MSc program, Biomedical Engineering Department

Course Unit Title	Biomedical Micro and Nano Systems
Course Unit Code	BME555
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:

The course defines the understanding of biomedical micro and nano systems manufacturing techniques. Design, fabrication and operation issues in applications of micro-total analysis systems, drug delivery systems, devices and instrumentation for diagnosis and treatment of human disease will be presented.

Objectives of the Course:

- To comprises extensive contents and in-depth discussions on both system- and circuit-level aspects of the design of implantable microsystems.
- Discuss issues surrounding design for implantability and testability.
- Various design aspects of neural simulation microsystems, cochlear implants and visual prosthesis are reviewed.

Learning Outcomes

At the end of the course the student should be able to		Assessment
1	Apply scaling laws and advantages offered by miniaturization	1,2,3,4,5
2	Discuss the basic micro fabrication techniques for silicon, glass and polymer devices	1, 2,3,4,5
3	Analyse design, fabrication and operation of MEMS-based sensors, actuator and fluidic devices4	1, 2,3,4,5

4	Integrate interdisciplinary pri5nciples of basic sciences, medical sciences and engineering to understand biomechanical Microsystems for diagnosis and treatment of human diseases	1, 2,3,4,5
5	Apply the principles to design novel Microsystems for better health care.	1,2,3,4,5

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

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	
2		BioMEMS Materials	
3		Microfabrication Methods	
4		Microfabrication Processes	
5		Lab-on-chip or Micro Total Analysis Systems	
6		Sensing and Detection Methods	
7		Review/exam	
8		Clinical Monitoring-1	

9		Clinical Monitoring-2	
10		MEMS Implants Bioelectronics Interfaces	
11		Nano systems manufacturing techniques	
12		Review	
13			Final Exam.

Recommended Sources

Textbook:

1. Ellis Meng, BIOMEDICAL MICROSYSTEMS, CRC Press, Taylor and Francis Group, ISBN: 978-1-4200-5122-3, Lecture notes

Assessment

Attendance	5%	
Project	15%	
Midterm Exam	30%	Written Exam
Final Exam	50%	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