

Chem 4871/6871 Electrochemistry

Fall 2018

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Class Time: MM I 5: 30 pm – 8:15 pm, T/TR, August 20 – October 6
Class Location: Classroom South 503
Office Hour: Tuesday 4:00 pm – 5:00 pm, or by appointment

Suggested Books: A. J. Bard and L. R. Faulkner, *Electrochemical Methods: Fundamentals and Applications*. 2nd Edition.
Electrochemistry chapters in *Instrumental Analysis (or Quantitative Analysis)*

Learning Outcome:

The objectives of this course are to explain fundamental electrochemistry concepts and to introduce their applications in a variety of disciplines. The students will be able to achieve the following goals after fulfilling the course requirements: 1. Know basic electronics related to electrochemical measurements; 2. Understand the signal generation and transduction pathways in an electrochemical process; 3. Correlate the measurements with the chemical processes of interest; 4. Describe the basic working mechanism and advantage/limitations of representative electrochemical methods; and 5. Read electrochemistry literature.

Grade Scale:

Tentative cutoffs are: A+: 95%; A: 90%; A-: 85%; B+: 80%; B: 75%; B-: 70%; C+: 65%; C: 60%; C-: 55%; D: 50%; and F: below 50%.

Tentative Schedule:

Aug. 21	Basics electronics in chemistry and physics; Signal/Noise; Instrumentation
Aug. 23	Homogeneous electron transfer reactions (Redox titration)
Aug. 28	Electrodes, Cell, homogeneous and heterogeneous ET pathways.
Aug. 30	Double layer, interface, mass transport
Sep. 4	Basic Voltammetry I, Amperometry, Coulometry etc.
Sep. 6	Electrochemical sensors and electroanalytical applications
Sep. 11	Thermodynamics; Electrochemistry in Energy Technology
Sep. 13	Review; Spectroelectrochemistry; Electrochemiluminescence
Sep. 18	In class exam (30%); Lab experiment (details to be provided)
Sep. 20	Voltammetry II; ET kinetics and MT kinetics; Bulk Electrolysis
Sep. 25	Hydrodynamic Methods; Impedance
Sep. 27	Imaging/Microscopy; Special topics; Review

*** Honor Code Applies***

Oct. 2 Presentations

Final: Friday October 5, 16:15-18:45 Final (50%) [Grade by Feb. 28]

In class presentation/discussion (**20%**): assigned/selected research topics/papers

Each student will present at least one selected journal paper or book chapter (in consultation with the instructor). The paper should be circulated to the whole class at least three-day in advance. Your grade will be based on your presentation (PowerPoint submitted before your presentation, updates after the discussion), your answers to the questions, and the question/s you raise regarding other presentations.

Each presentation should be about 8 minutes plus 4 minutes for discussion.

Demo or lab experiments will be arranged (pending schedule).

This syllabus is a guideline of the lectures and is subject to change.