AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Avanced Voltammetric Techniques						
Course Code	KİM616		Couse Level	Third Cycle (Doctorate Degree)			
ECTS Credit	10	Workload	250 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The aim of this course is to provide basic information about the thermodynamics and kinetics of electrochemical reactions.						
Course Content	The thermodynamics and kinetics of electrochemical reaction are examined in detail and the resulting concepts and equations are related to individual techniques. Various voltammetric techniques is investigated especially in relation to chemical analysis. Electrodes used in voltammetry and modified electrodes are introduced and also setup of voltammetric experiments are demonstrated.						
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	Analytical Electrochemistry. 2nd Ed. J. Wang. Wiley-VCH, Newyork, 2000.
2	Laboratory Techniques in Electroanalytical chemistry. 2nd Ed. Eds: P. Kissinger and W. Heineman, Marcel-Dekker, 1996
3	Electroanalytical Methods. Ed: F. Scholz. Springer, 2002

Week	Weekly Detailed Course Contents	
1	Theoretical	Electrical double layer
2	Theoretical	Thermodynamics of electrochemical reactions
3	Theoretical	Kinetics of electrochemical reactions
4	Theoretical	Cyclic voltammetry
5	Theoretical	Pulse voltammetry
6	Theoretical	Square-wave voltammetry. Quiz-1
7	Theoretical	Chronocoulometry
8	Theoretical	Electrochemical impedance spectroscopy
9	Theoretical	Student presentations. Discuss
10	Theoretical	Stripping voltammetry
11	Theoretical	UV/Vis/NIR spectroelectrochemistry. Quiz-2
12	Theoretical	Electrodes: Working and reference
13	Theoretical	Chemically modified electrodes
14	Theoretical	Electrolytes and experimental setup
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 understand electrochemical reactions in kinetics and termodynamics theories.
2	To discuss and compare puls and square-wave voltammetries in chemical analysis.
3	To learn the basics of ımpedans spectrometry and examine some applications.
4	To learn the basics of spectroelectrochemistry.
5	To review general knowledge about electrodes, electrolites etc. used in electroanalytical laboratories.

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
P1	4	4	4	4	
P2	4	4	4	4	4
P3	3	3	3	3	
P5	3	3	3	3	2