MSc program, Biomedical Engineering Department

Course Unit Title	Biomaterials for Medical Diagnosis and Therapy
Course Unit Code	BME510
Type of Course Unit	Elective
Level of Course Unit	Master of Science
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assoc. Prof. Dr. Terin Adalı
Name of Lecturer (s)	Assoc. Prof. Dr. Terin Adalı
Name of Assistant (s)	-
Mode of Delivery	Face to Face.
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	

Course description:

This course highlights the capabilities of biomaterials and devices for patient diagnostics and therapy. It is broken down into four major areas: in *vitro* and *in vivo* diagnostics (optical, electrical, mechanical), nanotechnology-enhanced analytical tools and techniques for diagnostics, and the future for patient diagnostics.

Objectives of the Course:

- Provide graduate level foundation on innovative biomaterial principles.
- Discuss concepts of surfaces & interfaces in biomedical function.
- Introduce biomimetric & rational design approaches to biomaterial engineering.
- Discuss cellular and molecular aspects of host responses to biomaterials.
- Develop critical analyses of biomaterials through grant proposal writing & review.

Learning Outcomes;

At the end of the course the student should be able to;

- Understand classes and usage area of biomaterials used in medicine
- Learns properties of biomaterials
- Explain host reactions to biomaterials and their evaluation
- Understand Tissue Engineering

		Assessment
1	Develop a thorough understanding on biomaterials used in artificial organ design and nanomedicine.	1,2
2	Develop a thorough understanding ability to nanotechnology, tissue engineering and biopharmaceutical sciences as a tool for medical diagnosis and theraphy.	1, 2

Assessment Methods: 1. Written Exam, 2. Project/Report,

Course's Contribution to Program

		CL
1	Apply the rules of scientific research and ethics	5
2	Discuss complex biomedical engineering issues as well as own research results comprehensively and in the context of current international research and present these in writing and orally	5
3	Solve problems by systems analytical thinking both in subject specific and interdisciplinary concepts	5
4	Combine specialized knowledge of various component disciplines	5
5	Carry out in dependent scientific work and organize (capacity of teamwork), Conduct and lead more complex projects	5
6	To assess the social and environment-related effects of their actions	5

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Topics	Assessment
1		Introduction: Nanotechnologies for Diagnosis – Present and Future	
2		Superparamagnetic Nanoparticles for Magnetic Resonance Imaging Applications I	1st Homework Assigned
3		Superparamagnetic Nanoparticles for Magnetic Resonance Imaging Applications II	
4		Carbon Nanotube-based Vectors for Delivering Immunotherapathics and Drugs	
5		Core-Shell Nanoparticles for Drug Delivery	
6		Molecular Imaging	

7		Polymeric Nanomaterials- Synthesis, Functionalization and Applications in Diagnosis and Therapy I	
8		Midterm	Midterm Exam
9		Polymeric Nanomaterials- Synthesis, Functionalization and Applications in Diagnosis and Therapy II	2nd Homework Assigned
10		Bionanoparticles and their Biomedical Applications I	
11		Bionanoparticles and their Biomedical Applications I	
12		Intelligent Hydrogels in Nanoscale sensing	2nd Homework Due
13		Nanotechnology for Gene Therapy I	
14		Nanotechnology for Gene Therapy II	
15		Project Presentation	
16		Final	Final Exam

Recommended Sources

Textbook:

1. Challa Kumar, Nanomaterials for Medical Diagnosis and Therapy, ISBN: 978-3-527-31390-7, 2007, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim

2. Research papers on related topics

Assessment

Project	25%	
Midterm Exam	30%	Written Exam
Final Exam	45%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Late assignments will not be accepted unless an agreement is reached with the lecturer.
3. Students may use calculators during the exam.
4. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload			
Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	15	4	60
Labs and Tutorials	10	10	100
Assignment	-	-	-
Project/Presentation/Report	3	10	30
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	6	6
Final Examination	1	12	12
Self Study	15	7	105
Total Workload			313
Total Workload/30(h)			10.4
ECTS Credit of the Course			10