

**MSc program, Biomedical Engineering Department**

<b>Course Unit Title</b>	Advanced Tissue Engineering	
<b>Course Unit Code</b>	BME543	
<b>Type of Course Unit</b>	Elective	
<b>Level of Course Unit</b>	Master of Science	
<b>National Credits</b>	3	
<b>Number of ECTS Credits Allocated</b>	10	
<b>Theoretical (hour/week)</b>	4	
<b>Practice (hour/week)</b>	-	
<b>Laboratory (hour/week)</b>	-	
<b>Year of Study</b>	-	
<b>Semester when the course unit is delivered</b>	-	
<b>Course Coordinator</b>	Assoc. Prof. Dr. Terin Adalı	
<b>Name of Lecturer (s)</b>	Prof. Dr. İsmet S. Deliloğlu	
<b>Name of Assistant (s)</b>	-	
<b>Mode of Delivery</b>	Face to Face.	
<b>Language of Instruction</b>	English	
<b>Prerequisites</b>	-	
<b>Recommended Optional Programme Components</b>	-	
<b>Course description:</b>		
<p>The course will cover the application of engineering principles, combined with molecular cell biology, to develop fundamental understanding of property function relationships in tissues. Exploitation of the understanding to manipulate cell and tissue properties rationally to alter, restore, maintain, or improve cell and tissue functions as well as to design bioartificial tissue substitutes.</p>		
<b>Objectives of the Course:</b>		
<p>To provide the students with an understanding of critical evaluation of scientific literature and scientific and engineering research and development in this field, as well as the skills required to present and support their findings.</p>		
<b>Learning Outcomes</b>		
At the end of the course the student should be able to		Assessment
1	Describe what is meant by the term “tissue engineering”	1
2	Explain basic principles of host response and tissue integration	1, 2
3	Give example of cell sources and cite their specific characteristics	1, 2
4	List different strategies to modify an/or design TE constructs	1, 2

5	Describe how TE constructs are fabricated and produced	
6	Explain what biodegradability is and how it affects tissue integration	
7	Describe specific applications of TE constructs	
8	Read, understand and assimilate papers, publications and lectures pertaining to the field of TE and have broad understanding of TE research.	

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	2 4
3	Solve problems by systems analytical thinking both in subject specific and interdisciplinary concepts	4
4	Combine specialized knowledge of various component disciplines	4
5	Carry out independent scientific work and organize (capacity of teamwork), Conduct and lead more complex projects	4
6	To assess the social and environment-related effects of their actions	4

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

### Course Contents

Week	Chapter	Topics	Assessment
1		Introduction	
2		Tissue Organization	
3		Tissue Dynamics/development	
4		Morphogenesis/development	
5		Stem cells/embryonic stem cells	
6		Review/ Exam	

7		Adult Stem Cells/Cell Differentiation	
8		Signalling	
9		Extracellular matrix	
10		Cell Adhesion/migration	
11		Cell-Biomaterial Integrations and Host Integration	
12		Cell source and immune response	
13		Cell and tissue culture	
14		Scale up reactor design	
15		Review	
16			Final Exam.

### Recommended Sources

#### Textbook:

1. John P. Fisher, Antonios G. Mikos, Joseph D. Bronzino, "Tissue Engineering", CRC Press, Taylor and Francis, 2007, ISBN. 978-0-8493-9026
2. Related papers, lecture notes

### Assessment

Project	30%	
Midterm Exam	30%	Written Exam
Final Exam	40%	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.
5. 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 h	64
Labs and Tutorials	10	10	100
Assignment	4	3	12
Project/Presentation/Report	3	10	30
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	5	5
Final Examination	1	3	3
Self Study	-	100	100
Total Workload			314
Total Workload/30(h)			10.5
ECTS Credit of the Course			10