, 2007. <i>Werkstoffe 2: Metalle, Keramiken und Gläser, Kunststoffe und Verbundwerkstoffe</i>. 3. Auflage. München: Elsevier GmbH (Spektrum Akademischer Verlag). ISBN 978-3- 8274-1709-1</p>
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