

Fall 2012
Dr. ANNA BRAJTER-TOTH
CHM 6153 ELECTROCHEMICAL PROCESSES
CBD 216

M, W, F 5th period 11:45 am- 12:35 pm

Office LEI 312; Office hours M,W 7-9 period or by appointment

Course Content and Format: The class is designed to provide background in physical concepts and theory of electrochemistry. The emphasis of this class is on electrochemistry principles, methods and applications to current problems.

Recommended text is listed below. References to literature articles and reviews will be used as examples.

Lectures and **class presentations by students** will be the class format. The presentations will use current literature articles. Literature articles will be selected by students working in groups. Students will have a chance to tailor topics to their interests. Recommendations will be given as to which articles would be best suited for class presentations. Guidelines for the presentations will be given in class.

The course should be of interest to chemistry graduate students (analytical, inorganic, organic/polymer) as well as to graduate students in engineering, materials and life sciences with interest in this area.

Recommended Reading: The reference text is: Bard and Faulkner "Electrochemical Methods". This text is a comprehensive textbook of electrochemistry. Other references will be given in class.

Grading: The grade in this class will be based exams, class presentations and homeworks and class participation. There will be bonus points for class participation. It is recommended that you read your notes, the text and other references as we go along in order to be able to participate. You will not do well if you cram for the exams.

Homework will have a written format and will include approximately one page reviews and some problems. The aim is to practice understanding of electrochemical concepts.

Homeworks and exams will be posted on-line at <https://www.chem.ufl.edu/~atoth/6153> . The exam dates and approximate dates of class presentations and homeworks are shown in the syllabus. The due dates will be announced and will be typically few dates after the homeworks and exams are posted.

The course grade will be determined by two take home progress exams, homeworks, class presentations and the comprehensive final. FINAL will be posted at the end of classes and is due on the date scheduled for the final. The final will be comprehensive and will be based on current literature articles.

Each exam is worth 25% of the course grade. The homeworks and oral presentations are worth 25% of the final grade.

W	Aug	22	Introduction
F		24	Overview of Terminology
M		27	Measurement Overview SHORT HOMEWORK 1
W		29	EChem Cells
F		31	Principles of Instrumentation - Op Amps
M	Sept	3	Labor Day HOLIDAY
W		5	Potentiostat
F		7	Transport and Surface Processes HOMEWORK 2
M		10	Echem Kinetics
W		12	EChem Kinetics - Homo vs. Heterogeneous
F		14	Rate Theory in EChem
M		17	Rate Theory of EChem Processes
W		19	Practical Kinetic Info - How To Get It?
F		21	PRESENTATIONS
M		24	PRESENTATIONS
W		26	Constant Potential Bulk Electrolysis
F		28	Constant Current Bulk Electrolysis
M	Oct	1	Diffusion and Fick's Laws
W		3	Overview of Potential Step Methods HOMEWORK 3
F		5	Large Amplitude Potential Step Methods
M		8	<i>Electrochemical Society Meeting</i> EXAM I
W		10	<i>Electrochemical Society Meeting</i>
F		12	<i>Electrochemical Society Meeting</i>
M		15	Chronocoulometry and Double Layer Effects HOMEWORK 4
W		17	Potential Sweep Methods
F		19	Potential Sweep Methods
M		22	Reversible and Irreversible Processes
W		24	Diagnostic Power of Cyclic Voltammetry
F		26	PRESENTATIONS
M		29	PRESENTATIONS
W		31	Hydrodynamic Methods; Rotating Disk Electrode EXAM II
F	Nov	2	Electrode Materials
M		5	PRESENTATIONS
W		7	PRESENTATIONS
F		9	Homecoming HOLIDAY
M		12	Veteran's Day HOLIDAY
W		14	Ultramicroelectrodes and Nanoelectrodes
F		16	Analytical Pulse Potential Step Techniques
M		19	Spectroelectrochemistry
W		21	EC On-Line with MS
F		23	Thanksgiving HOLIDAY
M		26	PRESENTATIONS
W		28	PRESENTATIONS
F		30	Fuel Cells
M		3	Solar Cells
W		5	Pick Up Final