

Study of electrode reactions: Cyclic voltammetry – reversible, irreversible and quasi reversible processes – study of reaction mechanism, adsorption, quantitative applications – spectroelectrochemistry – scanning electrochemical microscopy. Controlled potential and current techniques: Chronoamperometry – pulse voltammetry - square wave and staircase voltammetry - AC voltammetry - stripping voltammetry - bulk electrolysis – chronopotentiometry - Tafel polarisation - electrogravimetry - flow analysis. Electrochemical impedance spectroscopy: Faradaic impedance – equivalent circuits – AC impedance- Bode and Nyquist plots – applications. Electrochemical instrumentation: Operational amplifiers – current and voltage feedback - potentiostat and galvanostat – troubleshooting in electrochemical systems.

Text Books/References:

1. Joseph Wang, “Analytical Electrochemistry” Second Edition, John Wiley & Sons, 2001.
2. Allen J. Bard and Larry R. Faulkner, “Electrochemical Methods: Fundamentals and Applications”, Second Edition, John Wiley & Sons, 2001.
3. V.S. Bagotsky, “Fundamentals of Electrochemistry”, Second Edition, John Wiley & Sons, 2006.
4. Evgenij Barsoukov and J. Ross Macdonald, “Impedance Spectroscopy: Theory, Experiment, and Applications”, Second Edition, John Wiley & Sons, 2005.
5. Allen J. Bard, Martin Stratmann and Patrick R. Unwin, “Encyclopedia of Electrochemistry, Volume 3, Instrumentation and Electroanalytical Chemistry”, Wiley-VCH, 2003.