

DEPARTMENT OF MOLECULAR BIOTECHNOLOGY
COURSE SYLLABUS

Course Details				
Code		Academic Year		Semester
NWT310		4		8
Title		T	A	L
Biomaterials		3	2	6
Language		German		
Level	Undergraduate	X	Graduate	Postgraduate
Department / Program	Molecular Biotechnology			
Forms of Teaching and Learning	Face-to-face			
Course Type	Compulsory		Elective	X
Objectives	The aim of the course is to provide students with a basic knowledge of materials science knowledge and research ability, developments and innovations in the field of biomaterials, mass and surface properties of materials, biocompatibility, biological/biochemical basis of interaction of cells or tissues with materials, selected materials in implantology, as well as special materials and surface modifications. .			
Content	<ul style="list-style-type: none"> • Introduction to biomaterials science and technology • Biocompatibility • Classification of biomaterials • Properties of biomaterials • Cell surface interactions • Metallic biomaterials • Polymeric biomaterials • Ceramics • Composite biomaterials • Production processes of biomaterials • Characterization methods of biomaterials • Tissue engineering applications of biomaterials 			
Prerequisites	Chemistry 1&2, Biology			
Coordinator	-			
Lecturer(s)	-			
Assistant(s)	Res. Asst. Melis Işık Toksoy			
Work Placement	-			
Recommended or Required Reading				
Books / Lecture Notes	<ul 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. 			

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	<ul style="list-style-type: none"> • 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. 		
Other Sources			
Additional Course Material			
Documents	Google-classroom		
Assignments	Google-classroom		
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	20	
Quiz			
Assignments			
Attendance			
Recitations			
Projects	1	40	
Final Exam	1	40	
	Total	100	
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	13	3	39
Self-Study	13	3	39
Assignments	1	10	10
Presentation / Seminar Preparation			
Midterm Exam	1	11	11
Recitations	13	3	39

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Laboratory			
Projects			
Final Exam	1	12	12
Total Work Load			150
ECTS Points (Total Work Load / Hour)			6

Learning Outcomes

1	Understands common biomaterials such as metals, ceramics and polymers and their chemical structure, properties and morphology.
2	Defines the general structure and functions of cells, extracellular matrix and tissues.
3	Understands and considers methods for classifying biomaterials.
4	Defines methods for modifying the surfaces of biomaterials and selects the appropriate biomaterial for the desired biological reaction.
5	Describe the interactions between biomaterials, proteins and cells.
6	Understand the interaction between biomaterial and tissue in short-term and long-term implantation, differentiation of reactions in blood and tissue.
7	Evaluates and applies methods to characterize interactions between material and tissue.

Weekly Content

1	Introduction to biomaterials science and technology
2	Biocompatibility
3	Classification of biomaterials
4	Properties of biomaterials
5	Cell-Surface Interactions
6	Metallic Biomaterials
7	Polymeric Biomaterials - I
8	Polymeric Biomaterials - II
9	Ceramics
10	Composite Biomaterials
11	Production process of biomaterials
12	Characterization methods of biomaterials
13	Tissue engineering applications of biomaterials

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

	P1	P2	P3	P4	P5	P6	P7
1	5	5	5	3	3	4	3
2	5	5	5	3	3	4	3
3	5	5	5	3	3	4	3
4	5	5	5	3	3	4	3

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5	5	5	5	3	3	4	3
6	5	5	5	3	3	4	3
7	5	5	5	3	3	4	3
Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						
<p>P01 Working with modern scientific sources.</p> <p>P02 Having modern scientific knowledge and scientific analysis abilities and being able to apply them to scientific problems.</p> <p>P03 Having theoretical and practical skills in the area of biotechnology.</p> <p>P04 Having foreign language skills to follow the worldwide advancements in the field of biotechnology and to be able to discuss them with foreign colleagues.</p> <p>P05 Having computational skills for research data analysis purposes.</p> <p>P06 Having appropriate skills for academic and industrial jobs, being ready to take responsibility in working life.</p> <p>P07 Having knowledge about work occupational work and safety.</p>							
Compiled by:	Res. Asst. Aysel Oktay						
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