

DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	Academic Year			Semester
MWT310	3			6
Title	T	A	L	ECTS
Biomaterials	3	0	2	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		Elective	X
Objectives	<p>The students gain knowledge about the general principles for the description of physico-chemical contexts. They understand the basics of chemical and electrochemical equilibria and can apply them to different reactions.</p> <p>They are capable of independently performing and evaluating physical-chemical experiments.</p>			
Content	<p>Biological materials and biomineralization, structure-property relationships of selected biological materials, with particular emphasis on mechanical properties and the influence of hierarchy, bioactive, biodegradable, bioinert materials, acceptance / repulsion of implants, host response / immune response, wound healing, biometals, bioceramics, Biopolymers and Biocomposites, Selected Examples of Bioinspired Material Research; Dental and implant materials, drug delivery systems, 3D biomaterials printing</p>			
Prerequisites				
Coordinator				
Lecturer(s)	Asist Prof.Dr. Duygu Ekinci			
Assistant(s)				
Work Placement	No			
Recommended or Required Reading				
Books / Lecture Notes	Hench, L. L., J. R. Jones und M. B. Fenn, New Materials and Technologies For Healthcare, Imperial College Press.			
Other Sources	<ol style="list-style-type: none"> Schmidt, R., Werkstoffverhalten in biologischen Systemen: Grundlagen, Anwendungen, Schädigungsmechanismen, Werkstoffprüfung, 2. Auflage, Springer. Epple, M., Biomaterialien und Biomineralisation: Eine Einführung für Naturwissenschaftler, Mediziner und Ingenieure, Vieweg+Teubner. Wintermantel, E. and H.-W. Ha, Medizintechnik mit biokompatiblen Werkstoffen und Verfahren, Springer. Temenoff, J. S. und A. G. Mikos, Biomaterials: The Intersection of Biology and Materials Science, Prentice-Hall. Hench L. L. und J. R. Jones, Biomaterials, Artificial Organs and Tissue Engineering, Woodhead Publishing. Hench, L. L., J. R. Jones und M. B. Fenn, New Materials and Technologies For Healthcare, Imperial College Press. 			

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Additional Course Material			
Documents			
Assignments			
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	100
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	7	10	70
Assignments	4	10	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory	14	2	28
Projects			
Final Exam	1	2	2
		Total Work Load	184

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ECTS Points (Total Work Load / Hours)		6					
Learning Outcomes							
1	The students gain knowledge about the general principles for the description of physico-chemical contexts.						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
Weekly Content							
1	Introduction to biomaterials, biomaterials engineering and processing						
2	Properties of materials						
3	Surface properties and surface characterization of materials						
4	Bioceramics						
5	Hydrogels						
6	Smart Polymer systems						
7	Composites in biomedical applications						
8	Natural materials						
9	Metals						
10	Testing of Biomaterials - Biocompatibility						
11							
12							
13							
14							
15							
Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	P2	P3	P4	P5	P6	P7
All							



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1	2	3					
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
Contribution Level		1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High					
Compiled by:							
Date of Compilation:							