

Course	CHEM 405/505 Electrochemistry
Instructor	Doç. Dr. Mustafa Kemal Bayazıt
Term	2024-2025 Fall
Lecture Hours	<i>Thursday</i> 11.40-12.30 <i>FENS L056</i> <i>Friday</i> 8.40-10.30 <i>FENS L029</i>

Instructor's Contact Information

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Office Hours	Monday 15.40-16.30 (please email me!)

General Course Information

Course Description	This course is designed to be a comprehensive introduction to fundamentals of electrochemistry, modern electrochemical methods and applications of electrochemistry.
Objectives	<ul style="list-style-type: none"> • To provide a foundation in theoretical electrochemistry which is sufficient for the understanding of many basic phenomena. • To teach the theory behind a number of advanced electrochemical methods. • To familiarize the student with those electrochemical methods that are exploited in many electroanalytical and technologically important applications such as fuel cells, electrolysis and batteries.
Reference Books	<p>There will be no textbook for this course. You can study from lecture notes and reference books on <i>Electrochemistry</i>. Several examples are given below:</p> <ul style="list-style-type: none"> • Rieger, Electrochemistry, 2nd edition. (Chapman & Hall, 1994). • Bard and Faulkner, Electrochemical techniques: fundamentals & applications, 2nd edition, (Wiley, 2001) • Sawyer, Sobkowiak and Roberts, Electrochemistry for chemists, (Wiley, 1995) • Bockris, and Reddy, Modern electrochemistry, (Plenum, 1998)
Top Hat (online response system)	In lectures, we will use an online response system called TopHat accessible from tophat.com on your web browser, or through free Top Hat app (tophat.com/mobile-apps) if using tablet. If you have not used the system before, please review this "Getting Started" guide before the first lecture. You must log in Top Hat with your SU email account name and bring a device connected to SABANCIUNIV WiFi to each lecture.

Grading	<i>Top Hat activities– 20 %</i> <i>Homework – 15 %</i> <i>Project – 30 %</i> <i>Final exam – 35 %</i>
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Tentative Course Schedule

Date	Topic
Week 1	<i>Introduction to Electrochemistry</i>
Week 2	<i>Introduction to Electrochemistry</i>
Week 3	Part I: Fundamentals of Electrochemistry <i>A) Terminology, History, Electrode-Electrolyte Interface, Electrochemical Cells, Standard Half Cell Potentials</i>
Week 4	Part I: Fundamentals of Electrochemistry <i>A) Standard Half Cell Potentials: Calculations</i>
Week 5	Part I: Fundamentals of Electrochemistry <i>B) Electrodes, Electrode Reactions, Electrode Kinetics, Motion of Particles in Solution, Electrical Conductivity</i>
Week 6	Part I: Fundamentals of Electrochemistry <i>Motion of Particles in Solution, Electrical Conductivity</i>
Week 7	Part I: Fundamentals of Electrochemistry <i>C) Thermodynamics of Electrochemistry, Nernst Equation, Electrochemical Cells at Non-Standard Conditions</i>

Week 8	Part II: Basic Techniques in Electrochemistry <i>A) Electrochemical Measurement, Potentiostatic & Galvanostatic Methods</i>
Week 9	Part II: Basic Techniques in Electrochemistry <i>A) Electrochemical Measurement, Potentiostatic & Galvanostatic Methods</i>
Week 10	Part II: Basic Techniques in Electrochemistry <i>B) Voltammetry, Polarography, Cyclic Voltammetry</i>
Week 11	Part II: Basic Techniques in Electrochemistry <i>C) Electrochemical Impedance Spectroscopy</i>
Week 12	Part III: Applications of Electrochemistry <i>A) Fuel Cells & Hydrogen Production by Electrolysis</i>
Week 13	Part III: Applications of Electrochemistry <i>B) Batteries</i>
Week 14	Project Presentations
Week 15	Project Presentations