

COURSE OBJECTIVES



To introduce the fundamentals of electrochemistry, electrical concepts, and Electrochemical Impedance Spectroscopy (EIS).



To develop understanding of EIS instrumentation, experimental procedures, and impedance data analysis.



To explain equivalent circuit modelling and interpretation of electrochemical behaviour.



To provide practical exposure of EIS measurements and interpretation for engineering applications such as EIS in corrosion, electroplating, coatings, batteries, and fuel cells

COURSE OUTCOMES



Understand the basic principles of electrochemistry and Electrochemical Impedance Spectroscopy.



Analyze impedance data using Nyquist/Bode plots and equivalent circuit fitting.



Interpret electrochemical processes through physical meaning of circuit elements.



Relate EIS concepts to practical engineering, industrial, and research problems.



CONTACT US



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1st Winter School on ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY

THEORY AND PRACTICE

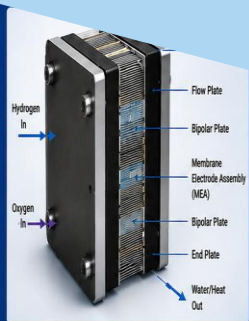
7th – 11th DECEMBER 2026

Organized by

Department of Metallurgical and Materials Engineering
National Institute of Technology, Rourkela
Rourkela-769008 Odisha, India

INTRODUCTION TO THE COURSE

Electrochemical Impedance Spectroscopy (EIS) is one of the most powerful and versatile electrochemical techniques used for investigating material behaviour, interface phenomena, and electrochemical processes. Owing to its non-destructive nature and exceptional sensitivity, EIS has found widespread applications in corrosion science, electroplating, protective coatings, batteries, fuel cells, and several emerging energy technologies. This workshop is designed to provide participants with a strong foundation in the principles of EIS, experimental methodologies, instrumentation, data interpretation, and its practical applications, making it an ideal starting point for students, researchers, and industry professionals.



COURSE OUTLINE

MODULE-I: FUNDAMENTALS



- Electrochemical Cells
- Faradaic & Non-Faradaic Reactions
- Electrical Impedance
- EIS Circuit Elements & Circuit Models

MODULE-II: INSTRUMENTATION

- Frequency Response Analyzer
- Complex Impedance
- Nyquist & Bode Analysis
- Randles Circuit Fitting



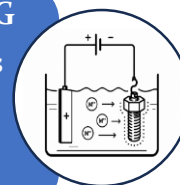
MODULE-III: EIS IN CORROSION



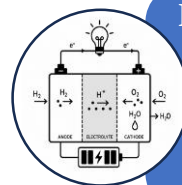
- Corrosion Resistance Evaluation
- Passive Film Analysis
- Pitting & High-Temperature Corrosion Analysis
- Corrosion Inhibitor Evaluation

MODULE-IV: EIS IN ELECTROPLATING

- Coating Performance & Defect Analysis
- Multilayer Coating Analysis
- Water Uptake Analysis
- Smart & Self-Healing Coatings



MODULE-V: EIS IN FUEL CELLS & BATTERY



- Battery SOC & SOH Analysis
- SEI Characterization
- Fuel Cell Electrode Kinetics
- Mass-Transport Limitation Studies

WHO SHOULD ATTEND?

- Young faculties
- Corrosion practitioners, designers, architects, technical managers, inspection and maintenance engineers.
- Quality control personnel and those involved in failure analysis.
- Facility owners and users who are concerned with corrosion

The successful participants who will attend the whole course will be given participation certificate.

IMPORTANT DATES

Last date for receipt of application is 15th of November 2026 and the notification of acceptance will be by 23rd November 2026.

REGISTRATION FEES

Research Scholars	: INR 300
Faculties from institutes	: INR 500
Industry delegates	: INR 1000

Participants (Faculty members and students) from NIT Rourkela are exempted from paying registration fees.