

DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	Academic Year			Semester
MWT201	2			3
Title	T	A	L	ECTS
Structure of Materials	2	2	1	6
Language	German			
Level	Undergraduate	X	Graduate	Postgraduate
Department / Program	Materials Science and Technology			
Forms of Teaching and Learning	Face to face			
Course Type	Compulsory	X	Elective	
Objectives	The students develop a first understanding of the structural structure and properties of ideal crystals. First principles for the correlation of the structure of solids with their chemical and physical properties are available for further study.			
Content	Introduction (historical development, behavior of matter, chemical bonds), overview of crystal symmetry (crystallographic axis system, basic concepts of morphology, crystal growth, crystallographic projections, symmetry principle, Bravais lattice, point groups, space groups), X-ray diffraction (generation of X-rays, the Bragg equation) , Introduction to the basics of crystal chemistry (thermodynamics of crystals, phase transitions, lattice energy, crystal chemical terms, bond types, radii and radii ratios, crystal structures), thermal, mechanical and electrical properties of crystals.			
Prerequisites				
Coordinator				
Lecturer(s)	Asist Prof.Dr. Duygu Ekinci			
Assistant(s)				
Work Placement	No			
Recommended or Required Reading				
Books / Lecture Notes	Binnewies, Jäckel, Willner, Rayner-Canham, „Allgemeine und Anorganische Chemie“, Spektrum Akademischer Verlag (2010).			
Other Sources	<ul style="list-style-type: none"> • Riedel, Janiak, „Anorganische Chemie" DeGruyter, Berlin (2011). • Kleber, Bautsch und Bohm, Einführung in die Kristallographie, Verlag Technik GmbH Berlin (1998). • Borhardt-Ott: „Kristallographie“, Springer Lehrbuch (2002). • Buerger: „Kristallographie. Eine Einführung in die geometrische und röntgenographische Kristallkunde“, De Gruyter Lehrbuch (1977) • Binnewies, Jäckel, Willner, Rayner-Canham, „Allgemeine und Anorganische Chemie“, Spektrum Akademischer Verlag (2010). 			
Additional Course Material				
Documents				
Assignments				

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Exams			
Course Composition			
Mathematics und Basic Sciences			%
Engineering			100%
Engineering Design			%
Social Sciences			%
Educational Sciences			%
Natural Sciences			%
Health Sciences			%
Expert Knowledge			%
Assessment			
Activity		Count	Percentage (%)
Midterm Exam		1	40
Quiz			
Assignments			
Attendance			
Recitations			
Projects			
Final Exam		1	60
Total		2	100
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	5	70
Assignments	5	10	50
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory	14	1	14
Projects			
Final Exam	1	2	2
Total Work Load			194
ECTS Points (Total Work Load / Hours)			6
Learning Outcomes			
1	The students develop a first understanding of the structural structure and properties of ideal crystals.		

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Weekly Content

1	Introduction (historical development, behavior of matter, chemical bonds)
2	Overview of the crystal symmetry (crystallographic axis system, basic concepts)
3	Morphology, crystal growth, crystallographic projections, symmetry principle, Bravais Grid.
4	Definition of symmetry, introduction of symmetry operators
5	X-ray diffraction I (generation of X-rays, the X-ray spectrum, X-ray diffraction, Bragg's equation)
6	X-ray diffraction II (generation of X-rays, the X-ray spectrum, X-ray diffraction, Bragg's equation)
7	Seminar I
8	Thermal, mechanical and electrical properties of crystals - I
9	Thermal, mechanical and electrical properties of crystals - II
10	Seminar II
11	Introduction to the basics of crystal chemistry
12	Thermodynamics of crystals, Phase transitions, lattice energy
13	Terms, bond types, radii, and radii ratios, crystal structures
14	Seminar IV
15	

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
All			3		1	2	
1							
2							
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5							
6							
7							
Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						
Compiled by:							
Date of Compilation:							