AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title		Chemical Sensors					
Course Code		KİM618		Couse Level	Third Cycle (Doctorate Degree)		
ECTS Credit	10	Workload	250 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		The subject of recognition of ionic and neutral molecular species by agents in membrane matrices is introduced and the principles of thermodynamics and nonthermodynamic assumptions of processes are thought.					
Course Content		Types of membranes and membrane models are presented. Some examples of amperometric and optical sensors are reviewed. Additionally, the concepts of sensitivity, selectivity and detection limit in relation to sensors are checked. The problems of sensor miniaturization are discussed.					
Work Placement		N/A					
Planned Learning Activities and Teaching Methods			Explanation (Presentation), Individual Study, Problem Solving				
Name of Lecturer(s)							

Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	35
Assignment	3	45

Recommended or Required Reading

1	Principles of Chemical and Biological Sensors. D. Diomond. John Wiley&Sons, 1998.
2	Chemical Sensors and Biosensors for Medical and Biological Applicatios. U.E. Spichiger-Keller. Wiley-VCH, 1998

Week	Weekly Detailed Course Contents	
1	Theoretical	The concepts of chemical and biochemical sensors
2	Theoretical	Molecular recognition of ions and neutral species
3	Theoretical	Reversibility and Thermodynamic equilibrium
4	Theoretical	Nonthermodynamic assumtions
5	Theoretical	Types of membranes and membrane models
6	Theoretical	The membrane composition and membrane medium. Quiz-1
7	Theoretical	Response behavior, sensitivity, selectivity and detection limit
8	Theoretical	Types of ion selective electrodes
9	Theoretical	Student presentations. Discuss
10	Theoretical	Ion selective optodes
11	Theoretical	Amperometric biosensors. Quiz-2
12	Theoretical	Principles of fiber optic chemical sensors
13	Theoretical	Glass electrode for pH and amperometric glucose electrode
14	Theoretical	Sensor miniaturization
15	Theoretical	Student presentations. Discuss
16	Final Exam	Final exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	3	42
Assignment	5	0	20	100
Midterm Examination	1	48	2	50
Final Examination	1	56	2	58
			Total Workload (Hours)	250
			[Total Workload (Hours) / 25*] = **ECTS**	10
25 hour workload is accepted as 1 ECTS				

Learning Outcomes

1	To meet with chemical sensors and biosensors concepts.
2	To learn the concepts of molecular recognition and review some examples.
3	To get acquainted with general information about membranes and their chemical composition.
4	To learn working principles of potentiometric sensors and discuss some applications.
5	To learn working principles of voltammetric sensors and discuss some applications.
6	To learn working principles of optical sensors and discuss some applications.

Programme Outcomes *(Chemistry Doctorate)*

1	Depending on the master degree competences, develops, insights and innovates current and advanced knowledge and/or research in proficiency level.
2	Gains high skill levels in using research methods in the field of his/her study.
3	Comprehends the interaction between disciplines related to his/her field. Reaches to original results using his/her expertise in order to analyze, synthesize and evaluate new and complicated ideas.
4	Enlarges the boundaries of his/her field of knowledge by publishing at least one research paper in national and/or international peer-reviewed journals.
5	Defends his/her original opinions related to his/her field before authority and communicates effectively illustrating his/her competence.
6	May communicate and debate written, orally and visually in European Language Portfolio level C1.
7	Follows the developments in computer software and information and communication technologies developed for his/her research area and uses these in order to solve research problems.
8	Collaborates for scientific research with national and international research teams.
9	Contributes to the course of creation and maintenance of knowledge based society and by introducing the scientific, social and cultural developments to the society he/she is living in.

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6
P1	3	3	3	3	3	3
P2	3	3	3	3	3	3
P3	3	3	3	3	3	3
P5	2	2	2	2	2	2