

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

2022 - 2023 Academic Year

BIOSENSORS

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
BIOSENSORS	COE4234050	Spring Semester	3+2	4	8
Prerequisites Courses	ELEKTRONİK I				
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Prof.Dr. Yasemin YÜKSEL DURMAZ				
Name of Lecturer(s)	Assist.Prof. Gülsen Betül AKTAŞ				
Assistant(s)					
Aim	Underlying engineering principles used to detect small molecules, DNA, proteins, and cells in the context of applications in diagnostic testing, pharmaceutical research, and environmental monitoring. Biosensor approaches including electrochemistry, fluorescence, acoustics, and optics; aspects of selective surface chemistry including methods for biomolecule attachment to transducer surfaces; characterization of bisensor performance; blood glucose detection; fluorescent DNA microarrays; label-free biochips; bead-based assay methods. Case studies and analysis of commercial biosensor.				
Course Content	This course contains; Introduction to Biosensors,Biological elements,Immobilization of biological elements,Electrochemical transducers,Optical transducers,Piezoelectric transducers,Immunosensors,Figures of merit,Lab-on-a-chip biosensors,Nanobiosensors,Applications of biosensors.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
grasping the fundamental concepts behind the operation of the most important classes of biosensors			1, 10, 12, 13	A, C	
grasping how biosensors are characterized, compared to each other, and designed to suit particular applications			1, 10, 12, 13	A, C	
explaining how biochemical functionality is coupled to a biosensor transducer			1, 10, 12, 13	A, C	
describing the major applications of biosensor technology in diagnostic tests, life science research, and environmental testing			1, 10, 12, 13	A, C	
exposing students to several of the most important emerging biosensor technologies			1, 10, 12, 13	A	
Encouraging the practice of critical thinking when considering a new detection technology and to develop the ability to communicate well-researched opinions to others			1, 10, 12, 13	A	
Teaching Methods	1: Lecture, 10: Brainstorming, 12: Case study, 13: Experiment / Laboratory				
Assessment Methods	A: Written Exam, C: Homework				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Introduction to Biosensors				
2	Biological elements				
3	Immobilization of biological elements				
4	Electrochemical transducers				
5	Optical transducers				
6	Piezoelectric transducers				
7	Immunosensors				
8	Figures of merit				
9	Lab-on-a-chip biosensors				
10	Nanobiosensors				
11	Applications of biosensors				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			
Resources					
Gennady Evtugyn, "Biosensors: Essentials", Springer, 2014Jeong-Yeol Yoon, "Introduction to Biosensors", Springer, 2016					