Course Unit Title	Artificial Organs
Course Unit Code	BME321
Type of Course Unit	Compulsory
Level of Course Unit	
National Credits	3
Number of ECTS Credits Allocated	5
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	2
Year of Study	1
Semester when the course unit is delivered	2
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	BME102
Recommended Optional Programme Components	

Course description:
The important goal of this course is to thought technologies that will maintain, improve or even restore the function of diseased organs. The growing need for these technologies is substantial. Improved health care has resulted in an increased life span for the general population and, when coupled with a growing shortage of donor organs, makes it clear that organ assistance and substitution devices will play a larger role in managing patients with end-stage disease by providing a bridge to recovery or transplantation.

Objectives of the Course:

- Improving decision making: characterizing risk, uncertainty and opportunity,
- quantifying goals and identifying alternatives, tools for multi-goal design of artificial organs
- Make better decisions on tissue engineering problems through critical thinking and creative problem solving
- Develop insight into how you make design on your own and in collaboration with others.
- Recognize and remove barriers to individual and group creativity to foster an innovative work environment

Learning Outcomes

At the end of the course the student should be able to		Assessment
1	Develop a thorough understanding on artificial organs design and regenerative medicine.	1, 2, 3,4,5
2	Develop a thorough understanding ability that the field of medical device and artificial organ development is redefining what is believed to be possible for augmenting or replacing organ function.	1, 2, 3,4,5
3	Develop a thorough understanding on these devices which may now be either fully artificial or bioartificial- so-called "biohybrid organs" - a combination of biologic and synthetic components,	1, 2, 3,4,5
4	incorporating multiple technologies involving sensors, new biomaterials, and innovative delivery systems.	1,2,3,4,5

5	Following new innovations	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 knowledge of mathematics, natural science with relevant to life science and multidisciplinary context of engineering science.	4
2	Analyse, design and conduct experiments, as well as to analyse and interpret data.	4
3	Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	4
4	Function on multidisciplinary teams.	4
5	Control in design work, by using simulation, modelling and tests and integration in a problem solving oriented way.	5
6	Display an understanding of professional and ethical responsibility.	4
7	Communicate effectively aware of the non-technical effects of engineering.	1
8	Search technical literature and other information sources.	2
9	Recognize of the need for, and an ability to engage in life-long learning.	3
10	Exhibit a knowledge of contemporary issues.	3
11	Use the techniques, skills and modern engineering tools necessary for engineering practice to develop marketable products for the global market.	5

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

Course Contents

Week	Chapter	Topics	Assessment
1		Application of Biomaterials in Artificial Organs I	
2		Application of Biomaterials in Artificial Organs II	
3		Biological Mechanisms as Models for Mimicking	
4		Engineered Muscle Actuators: Cells and Tissues	Assignment 1
5		Artificial Muscles Using Electroactive Polymers	
6		Bio-Nanorobotics: A Field Inspired by Nature I	Assignment 2
7		Bio-Nanorobotics: A Field Inspired by Nature II & Revision	
8		MIDTERM	Midterm Exam
9		Interfacing Microelectronics and Human Visual System I	
10		Interfacing Microelectronics and Human Visual System II	
11		Engineered Muscle Actuators: Cells and Tissues	
12		Artificial Support and Replacement of Human Organs I	Assignment 3
13		Artificial Support and Replacement of Human Organs II	
14		Biomimetics: Reality, Challenges, and Outlook	
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.John P. Fisher, Antonios G. Mikos, Joseph D. Bronzino, Tissue Engineering, ISBN-10: 0-8493-9026-5, 2007, Taylor and Francis Group.
3.Yoseph Bar-Cohen, Biomimetics Biologically Inspired Technologies, ISBN-10: 0-8493-3163-3, 2006, Taylor and Francis Group.
4.Research papers on related topics.

Lab Manual

Supplementary Course Material

- Related Research Papers

Assessment

Attendance	5%	Less than 25% class attendance results in NA grade
Assignment	5%	
Midterm Exam	30%	Written Exam
Quiz	15%	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)	16	4	64
Labs and Tutorials	20	1	20
Assignment	2	8	12
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	-	-	-

Midterm Examination	1	2	2
Final Examination	1	2	2
Self-Study	15	4	60
Total Workload			170
Total Workload/30(h)			5.7
ECTS Credit of the Course			6