

## Electroanalytical Chemistry 549– Fall 2019

Rutgers, The State University of New Jersey-Newark

### Syllabus

**Lecture: Thursday, 6:00-8:50 pm, LSC I, Room 103)**

**Professor:** Dr. Huixin He (LSC II, Room 219 B)

**Email:** [huixinhe@newark.rutgers.edu](mailto:huixinhe@newark.rutgers.edu)

**Office Hours:** By appointment

### The course Synopsis

This course introduces the fundamentals of electrochemistry and commonly used electro-analytical methods, such as cyclic voltammetry, liner sweeping voltammetry with rotating disk-ring electrodes, stripping voltammetry, pulse voltammetry techniques, and AC impedance spectroscopy. Some experimental demonstrations will be designed to improve the basic understanding these techniques. Frontiers research in various fields using these electrochemical techniques will be discussed.

### Learning goals of this course

After taking this course, the students should be able to

- Understand the basic concepts of electrochemistry and common electrochemical techniques
- Understand what physical chemical properties of a material can be studied with the commonly used electrochemical techniques.
- Design experiments so that a physical chemical property of a material can be determined by one or two electrochemical techniques.
- Design electroanalytical methods for both quantitative and qualitative measurements.

### Recommended textbooks and references

- Electrochemical Methods: Fundamentals and applications by Allen J. Bard, Larry R. Faulkner, second edition
- Some literatures will be provided during the class.
- Understanding Voltammetry: Problems and solutions by Richard G Compton, Christopher Batchelor-McAuley, and Edmund J F Dickinson (optional)

**Prerequisites:** Undergraduate physical chemistry I and II, Undergraduate analytical chemistry lecture and labs.

## Tentative Class Schedule:

Week	Date	Lecture	Topic
1	Sept 5	Lecture 1	Introduction: Basic Concepts
2	Sept 12	Lecture 2	Kinetics of Electrode Reaction, lab demon
3	Sept 19	Lecture 3	Kinetics and Cyclic Voltammetry (CV)
4	<b>Sept 24</b> (not 26 due to travel)	Lecture 4	Micro and Nanoelectrodes
5	Oct 3	Lecture 5	<b>Midterm I</b> , Pulse voltammetry Techniques
6	Oct 10	Lecture 6	Pulse voltammetry Techniques ( continue)
7	Oct 17	Lecture 7	Stripping Voltammetry Techniques
8	Oct 24	Lecture 8	Methods involving forced hydrodynamics
9	Oct 31	Lecture 9	<b>Midterm II</b> , Impedance
10	Nov 7	Lecture 10	Impedance (continue)
11	Nov 14	Lecture 11	Industry Guest Lecture, AC impedance Application
12	Nov 21	Lecture 12	Case study: Applications of Electroanalytic chemistry
13	<b>Nov 26 (Thanksgiving)</b>	Lecture 13	Student Presentation
14	Dec 5	Lecture 14	Overview
Final Exam	Dec. 19	6:20-9:20 pm	<b>Final Exam</b>

**Last lecture ends on Dec. 11, so that the last lecture for this course will be Dec. 5.**

### Exam:

Quizzes and Exams will be based on the lecture covered materials and the associated assigned reading materials. All the quizzes and exams will be given as closed book, closed note format. No electronic devices are allowed (except for a regular calculator). Quizzes will be given at random bases, either in the beginning or the end of a lecture.

### Grading:

**Random Quizzes 10%**

**Midterm I 20%**

**Midterm II 20%**

**Presentation 10%**

**Comprehensive final: 40%**

**The final letter grades will be based on the following scale**

A = 100-85

B+ = 84-80

B = 79-70

C+ = 69-65

C = 64-55

D = 54-45

F = 0-44

**Attendance Policy:**

Rutgers University attendance policy should be followed, which can be found at:

<http://policies.rutgers.edu/view-policies/academic-%E2%80%93-section-10#2>

**Academic Integrity Policy:**

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