

Chem 4871/6871 Electrochemistry
Spring 2017

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Class Time: MM I 5: 30 pm – 8:15 pm, MW, January 9 – February 25
Class Location: Classroom South 509
Office Hour: Tuesday 4:30 pm – 5:30 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:

Jan. 9 Basics in chemistry, physics and electronics; practical aspects: electrodes, cell, etc.
Jan. 11 Homogeneous electron transfer reactions, basic redox concepts
Jan. 16 **MLK holiday**
Jan. 18 Double layer, interface, mass transport
Jan. 23 Voltammetry I, Amperometry, Coulometry etc.
Jan. 25 Electrochemical sensors and electroanalytical applications
Jan. 30 Thermodynamics
Feb. 1 Kinetics
Feb. 6 **In class exam (30%); Lab experiment (details to be provided)**
Feb. 8 Voltammetry II, ET kinetics and MT kinetics
Feb. 13 Electrochemistry in Energy: batteries, supercapacitors and fuel cells
Feb. 15 Special topics and Review

*** Honor Code Applies***

Feb. 20 Presentations I
Feb. 22 Presentations II; summary

Final: Friday February 24, 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.