PhD Course ‘Practical Electrochemistry’

Course coordinators: Mikhail Vagin

Scope and Purpose
The goal of the course is to help the attendees with understanding and practical usage of broad and complex electrochemical methodology. The real student-oriented concept implies the discussion of the problems and the routine issues of electrochemical methods, which encounter the beginner. The course plan will be developed on demands of attendees and will contain theoretical and practical aspects. The special attention will be focused on the electrochemical phenomena of conducting organic materials. Being one of the most powerful tools to the assessment of a material functions, the fundamental electrochemistry still has a gap with the real demands of students and researchers, which work in modern science and technology. The objective of the course is to provide a guidance thought the modern electrochemical techniques towards the quantitative analysis of observed phenomena.

The course is prepared for students and researchers from different backgrounds such as material science, medicine, chemistry, physics and electronics. If it will be requested by attendees, the laboratory exercises will be provided in order to give a hands-on experience of the real electrochemical experiment.

Duration of course: 1.5 months
Course location: IFM LiU (Campus Linkoping) or ITN LiU (Campus Norrkoping)
Course language: English
Course content: 6 discussion sessions (2 hours of each), 1 laboratory exercise (2 hours).

Preliminary topics: Introduction to Electrochemistry, Mass transfer, Electron transfer kinetics, Electrode potentials, Voltammetry, Impedance spectroscopy, Steady-state techniques, Electrochemical catalysis, Conductive polymers, Electrochemical systems for energy conversion and storage

Exam: open book exam followed by the presentations of the students projects

Course plan:
Number of discussion sessions: 6, which will be guided by the coordinator or invited moderator. Duration of each session is 2 hours, which will be spend as a round table discussion. The first session will be dedicated to the definition of subsequent course content. If it will be necessary, the discussion will be enhanced by the modern published examples of the employment of electrochemical methods, which will be relevant to the objectives of the student’s research. The special effort will be addressed on the guided quantification of the observed electrochemical phenomena.

The teacher will send the session materials of the course to each student prior the lectures. The students will have to prepare questions and send them back to teacher before the lecture as a feedback. Teacher and students will discuss all questions during the session.

Number of laboratory exercise: 1, which will be guided by teacher. Students will choose the themes. Duration of exercise is 2 hours, which will be divided in 1.5 hour of laboratory work and 30 minutes of discussion. The teacher will send details of exercise to each student in advance.

The course will be finished by the open book exam followed by the presentations of the attendee’s projects related to electrochemical methodology.

**Total credits:** 4 ECTS

**Target group:** PhD students from chemistry, physics, medicine and material science.

**Text and reference books**


**Course Coordinator:**

**Dr. Mikhail Vagin**

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