ABDULLAH GUL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
MATERIAL SCIENCE AND MECHANICAL ENGINEERING
COURSE DESCRIPTION AND SYLLABUS

Course Name	CODE	SEMESTER	T+L Hour	CREDIT	ECST
Biosensors	MSME 645	Fall-Spring	3+0	3	10

Prerequisite Courses	N/A

Course Type	Selective
Course Language	English
Course Coordinator	Assistant Prof. Kutay İçöz
Lecturers	Assistant Prof. Kutay İçöz
Course Assistants	N/A
Course Objectives	Learning the fundamentals of Biosensors. Reviewing recent literature and application of the devices to biology and medicine.
Learning Outcomes	• Learning the fundamentals of Biosensors. • Learning the fundamentals of materials used in Biosensors. • Learning the fabrication methods of Biosensors. • Detailed study of the surface chemistry and functionalization methods. • Learning the fundamentals of transduction mechanisms in Biosensors. • Learning the fundamentals of microfluidic based Biosensor. • Gaining the ability to understand the devices developed for cell and biomolecule sensing.
Course Content	• Nano/Micro technology applications for Biosensing • Materials and specifications • Surface properties • Transduction mechanisms • Microfluidics • Micro/nano biosensors • Standard laboratory methods for biosensing • Cantilever/Carbon Nanotube Biosensors • Target based Biosensing

WEEKLY SUBJECTS AND RELATED PRELIMINARY PAGES

Week	Subjects	Preliminary
1	Biosensor Fundamentals, market value, examples	The relevant articles from the literature
2	Materials: Silicon based, paper based, polymer based biosensors Fabrication techniques: Lithography and light sensitive polymers	The relevant articles from the literature
3	Sensing Mechanisms 1: Electrochemical, optical and mechanical etc.	The relevant articles from the literature
4	Surface Props developed for Biosensing: Chemical and biological receptors, surface coating and surface chemistry	The relevant articles from the literature
5	Surface Props developed for Biosensing: Micro patterning methods	The relevant articles from the literature
6	Midterm	
7	Microfluidic Devices for Biosensing	The relevant articles from the literature
8	Standard laboratory analysis techniques (ELISA, flow cytometry) for Biosensing	The relevant articles from the literature
9	Immunosensors	The relevant articles from the literature
10	Cell /Protein/DNA detection	The relevant articles from the literature
11	Midterm	
12	Bacteria/Virus detection	The relevant articles from the literature

13	Novel Biosensors 1	The relevant articles from the literature
14	Novel Biosensors 2	The relevant articles from the literature
15	Novel Biosensors 3	The relevant articles from the literature
16	Final Exam	

RESOURCES	
Course Notes	Lecture Slides
Other Resources	**Course Textbook:** "Principles of Bacterial Detection: Biosensors, Recognition Receptors and Microsystems" by Mohammed Zourob, Sauna Elwary, Anthony P.F. Turner**.**

MATERIAL SHARING	
Documents	Lecture notes, slides
Homework	Students will be given one homework each week
Exams	2 Midterms and 1 Final Exam

RATING SYSTEM		
SEMESTER WORKS	**NUMBER**	**CONTRIBUTION**
Midterm	2	40
Homework	10	20
TOTAL	10	10
Success Rate of Semester		70
Success Rate of Final		70
TOTAL	1	30

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

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS

No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	Accessing knowledge, evaluating and interpreting information by doing scientific research in the field of Materials Science and Mechanical Engineering					**X**
2	Ability to use science and engineering knowledge for development of new methods in Materials Science and Mechanical Engineering					**X**
3	To be able to understand and analyze materials by using basic knowledge on Materials Science and Mechanical Engineering					**X**
4	Design and implement analytical, modeling and experimental research					**X**
5	Solve and interpret the problems encountered in experimental research					**X**
6	Considering scientific and ethical values during the collection and interpretation of data				**X**	
7	Integrating knowledge of different disciplines with the help of scientific methods, and completion and implementation of scientific knowledge using data				**X**	
8	To gain leadership ability and responsibility in disciplinary and interdisciplinary team works					**X**
9	To be able to contribute to the solution of social, scientific and ethical problems encountered in the field of Materials Science and Mechanical Engineering					**X**
10	To be able to define, interpret and create new information about the interactions between various discipline of Materials Science and Mechanical Engineering					**X**

*From 1 to 5, it increasingly goes.

ECTS / WORK-LOAD TABLE			
Activities	Activities	Duration	Total

		(Hour)	(Work-Load)
Course Duration (Including exam week: 16x total course hour)	16	3	48
Out of Class Exercise Time (Pre-study, reinforcement)	16	8	128
Searching on Internet, library study	16	3	48
Presentation	5	3	15
Homework	10	3	30
Midterms	2	15	30
Final	1	15	15
Total Work-Load			314
Total Work-Load / 30			314/30
Course ECTS Credit			10