Draft: CH454/554 Advanced Electrochemistry Fall 2020

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Office hours: Office hours: Monday 3-4 pm and Friday 9-10 am in LISB 435.

Location: Class lecture and discussion will be held in Fenton 117 from 12:00 pm to 1:50 pm Tuesday and Thursday.


Course website: Lecture notes, homework solutions, and grades will be posted on the Canvas course site.

Prerequisites: Undergraduates in this course are expected to have taken physical chemistry CH 411. Graduate students in Chemistry and Physics should be suitably prepared to take the course.

Course Description

This course covers the fundamentals of electrochemistry, practical electrochemical methods, and applications of electrochemistry in modern technology with the focus on energy storage technologies. Electrochemistry is a field of science that describes the interrelation of chemical and electrical effects. Much of the field deals with describing how chemical changes are caused by the passage of electrical current or how the production of electrical current can be caused by chemical reactions. Electrochemists rely on a foundational understanding of thermodynamics, electron transfer kinetics, and mass transport phenomena – each of which are treated in detail in this course in the context of understanding electrochemical phenomena. Electrochemical impedance spectroscopy will be discussed and the fundamental theory applied to practical applications. Students will also be exposed to laboratory and computer simulation projects.

How Grades Will Be Determined

The grades will be determined based on the following percentage breakdown of the final total score:
Problem Sets - 20%  Projects - 25%  Midterm Exam - 20%  Final Exam - 35%

Problem sets will be marked for completion, students who complete each problem set and turn them in by the deadline will receive full credit. Each problem must be fully worked, with clear logical explanation of the approach to receive credit.

Projects will be graded based on the quality of the project report. Reports are expected to be concise formal documents with professional quality graphs and data analysis and insightful discussion of the data (5 pages of concise, single spaced, scientific writing for each). Each project assignment is accompanied by a document outlining project expectations.

A = Clearly written, concise document, with high-quality figures. All required pieces of data are shown and discussed without major errors in the interpretation.
B = One or more issues with the items above.
C = Multiple issues with quality of the written document and interpretation/discussion.
D = Multiple issues and incomplete.

The midterm and final exams will be based largely on the content in the assigned problem sets, content emphasized in class discussion, and that emphasized in the projects. Letter grades will not be assigned on these exams, students will receive a percentage score for the exam.

A+ course grades will be given to the top-performing students in the course, provided they reach >95% (according to breakdown given above). Students earning >90% in the course will earn at least and A, > 80% at least a B, >70% at least a C, and >60% at least a D. The instructor may lower these threshold percentage scores for the course to increase the letter grades and account for variations in difficulty of the exam questions from year-to-year. Students with a given percentage score will not, however, earn a grade lower than that indicated above.

Graduate students in the course will have additional requirements over that of the undergraduate students. These may include: one additional required project, increased reading assignments, additional problems sets, and additional required exam problems.

Course Policies

• Late or missed work will not generally be accepted without prior approval.
• Project reports must be your own work. You may share data across the class if it strengthens the quality of the report but the analysis and discussion of the data in the report must be your own work.
• There will be a zero-tolerance policy for plagiarism and or cheating on exams.
• Homework solutions must be your own work. You must clearly show your work and the reasoning used to obtain the answer to get credit. Please see the UO policy at:
http://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code

- Accessibility: The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of this course that result in disability related barriers to your participation. For more information or assistance, you are also encouraged to contact the Accessible Education Center, 164 Oregon Hall, 346-1155; website: http://aec.uoregon.edu/content/about

- A graduate employee (GE) will serve as a teaching assistant for this course. The GE’s responsibilities will include assisting in the implementation of the project component of the course, including supervising students completing the projects and obtaining/distributing materials needed for the project. The GE may assist with grading, and will also be available for general assistance in preparing project reports, completing homework assignments, and preparing for exams. Should graduate students enrolled in the course perceive the course as leading to any conflict of interest, privacy concerns, or unfairness related to having a GE in the above role please contact Prof. Shannon Boettcher to discuss paths of recourse. If the GE is involved in grading assignments, graduate students may request that a faculty member, not the GE, grade their assignments. To do this please make the request in writing via email to Prof. Boettcher.