Basic Electrochemistry Course 2026

19 March 2026, St. Gallen, Switzerland

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Basic Electrochemistry Course 2026

Duration: 1 full day (8 hours, including breaks)
Date: 19 March 2026
Venue: Pädagogische Hochschule St.Gallen, Institut Mathematische, Naturwissenschaftliche und Technische Bildung, Notkerstrasse 27, CH-9000 St.Gallen
Room H201 (Lecture) and Physics lab H202 (Demo stations)

Target group:
Professionals, educators, students, and researchers looking to take their first steps in electrochemistry and/or wishing to gain confidence in using electrochemical methods.

Difficulty level:
Beginner
Designed for participants with little to no prior experience in electrochemistry.

Course Description
This course introduces the basic principles of electrochemistry for dealing with a broad range of electrochemical systems (batteries, corrosion, fuel cells, surface treatments, and sensors). It covers the main concepts in electrochemistry, such as electrode potential and redox reactions together with the fundamental laws (i.e. Faraday law). It also provides first hands-on experience with potentiostat setup and operation, including common electrochemical techniques. To do that, a combination of theoretical lectures and practical demonstrations will be used. Participants will have the possibility to see different experimental stations (electrochemical cells, corrosion, batteries and electrodeposition) through interactive demonstrations.

Course Content
Theory (60%)
Demonstrations (30%)
Discussions and exercises (10%)

Course Cost
CHF 200.00

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Course Objectives
By the end of the course, participants will be able to:

- Understand the core principles of electrochemistry, including redox reactions, cell potentials, and chemical reactions that occur at electrode surfaces.
- Use essential electrochemical terminology and key measurement concepts with confidence.
- Design and operate a basic three-electrode electrochemical cell for standard laboratory experiments.
- Gain hands-on experience with potentiostat setup and operation, including common electrochemical techniques.
- Record and interpret cyclic voltammograms, and extract key analytical parameters
- Identify and troubleshoot common sources of error and artefacts in electrochemical measurements.

The course includes lecture materials, a USB stick, lunch and breaks.

Organizers

PHSG, St. Gallen
OST, Buchs SG
EPFL, Lausanne
Metrohm Schweiz AG, Zofingen

Lecturers and Trainers

PHSG, St. Gallen – Dr. Frank Gfeller
OST, Buchs SG – Dr. Noémie Ott
EPFL, Lausanne – Dr. Anna Igual Munoz
Metrohm, Zofingen - Dr. Teressa Nathan Walleser

EPFL Metrohm Schweiz AG OST Eastern Switzerland University of Applied Sciences PH SG

Course Program

Morning Session (08:30 - 12:30)

08:30 - 09:00 Welcome and Icebreaking session with coffee.

09:00 - 09:45 **Introduction: Where do we find electrochemistry? An overview of key technologies – from energy to materials (45 min)**

Importance and applications of electrochemistry in energy, corrosion, sensors, and materials science. Galvanic cells vs electrolytic cells.

5 min break

09:50 - 10:40 **Electrode reactions and potentials (45-50 min)**

Basic concepts: oxidation, reduction, electrode, electrolyte, current, potential

Galvanic vs electrolytic cells

Electrode potentials Reference electrodes and potentials

Reaction rates

10:40 – 11:10 Coffee break (30 min)

11:10 – 12:30 **Instrumentation and electrochemical Techniques – Fundamentals and Application (80 min)**

Principle of potentiostat/galvanostat

Introduction to electrochemical techniques:

- Potentiostatic vs galvanostatic control
- Cyclic Voltammetry (CV): principles, data interpretation
- Chronoamperometry (CA) and Chronopotentiometry (CP) basics

Applications: Corrosion, Battery, Sensor, Analytics

12:30 – 13:30 Lunch break (60 min) – Provided at the PHGS Cafeteria

Afternoon Session (13:30 – 17:00)

13:30 – 14:30 Practical Experiments in Electrochemistry (45 min/station)

14:30 – 15:30 Practical Experiments in Electrochemistry (45 min/station)

15:30 – 16:00 Coffee break (30 min)

16:00 – 17:00 Practical Experiments in Electrochemistry (45 min/station)

17:00 – 17:30 Concluding Note: Q&A Discussion and Feedback

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Practical Experiments in Electrochemistry

(you may choose 3 workstations of your interest)

Workstation 1 : Hands-On Cyclic Voltammetry: Exploring Redox Reactions.

This workstation introduces the practical setup of a cyclic voltammetry (CV) experiment using the well-known redox couple $[Fe(CN)_6]^{3-/4-}$. It covers the configuration of the electrochemical cell and potentiostat parameters, execution of a CV measurement, and collection of current–voltage data. The resulting responses demonstrate fundamental electrochemical concepts such as redox processes, reversibility, peak currents, and peak potentials, with emphasis on data analysis and interpretation.

Workstation 2 : Electrochemical Measurements for Determining Corrosion.

This workstation introduces potentiodynamic polarization measurements to study the electrochemical behavior of active and passive metals. Controlled potential sweeps are applied to record current–potential responses, producing polarization curves that highlight key corrosion parameters such as corrosion potential, corrosion current, passivation behavior, and breakdown potential. The session emphasizes analysis and interpretation of the recorded data.

Workstation 3 : Electrochemical Surface Treatment.

This workstation explores electroplating (electrodeposition/galvanic coatings) and anodization as electrochemical surface treatment processes. Controlled cathodic and anodic polarization are applied to form protective and functional coatings on metal surfaces. Changes in current and potential during the process show coating formation, growth behavior, and process control, highlighting the connection between electrochemical parameters and material properties.

Workstation 4 :
Energy Storage (Battery / Supercapacitor).

This workstation introduces energy storage concepts using battery-type and supercapacitor-type devices. Experiments such as cyclic voltammetry and galvanostatic charge–discharge demonstrate differences in storage mechanisms. Measurements of voltage, current, and charge highlight key parameters including capacity, capacitance, energy, power, internal resistance, and coulombic efficiency, emphasizing practical understanding of energy storage behavior.

Workstation 5 :
Electrochemical Sensor: pH Measurement.

This workstation introduces the principle of pH measurement with a pH-sensitive electrode. It covers electrode calibration and proper setup for accurate reading. Observations of electrode response across different solutions show acid–base behavior, emphasizing accurate data collection and interpretation.

Workstation 6 : Electrocatalysis: Hydrogen Generation and Water Splitting.

This workstation demonstrates electrochemical water splitting for hydrogen generation using different electrode materials. Controlled potentials are applied to study current response and gas evolution, highlighting key concepts such as catalyst activity, overpotential, and material-dependent efficiency, with emphasis on data interpretation and practical understanding of electrocatalytic processes.

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