

School of Engineering and Natural Sciences / Biomedical Engineering (English)

2024 - 2025 Academic Year

TISSUE and GENETIC ENGINEERING

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
TISSUE and GENETIC ENGINEERING	BME4210778	Spring Semester	3+0	3	6
Prerequisites Courses	BİYOMALZEMELER				
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Assoc.Prof. Özge ŞENSOY				
Name of Lecturer(s)	Assoc.Prof. Özge ŞENSOY, Prof.Dr. Esra ÇAĞAVİ, Assist.Prof. Elif HOCAOĞLU, Prof.Dr. Yasemin YÜKSEL DURMAZ				
Assistant(s)	Tissue and Genetic Engineering				
Aim	Doku mühendisliği, vücuttaki hastalıklı veya yaralı doku ve organları yenilemeyi veya onarmayı amaçlayan bir alandır. Doku mühendisliği, biyoloji, kimya, malzeme bilimi, mühendislik, immünoloji ve transplantasyon gibi birçok farklı bilimi kapsar. Ders, doku büyümesi ve gelişimi ile doku ve organların tasarlanması için gerekli araç ve teorik bilgilerin genel bir anlayışını sağlar. Öğrencilere yönelik öğrenme yöntemi ve sömestir projesi, öğrencilere doku kavramlarını, ilkelerini ve uygulamalarını tanıtmak için öğretim aracı olarak kullanılacaktır.				
Course Content	This course contains; Introductory Lecture,Introduction to Tissue Engineering ,How Genetic Engineering serves to Tissue Engineering ,Stem Cell Tissue Engineering ,Polymeric Scaffolds for Tissue Engineering Applications ,Fabrication Methods of Tissue Engineering Scaffolds,3D Organ Printing and Cell Encapsulation,Basics in Immunology and Immune Host Response to Biomaterials,Extracellular Matrix: Structure Function, and Application to Tissue Engineering,Microvascular Imaging Methods for Tissue Engineering,In Vitro & In Vivo Testing,Standards and Regulations in Tissue Engineering Applications: ISO, FDA etc.,Project Presentations,Selected Topics on Tissue Engineering.				
Course Learning Outcomes		Teaching Methods	Assessment Methods		
Describe the tissue engineering as a prominent approach composed of different disciplines		10, 13, 14, 37, 5, 9	A, F		
Define the different strategies and approaches in tissue engineering		10, 14, 2, 5	A, F		
Analyze, evaluate, describe and compare different experimental techniques in tissue engineering		10, 14, 5	A, F		
Understand the experimental design of a tissue engineering study		10, 37, 4, 5	A, F		
Get the ability to combine their personal knowledge in biology, material science, engineering and medicine to understand and address the challenges in tissue engineering		10, 18, 2, 5	A, F		
Describe the national and universal standards for tissue engineering preclinic and clinic applications		10, 18, 2, 5	A, F		
Teaching Methods	10: Discussion Method, 13: Case Study Method, 14: Self Study Method, 18: Micro Teaching Technique, 2: Project Based Learning Model, 37: Computer-Internet Supported Instruction, 4: Inquiry-Based Learning, 5: Cooperative Learning, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, F: Project Task				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Introductory Lecture				
2	Introduction to Tissue Engineering				
3	How Genetic Engineering serves to Tissue Engineering				
4	Stem Cell Tissue Engineering				
5	Polymeric Scaffolds for Tissue Engineering Applications				
6	Fabrication Methods of Tissue Engineering Scaffolds				
7	3D Organ Printing and Cell Encapsulation				
8	Basics in Immunology and Immune Host Response to Biomaterials				
9	Extracellular Matrix: Structure Function, and Application to Tissue Engineering				
10	Microvascular Imaging Methods for Tissue Engineering				
11	In Vitro & In Vivo Testing				
12	Standards and Regulations in Tissue Engineering Applications: ISO, FDA etc.				
13	Project Presentations				
14	Selected Topics on Tissue Engineering				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources	
(1) Migliaresi, Claudio, and Antonella Motta. Scaffolds for tissue engineering: Biological design, materials, and fabrication. Jenny Stanford Publishing, 2014.	
(2) Birla, Ravi. Introduction to tissue engineering: applications and challenges. John Wiley & Sons, 2014.	
(3) Bronzino, Joseph D., and Donald R. Peterson. Tissue engineering and artificial organs. CRC press, 2016	