

Iowa State University
Department of Chemistry
Fall 2020
Chem 512 – Electrochemical Methods of Analysis (Credits: 3)
9:55 a.m. MWF

Instructor:

Asst. Prof. Robbyn K. Anand
Office: Hach Hall 2101C
Student hours: Mondays 11 a.m. – 1 p.m.
E-mail: rkanand@iastate.edu
Office Phone: 515-294-8944

Prerequisites: Suggested that students complete Instrumental Analysis (Chem 316) before taking this course.

Course Goals: This course is useful for both those doing electrochemical research *per se* and those in fields tangential to electrochemistry such as sensor design, alternative energy, anti-corrosion, materials, catalysis, and species transport (e.g. capillary electrophoresis).

Note: This course may be taken to clear the Analytical Diagnostic.

Learning Objectives: My goal is for you to develop a broad working knowledge of electroanalytical chemistry within a classical theoretical framework. Here are some learning outcomes that we aim to achieve:

1. Working knowledge of the governing equations of electrochemical processes. *How the properties of chemical species and materials lead to signals in current, potential, and time.*
2. An understanding of the major directions of contemporary electrochemical research and the ability to explain these topics to a broad audience. *Communicate electrochemical concepts effectively.*
3. The ability to critique a recent journal article on an electrochemistry-related topic. *Think critically about electrochemistry.*
4. Basic knowledge of electrochemical instrumentation, electrode materials, and experimental parameters. *How to do electrochemistry.*

Textbook: Electrochemical Methods: Fundamentals and Applications – Allen J. Bard, Larry R. Faulkner, 2nd Ed.

Course Format: In this course, we will use a mixture of lecture, literature discussion, and student presentations.

Assignments (Grade %):

1. Online quizzes before discussion of recent literature. **15%**
2. Electrochemical simulation. **15%**
3. Homework assigned for practice from the textbook. **20%**
4. Two exam-style questions assigned per week (replaces exams). **30%**
5. Individual presentations. **20%**

Course Policies:

Plagiarism – Copying material from any source (online, other students, etc.) without citing the source is considered plagiarism and will result in a failing grade.

Last Drop Date – Listed on the ISU Fall 2020 schedule as **August 21, 2020**.

Course Calendar:

August			7	W	Potential Step
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17	M	Electrode Processes	9	F	<i>Literature Discussion 2</i>
19	W	Electrode Processes	12	M	Potential Step
21	F	Electrode Processes	14	W	Potential Step
24	M	Electrode Processes (<i>H1</i>)	16	F	<i>Literature Discussion 3</i>
26	W	Electrode Processes	19	M	Potential Sweep – <i>Sim. Due</i>
28	F	Potential/Thermo.	21	W	Potential Sweep
31	M	Potential/Thermo. (<i>H2</i>)	23	F	<i>Literature Discussion 4</i>
September			26	M	Potential Sweep
2	W	Potential/Thermo.	28	W	Potential Sweep
4	F	Potential/Thermo.	30	F	<i>Student Presentations</i>
7	M	<i>Labor Day</i>	November		
9	W	Potential/Thermo. (<i>H3</i>)	2	M	Hydrodynamic Methods
11	F	Kinetics	4	F	<i>Student Presentations</i>
14	M	Kinetics (<i>H4</i>)	6	M	Hydrodynamic Methods
16	W	Kinetics	9	W	Double-Layer Structure
18	F	Kinetics	11	F	<i>Student Presentations</i>
21	M	Kinetics (<i>H5</i>)	13	M	Selected Topics
23	W	Mass Transfer	16	W	Selected Topics
25	F	Mass Transfer	18	F	Selected Topics
28	M	Mass Transfer (<i>H6</i>)	20	F	<i>Student Presentations</i>
30	W	Mass Transfer	23	M	<i>Final Exam Week</i>
October			25	W	<i>Fall Semester Ends</i>
2	F	<i>Literature Discussion 1</i>			
5	M	Potential Step			

Students with Disabilities

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. All students requesting accommodations are required to meet with staff in Student Disability Resources (SDR) to establish eligibility. A Student Academic Accommodation Request (SAAR) form will be provided to eligible students. The provision of reasonable accommodations in this course will be arranged after timely delivery of the SAAR form to the instructor. Students are encouraged to deliver completed SAAR forms as early in the semester as possible. SDR, a unit in the Dean of Students Office, is located in room 1076, Student Services Building or online at www.dso.iastate.edu/dr/. Contact SDR by e-mail at disabilityresources@iastate.edu or by phone at 515-294-7220 for additional information.

COVID-19 health and safety requirements

Students are responsible for abiding by the university's COVID-19 health and safety expectations. All students attending this class in-person are required to:

- properly wear a face covering and/or face shield, covering the nose and mouth, while in classrooms, laboratories, studios, offices, and other learning spaces. It is important to remember that a face covering and/or face shield is required to be worn whenever you are on campus, in the presence of others, and unable to maintain physical distance.
- practice physical distancing to the extent possible;
- assist in maintaining a clean and sanitary environment;
- not attend class if you are sick or experiencing symptoms of COVID-19;
- not attend class if you have been told to self-isolate or quarantine by a health official.
- follow the faculty member's guidance with respect to these requirements. Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space. These requirements extend outside of scheduled class time, including coursework in laboratories, studios, and other learning spaces, and to field trips. These requirements may be revised by the university at any time during the semester.

Faculty may refer matters of non-compliance to the Dean of Students Office for disciplinary action, which can include restrictions on access to, or use of, university facilities; removal from university housing; required transition to remote-only instruction; involuntary disenrollment from one or more in-person courses; and such other measures as necessary to promote the health and safety of campus.

It is important for students to recognize their responsibility in promoting the health and safety of the Iowa State University community, through actions both on- and off-campus. The university's faculty asks that you personally demonstrate a commitment to our Cyclones Care campaign. Iowa State University's faculty support the Cyclones Care campaign and ask you personally to demonstrate a commitment to our campaign. Your dedication and contribution to the campaign will also protect your classmates and friends, as well as their friends and families.