

Course	CHEM 405 Electrochemistry
Instructor	Prof. Dr. Selmiye Alkan Gürsel
Term	2022-2023 Spring
Lecture Hours & Zoom Link	Monday <b>11.40-12.30</b> Wednesday <b>10.40-12.30</b> <a href="https://sabanciuniv.zoom.us/j/91354091324">https://sabanciuniv.zoom.us/j/91354091324</a>

*We may have to revise the course plan according to the countrywide reassessment to be made regarding higher education. This is expected to happen at the beginning of April. The content to be delivered is certain but the method of course delivery, the number and dates of exams, and some other details are subject to change*

#### 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"> <li>• To provide a foundation in theoretical electrochemistry which is sufficient for the understanding of many basic phenomena.</li> <li>• To teach the theory behind a number of advanced electrochemical methods.</li> <li>• To familiarize the student with those electrochemical methods that are exploited in many electroanalytical and technologically important applications such as batteries and fuel cells.</li> </ul>
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"> <li>• Rieger, <b>Electrochemistry</b>, 2nd edition. (Chapman &amp; Hall, 1994).</li> <li>• Bard and Faulkner, <b>Electrochemical techniques: fundamentals &amp; applications</b>, 2nd edition, (Wiley, 2001)</li> <li>• Sawyer, Sobkowiak and Roberts, <b>Electrochemistry for chemists</b>, (Wiley, 1995)</li> <li>• Bockris, and Reddy, <b>Modern electrochemistry</b>, (Plenum, 1998)</li> </ul>
Top Hat (online response system)	<p>In lectures, we will use an online response system called <b>TopHat</b> 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. <b>You must log in Top Hat with your SU email account name and bring a device connected to SABANCIUNIV WiFi to each lecture.</b></p>



<b>Grading</b>	<i>Top Hat activities– 20 %</i> <i>Homework – 20 %</i> <i>Project – 30 %</i> <i>Final exam – 30 %</i>
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### **Tentative Course Schedule**

<i>Date</i>	<i>Topic</i>
<b>March 6 &amp; 8</b>	Introduction to Electrochemistry
<b>March 13 &amp; 15</b>	<u>Part I: Fundamentals of Electrochemistry</u>  A) Terminology, History, Electrode-Electrolyte Interface, Electrochemical Cells, Standard Half Cell Potentials
<b>March 20 &amp; 22</b>	<u>Part I: Fundamentals of Electrochemistry</u>  A) Standard Half Cell Potentials, Electrochemical Series
<b>March 27 &amp; 29</b>	<u>Part I: Fundamentals of Electrochemistry</u>  B) Electrodes, Electrode Reactions, Electrode Kinetics,  Motion of Particles in Solution, Electrical Conductivity
<b>April 3 &amp; 5</b>	<u>Part I: Fundamentals of Electrochemistry</u>  C) Thermodynamics of Electrochemistry, Electrolysis, Faraday's Law
<b>April 10 &amp; 12</b>	<u>Part I: Fundamentals of Electrochemistry</u>  C), Nernst Equation
<b>April 17 &amp; 19</b>	<u>Part II: Basic Techniques in Electrochemistry</u>  A) <u>Electrochemical Measurement, Potentiostatic &amp; Galvanostatic Methods</u>



<b>April 24 &amp; 26</b>	<u>Part II: Basic Techniques in Electrochemistry</u> B) Voltammetry, Polarography
<b>May 1 &amp; 3</b>	<u>Part II: Basic Techniques in Electrochemistry</u> B) Cyclic Voltammetry
<b>May 8 &amp; 10</b>	<u>Part II: Basic Techniques in Electrochemistry</u> C) Electrochemical Impedance Spectroscopy
<b>May 15 &amp; 17</b>	<u>Part II: Basic Techniques in Electrochemistry</u> C) Electrochemical Impedance Spectroscopy
<b>May 22 &amp; 24</b>	<u>Part III: Applications of Electrochemistry</u> <i>A) Fuel Cells</i>
<b>May 29 &amp; 31</b>	<u>Part III: Applications of Electrochemistry</u> <i>B) Batteries</i>
<b>June 5 &amp; 7</b>	Project Presentations
<b>June 12 &amp; 14</b>	Project Presentations