

Spring 2008 / CHEM 959 Electrochemistry

Lecture Time and Location

CHEM 959 Lectures will be from 11.00-11:50 AM in room 1003 Mallot

Instructor

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Exams

There will be two (2) one hour exams each worth 100 points. The first exam will be on March 3rd.

Paper/Reports

Students will also be required to write a report on an electrochemical technique related to their research project that will be worth 100 points. The paper is due in class on May 7th. A general outline of what is expected will be passed out in class and posted on blackboard.

Homework

Study guides and homework will also be provided but not graded.

Exam 1 will be over material covered up to spring break (Fundamentals, electrode reactions and interfacial properties and controlled potential techniques) and will be held on Wednesday, March 26th in class.

Exam 2 will be over material covered after spring break (practical considerations, potentiometry, electrochemical sensors and conductivity detection) and will be held on May 12 from 10:30 am to 1:30 pm (finals week).

Texts and Reference Materials

The class will follow the general format of the textbook "*Analytical Electrochemistry*" by Joseph Wang. This book is a good general reference and is available at Amazon.com for \$98.50. If you plan on doing a lot of electrochemistry in your research, you (or your research group) might want to invest in a copy. I will also have a copy available for individuals to check out if they want to Xerox a particular chapter.

Other references that will be used in this class include:

Quantitative Chemical Analysis (5th edition) by Daniel Harris (WH Freeman and Company, NY) 1999, Chapters 14-18

Laboratory Techniques in Electroanalytical Chemistry, (2nd edition) by Peter Kissinger and William Heineman (Marcell Dekker) 1996

Electroanalytical Methods, (2nd edition) by Al Bard and Larry Faulkner, (Wiley), 2000

Schedule

January 18- February 1

Fundamental concepts of electrochemistry: half cell reactions, Nernst equation, batteries, faradaic processes, electrical double layer, electrocapillary effect

February 2-22

Study of electrode reactions and interfacial properties: cyclic voltammetry, spectroelectrochemistry, scanning probe microscopy, electrochemical quartz crystal microbalances, impedance spectroscopy.

February 25- 29

Controlled potential techniques: chronoamperometry and polarography

March 3-7

No class (Pittcon); work on reports

March 10-31

Controlled potential techniques: Pulsed voltammetry, AC voltammetry, Stripping analysis, flow analysis, Pulsed amperometric detection

March 17-22

Spring Break

March 24- April 7

Practical Considerations: electrochemical cells, solvents, oxygen removal, instrumentation, working electrodes, chemically modified electrodes, microelectrodes, in vivo voltammetry

April 9-21

Potentiometry: ion selective electrodes, on line

April 23-April 30

Electrochemical sensors: enzyme based electrodes, affinity biosensors, gas sensors, solid state devices

May 2-5

Conductivity detection

May 7

Review

May 12 (Finals week)

10:30 am Exam on second half of the material