Hochschule München University of Applied Sciences

Courses in English
Course Description

Department	09 Engineering and Management
Course title	**Material Science and Chemistry**
Course number	
Hours per week (SWS)	4
Number of ECTS credits	5
Course objective	Competence Level 2 „Understand“: • Students are able to explain the molecular structure of matter and understand the transformation of matter and energy in chemical reactions. • Students understand the building principles of atoms and molecules. • Students can explain important fundamentals of materials (technical terminology, bonds, etc.). • Students can explain the structure of metallic materials and the importance of structural defects. • Students can describe the mechanical properties of metals and important aspects of application (e.g. strengthening mechanisms). • Students can explain thermally activated processes (diffusion, recrystallisation, etc.). • Students can describe important procedures for materials testing (e.g. tensile tests, etc.). • Students can explain changes in the conditions of metals when adding alloying elements. • Students can explain the principles and applications of metals, such as ferrous and non-ferrous metals. • Students can explain the fundamentals of technical ceramics and polymers in their own words. Competence Level 3 „Apply“: • Students are able to use the electron configuration of elements and their position in the periodic table to predict the corresponding chemical behaviour. • Students are able to formulate situational statements about materials clearly and use the correct technical terminology. Competence Level 4 „Analyse“: • Students can categorise functions of materials in terms of their molecular structure and prevailing bonding types. • Students can independently reflect on essential and inessential aspects of technical material questions. • Students can analyse application issues. Competence Level 5 • Students can independently assess essential and
Prerequisites	none.

Hochschule München University of Applied Sciences

Courses in English
Course Description

Recommended reading	BROWN, Theodore L., LEMAY, H. Eugene, BURSTEN, Bruce E., MURPHY, Catherine J., WOODWARD, Patrick M., STOLTZFUS, Matthew W. C, 2018. Chemistry-The Central Science. 14th Edition. Harlow (United Kingdom): Pearson Education. ISBN-13: 978-1-292-22122-9. ATKINS, Peter W. and JONES, Loretta, 2006. Chemical Principles –The Quest of insight. 7th Edition. Ney York (U.S.A.): W.H. Freeman and Company. ISBN-13 978-1-44664411--88339955--33 SHACKELFORD, James F., 2015. Introduction to Materias Science for Engineers. Eigth Edidtion. München: Pearson Studium Verlag. ISBN 978-0-273-79340-3 ASHBY, M.F. und D.R.H. JONES, 2018. Engineering materials. An introduction to properties, applications and design: 1 [online]. Fifth edition. Amsterdam: Butterworth-Heinemann, ISBN 978-0-08-102051 7 ASHBY, M.F. und D.R.H. JONES, 2013. Engineering materials. 2: an introduction to microstructures and processing [online]. 4. ed. Amsterdam: Elsevier. Issn Ser. ISBN 9780080966694
Teaching methods	Seminars
Assessment methods	Written exam Duration: 90 minutes
Language of instruction	English
Name of lecturer	Prof. Dr. Stefan Raber Prof. Dr. Karlheinz Trebesius
Email	stefan.raber@hm.edu treberius@hm.edu
Link	
Course content	Material Science: • Basics in materials science (periodic system, bonds, material classes, determining material properties) • Structure of materials • Mechanical properties of metals • Thermally activated processes • Methods of materials testing • Alloys and phase diagrams • Ferrous and non-ferrous metals • Polymers • Technical ceramics Chemistry: • Classes of matter • Atomic structure (Bohr model and wave mechanical • model) • Periodic table and periodic properties • Intra- and intermolecular chemical bonds • Basics in chemical reactions
Remarks	