ABDULLAH GUL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
BIOENGINEERING DEPARTMENT
COURSE DESCRIPTION AND SYLLABUS

Course Name	CODE	SEMESTER	T+L Hour	CREDIT	ECST
Material Design and Fabrication for Tissue Engineering	524	FALL-SPRING	3 + 0	3	7,5

Prerequisite Courses	None

Course Type	Elective
Course Language	English
Course Coordinator	Prof. Dr. Sevil Dinçer İşoğlu
Lecturers	Prof. Dr. Sevil Dinçer İşoğlu, Asst. Prof. İsmail Alper İşoğlu
Course Assistants	None
Course Objectives	General Introduction to Tissue Engineering, Explanation of Properties of Tissue Scaffold, Comprehensive Study of Manufacturing Methods of Tissue Scaffolds used in Tissue Engineering, Follow the Most Recent Studies in Literature.
Learning Outcomes	Students, • Able to describe the properties of ideal tissue scaffold • Able to describe the fundamental manufacturing methods of ideal tissue scaffold • Able to apply knowledge of desalination, gas foaming, and additive manufacturing with particle aggregation • Able to apply knowledge of freeze- drying, thermally induced phase separation, and production of tissue scaffold with supercritical carbon dioxide • Able to perform fiber generation and electrospinning • Able to perform additive manufacturing with 3D printing • Able to define texture methods and interpret the relationship between texture methods and materials of tissue scaffold
Course Content	• Definition of tissue scaffold, the properties of ideal additive materials • Relations of cell, tissue scaffold and biosignal molecules • Designing of tissue scaffold and selection of materials • Aspect of fabrication methods • Salt-leaching, ice- removing, gas foaming • Particle aggregation, freeze- drying and phase separation • Supercritical carbon dioxide, methods of forming fiber • Electrospinning • 3D printing • Bioplotter, nano and microtexture

WEEKLY SUBJECTS AND RELATED PRELIMINARY PAGES

Week	Subjects	Preliminary
1	Definition of tissue engineering	Course book, Introduction part and related articles
2	The properties of ideal additive materials	Course book, Introduction part and related articles
3	Relations of cell, tissue scaffold and biosignal molecules	Course book, Introduction part and related articles
4	Designing of tissue scaffold and selection of materials	Course book, Introduction part and related articles
5	Aspect of fabrication methods	Course book, Introduction part and related articles
6	Salt-leaching, ice- removing	Course book, part A and related articles
7	Gas foaming and particle aggregation	Course book, part B and related articles
8	Freeze- drying and phase separation	Course book, part H,I and related articles

9	Supercritical carbon dioxide	Related articles
10	Midterm	Course notes and book
11	Methods of forming fiber	Course book, part N and related articles
12	Electrospinning	Course book, part N and related articles
13	3D printing	Course book, part Q and related articles
14	Bioplotter	Related articles
15	Nano and microtexture	Related articles
16	Final	Couse notes and book

RESOURCES	
Course Notes	Related course notes and slides
Other Resources	Course book: "A Amnuel for Biomaterials/Scaffold Fabrication Technology", Khang, Kim, Lee, 1st Edition, 2007, World Scientific.

MATERIAL SHARING	
Documents	Related course notes and slides
Homework	One assignment about related chapter of this course per week
Exams	One midterm and one final

RATING SYSTEM		
SEMESTER WORKS	**NUMBER**	**CONTRIBUTION**
Midterm	1	20
Homework and quiz	14-14	25-25
TOTAL		70
Success Rate of Semester		70
Success Rate of Final	1	30
TOTAL		100

Course Category	
Basic Sciences and Mathematics	50%
Engineering Sciences	50%
Social Sciences	0%

THE RELATIONSHIP BETWEEN THE LEARNING OUTCOMES AND PROGRAM COMPETENCE

No	Program Outcomes	Contribution Level				
		1	2	3	4	5
1	Understanding of Life Sciences, Mathematics and Engineering at the post-graduate level, and being able to implement of this knowledge into bioengineering problems					x
2	Having the ability of developing a new scientific method or a technological product or process, and, designing experiments, implementing, collecting data and evaluating regarding these issues					x
3	Choosing technical equipment used in the applications related to bioengineering, having sufficient knowledge in adopting and using new technological equipment					x
4	Having the ability of reaching the information, using resources, contributing to the literature by transferring the process and results of scientific studies as written or verbally in the national and international environments					x
5	Having the ability of working as an individual or a team, in the teams composed of discipline or different disciplines, gaining awareness of leadership and taking responsibility				x	
6	Having advanced level of foreign language knowledge to manage efficient verbal, written and visual communication in the major field				x	
7	Having the understanding of ethics in science and the responsibility in profession with the awareness of lifelong learning, being beneficial to society and sensitiveness to global issues				x	
8	Being aware of the social impacts of the solutions and applications of the challenges regarding Bioengineering				x	

*From 1 to 5, it increasingly goes.

ECTS / WORK-LOAD TABLE			
Activities	Activities	Duration (Hour)	Total (Work-Load)
Course Duration (Including exam week: 16x total course hour)	16	3	48
Out of Class Exercise Time (Pre-study, reinforcement)	16	7	112
Reading	16	3	48
Searching on Internet, library study	5	3	15
Presentation	5	3	15
Homework	16	3	48
Midterms	1	15	15
Final	1	15	15
Total Work-Load			301
Total Work-Load / 30			301/30
Course ECTS Credit			7,5