

## Syllabus for CHEM 626, Electrochemistry Spring 2018

### Instructor

Dr. Yingwen Cheng  
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### Lecture Time and Location

Tuesday Thursday 9:30-10:45 AM, Faraday Hall 205

### Office hours

Tuesday and Wednesday 3:30-5:20 pm in 411 La Tourette and by appointment. Please arrange by email.

### Textbook

Bard and Faulkner, **Electrochemical Methods: Fundamentals and Applications**, 2<sup>nd</sup> edition, Wiley 2001, (ISBN 0-471-04372-9)

### Purpose

This course is intended to teach fundamentals of electrochemistry and the application of electrochemical methods to chemical problems. Topics to be discussed include electrode processes, thermodynamics and potential, electron and mass transfer; electrochemical measurement methods and instruments; principles of electrochemical devices including batteries, supercapacitors, fuel cells, and electrochemical sensors.

### Grading

Homework assignments: 40%

Midterm exam: 30%

Final exam: 30%

Grading scale:

≥90% =A; 80-90% =B; 70-80% =C; 60-70% =D; <59% =F

### Assignments:

1. Homework assignments (~6); You will have one week to complete the assignments;
2. Mid-term examination on Mar. 22, (in-class, cover topics up to date);
3. Final paper + presentation.

Final paper should be a review article focuses on an application of electrochemistry to an area of your interest. The paper should be around five pages in length (including figures and tables) and be double spaced. This paper should include background, where and when electrochemistry is used, why it is useful, the current status and a summary of ongoing challenges. The main goal should be bridge information presented in this course to your topic and teach us something new. During the last week of class (May 8 and 10), each student should also give a powerpoint presentation that summarize the paper, and email the slides to Dr. Cheng the day before presentation.

You should suggest your topic to Dr. Cheng no later than Apr. 10 for approval, and May 11 is the last day to turn in your review article.

### Course policy

NIU Policy on Academic Integrity: <http://niu.edu/academic-integrity/students/index.shtml>

### Tentative Schedule.

Date	Topic	Notes
1/16, 1/18	Introduction and overview	
1/22, 1/25	Potentials and thermodynamics of cells	
1/30, 2/1	Kinetics of electrode processes	
2/6, 2/8	Mass transfer	
2/13, 2/15	Double layers	
2/20, 2/22	Potential step methods	
2/27, 3/1	Potential sweep method	
3/6, 3/8	Voltammetry	
3/11-18	SPRING BREAK	
3/20, 3/22	Voltammetry	3/22 mid-term exam
3/27, 3/29	Modified electrodes	
4/3, 4/5	Electrochemical Instrumentation	
4/10, 4/12	Solid state electrochemistry	
4/17, 4/19	Solid state electrochemistry	
4/24, 4/26	Devices: batteries and supercapacitors	
5/1, 5/3	Devices: electrocatalysis and fuel cells	
5/8, 5/10	Student presentation	
5/11	Last day to turn in review article	