

**UNIVERSITY OF MADRAS**  
**M.Sc., DEGREE PROGRAMME IN CHEMISTRY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

Title of the Course	<b>ELECTRO ANALYTICAL TECHNIQUES</b>				
Category	SEC	Credits	2	Course Code	SKILL-F
Instructional hours per week	Lecture	Tutorial	Lab Practice	Total	
	1		1	2	
Prerequisites	<b>Basic knowledge of chemistry</b>				
Objectives of the course	Electrochemistry as an analytical tool To understand the concepts of Electrochemical techniques To apply electroanalytical chemistry to carry out trace analysis To have idea of electrodes used in experiments To understand their application in sensors				
Course Outline	<b>Unit I Voltammetry:</b> Introduction, Principles Voltametric techniques such as cyclic voltammetry.  <b>UNIT-II Potentiometry:</b> Electrodes, Types- glass membrane electrodes, solid state, precipitate, chemically modified and enzyme catalysed electrodes. Direct and indirect potentiometric methods includes acid base in non-aqueous systems. Manual and automatic titrations.  <b>Unit III Techniques</b> Differential, normal, reverse and pulse voltammetry techniques. Cathodic and anodic stripping voltammetry – trace metal analysis.  <b>Unit IV Electroanalytical Techniques:</b> Electrochemical measurements for corrosion studies applications of Electrochemical Impedance spectroscopy,  <b>Unit V Electrochemical sensors:</b> Potentiometric sensors, Amperometric sensors, Conductometric sensors, Field effect transistors				
Extended Professional Component (is apart of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/NET/UGC-CSIR/GATE/TNPSC others to be solved (To be discussed during the Tutorial hours)				
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.				
Recommended Text	1. Allen J. Bard, Larry R. Faulkner, "Electrochemical Methods – Fundamentals and Applications", John Wiley & Sons, New York. 2. Daniel C. Harris, "Quantitative Chemical Analysis", W.H. Freeman and Company, New York. 3. I.M. Kolthoff, and P.J. Elving, "Treatise on Analytical Chemistry", Wiley-Interscience, New York. 4. Brian R. Eggins, "Chemical Sensors and Biosensors", John Wiley & Sons, New York.				

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<b>Reference Books</b>	<ol style="list-style-type: none"><li>1. Peter T. Kissinger, William R. Heineman, "Laboratory Techniques in Electroanalytical Chemistry", Marcel Dekker Inc., New York.</li><li>2. Basil H. Vassos, Galen W. Ewing, "Electroanalytical Chemistry", John Wiley &amp; Sons, New York.</li></ol>
<b>Website and e-learning source</b>	<ol style="list-style-type: none"><li>1. <a href="https://www.britannica.com/science/chemical-analysis/Electroanalysis">https://www.britannica.com/science/chemical-analysis/Electroanalysis</a></li><li>2. <a href="https://www.sciencedirect.com/topics/materials-science/electroanalytical-method">https://www.sciencedirect.com/topics/materials-science/electroanalytical-method</a></li><li>3. <a href="https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Instrumental_Analysis_(LibreTexts)/22%3A_An_Introduction_to_Electroanalytical_Chemistry">https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Instrumental_Analysis_(LibreTexts)/22%3A_An_Introduction_to_Electroanalytical_Chemistry</a></li><li>4. <a href="https://onlinecourses.nptel.ac.in/noc24_cy10/preview">https://onlinecourses.nptel.ac.in/noc24_cy10/preview</a></li></ol>