Spring 2020 CHM 6153 ELECTROCHEMICAL PROCESSES
FLI 0109 M, W, F period 8 3:00- 3:50 pm
Instructor: Dr. Anna Brajter-Toth
Sisler A228; Office hours by appointment

Course Content and Format: *The material in this class is highly relevant to all areas of chemistry (analytical/physical, inorganic, and organic/polymer) as well as engineering, materials and life sciences.*
This class is structured to first introduce fundamentals of electrochemical processes and electrochemical methods used in different areas of science and industry. Essential background in physical concepts and theory will be discussed. The class focus is however on "real life" applications with emphasis on systems design for applications and data analysis.

In addition to in class lectures, in **class presentations by students** using literature references **are part of the course.** This format will be used to review concepts discussed in class. Presentations can be tailored to your interests. Guidelines for presentation format (power point) and duration will be given in class.

Class participation is strongly encouraged. Suggested homework problems will be given in class.

Recommended Reading: The reference text is: ***A.J. Bard and L. R. Faulkner "Electrochemical Methods: Fundamentals and Applications."*** This book is a comprehensive "textbook" of electrochemistry and is a good source of additional references, including other books and research articles. References to literature articles and reviews will be used in class lectures. Be cautious when using on-line sources (such as Wikipedia).

Grading: Class grade will be based on three exams and a final. Each exam, including the final, is worth 25% of the course grade. Homeworks will be reviewed but will not be graded. Final exam on April 29, 2020 will be based on recent literature.

Exams and class presentations dates will be announced in class. Due dates for homeworks will also be announced in class and will be typically few dates after homeworks are posted.

The list of topics to be covered :
Measurements Overview
Principles of Instrumentation; Review of Electrode Materials
Transport and Surface Processes**;** EChem Kinetics
Rate Theory of EChem Processes; Kinetics and Tafel Equation
Bulk Electrolysis
Potential Step Methods
Diffusion and Fick's Laws; Large Amplitude Potential Step Chronoamperometry
Large Amplitude Chronocoulometry;Double Layer Effects
Applications of Chronoculometry; Adsorption
Potential Sweep Methods; Dc Polarography Reversible and Irreversible Processes
Cyclic Voltammetry; Double Layer and Charging Current
Hydrodynamic Methods; Rotating Disk Electrode
Ultramicroelectrodes, Nanoelectrodes; Modified Electrodes

Spectroelectrochemistry and EC-MS