



**MARMARA UNIVERSITY**  
**Institute of Graduate Study for Pure and Applied Sciences**  
**Physics Department - Physics Program**

**SYLLABUS**

**2016-2017 Fall and Spring Semesters**      **Course Level:** Yüksek Lisans (Second Cycle)

Course Code	Course Name	Course Type	Course Pool (if any)	Weekly Course Hours T    U	Credits	ECTS Credits	Semester
<b>BYL7020.1</b>	Immobilized Enzymes and Biosensor Technology	Zorunlu		3			

Prerequisite Courses (Course Code and Name, Min Letter Grade to success)	Prerequisite to (Course Code and Name, Min Letter Grade to success)	Weekly Time & Classroom Schedule (Day, Hours, Classroom)
<Bu dersi bağlayan önceki derslerin kodu, adı, min hb> {Her bir dersi birbirinden noktalı virgülle ayırınız.}	<Bu dersin bağladığı sonraki derslerin kodu, adı, min hb> {Her bir dersi birbirinden noktalı virgülle ayırınız.}	

<b>Course Lecturer</b>	Doç. Dr. N. Cenk SESAL	<b>Teaching Assistant(s)</b>	<Title, Name, Surname>
<b>Office</b>	C223	<b>Office</b>	
<b>Tel / Extention</b>	3277	<b>Tel / Extention</b>	
<b>E-mail</b>	<a href="mailto:csesal@marmara.edu.tr">csesal@marmara.edu.tr</a>	<b>E-mail</b>	
<b>Web</b>		<b>Web</b>	
<b>Office Days and Hours</b>	Pazartesi 08 30- 09 30	<b>Office Days and Hours</b>	

**Course Objectives**  
 Bioanalytical devices can be defined as biosensors by utilizing a multidisciplinary approach with the partnership of many science fields such as biology, physics, chemistry, biochemistry, engineering, and the selectivity of biological molecules or systems. The aim of this course is to examine the design, production and applications of biosensors in detail and to give students general information about biosensors that they may be injured in later years.

	Course web pages:
<b>Textbooks and/or References (Recommended Reading)</b>	1 Nanotechnology and Biosensors 2018
	2 Electrochemical Biosensors 2015
	3 Biosensor Systems 2007
	4 New Articles
	5

<b>Learning Outcomes</b>	1 To be able to recognize new generation biosensors produced with nano-technology and semiconductor chip technologies, to interpret their applications
	2 To be able to recognize the side methods such as elisa and PCR methods that can be used in biosensor analysis, to interpret the applications
	3 To learn the definition of biosensor and its basic concepts
	4 Interpret how affinity molecules and enzyme reactions are used in biosensor technology
	5 To learn how bioreceptors attach to the sensor surface (immobilization)
	6 To learn the working principles and necessary physics of biosensors collected in thermal, optical, mechanical and magnetic basics,

Program Gains / Outputs																1:Week; 2:Medium; 3:Strong
Program Gains x Course Learning Gains Matrix	PG1	PG2	PG3	PG4	PG5	PG6	PG7	PG8	PG9	PG10	PG11	PG12	PG13	PG14	PG15	Course Learning Gains
	3	3	2	3	3	3	3	2	2	2	3	3				LG1 To be able to recogn...
	2	3	3	3	2	3	2	3	2	2	3	3				LG2 To be able to recogn...
	3	3	2	3	3	2	2	3	2	3	3	3				LG3 To learn the definit...
	3	3	3	3	3	3	3	2	2	2	3	3				LG4 Interpret how affini...
	3	3	2	3	3	3	2	2	2	3	3	3				LG5 To learn how biorece...
	3	3	3	3	3	3	3	3	2	2	3	3				LG6 To learn the working...

	3	3	3	3	3	3	3	3	2	2	3	3	0	0	0	TOTAL EFFECT	
<b>Language of Instruction</b>	<b>Learning Activity and Teaching Methods</b>										<b>Course Presentation</b>						
	<expression/presentation, question-answer, discussion, problem solving, case study, experiments/laboratory, observation, tripping dramatisation, project, homework, etc.>										<face-to-face, experiments, question-answer, discussion, case study, have it made by showing, etc.>						
<b>Week</b>	<b>Date</b>	<b>Course Contents (Topics)</b>										<b>Reference No - Section</b>					
Week 1		What is a biosensor? Biosensor sections															
Week 2		Various interactions: Antibody-antigen interaction, DNA Protein-protein interactions															
Week 3		ELISA immobilization techniques and properties of enzymes															
Week 4		Principles of biosensors and hardware innovations in biosensors															
Week 5		Amperometric and Potentiometric Biosensors															
Week 6		Piezoelectric biosensor															
Week 7		Midterm preparation and general review															
Week 8		Midterm															
Week 9		Design of biosensors using PCR principles															
Week 10		Biosensor application areas															
Week 11		SPR and similar optical biosensors															
Week 12		Chromatography and biosensor similarities															
Week 13		Electrochemical biosensors															
Week 14		Various article reviews about biosensors															
Week 15		Microbial biosensors															
Week 16		Study Week															
Week 17		Final Exam Week															
<b>Evaluation Method</b>		<b>YSSL (BDS)</b>	<b>BNAL (BDS)</b>	<b>BDKL (BDS)</b>	<b>Grade Calculation</b>												
Bağıl Değerlendirme Sistemi (BDS)					Yarıyıl/yıl içi değerlendirme ve yarıyıl/yıl sonu sınavı notlarından hesaplanır.												
<b>Assessment Methods and Criteria</b>	<b>Evaluation Tool</b>	<b>Quantity</b>	<b>Date</b>	<b>Weight in Total (%)</b>	<b>Weight in Semester Evaluation (%)</b>												
	Final	1		60,00	0,00												
	Resit (Final Make-up) Exam (if exists)			60,00	0,00												
	<b>Semester Evaluation</b>			40,00	100,00												
	Midterm(s)	1		10,00	25,00												
	Quiz(es)																
	Project(s)	1		10,00	25,00												
	Homework(s)	1		10,00	25,00												
	Laboratory / Workshop																
	Presentation/ Seminar / Demo																
Research / Report / Other	1		10,00	25,00													
Presents to course																	
<b>Student Workload (ECTS Credit) Calculation</b>																	
<b>Evaluation Tool</b>	<b>Hour/Quantity</b>	<b>Workload Hours</b>	<b>Evaluation Tool</b>	<b>Hour/Quantity</b>	<b>Workload Hours</b>	<b>Evaluation Tool</b>	<b>Hour/Quantity</b>	<b>Workload Hours</b>									
Theoretical hours			Midterm & preparation			Laboratory/Atelier & preparation											
Application hours			Quiz & preparation			Presentation & preparation											
Pre-class and Post-class self study			Project & preparation			Research & preparation											
Pre and post-application self study			Homework & preparation			Final & preparation											
<b>Total Student Workload Hours: 0</b>		<b>1 ECTS Credits = 25 Student Workload Hours</b>					<b>Workload Calculation:</b>	True									