Chemistry 412, Spring 2023

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Office hours: Drop in 374D or by appointment

Text: Harris, Quantitative Chemical Analysis, 9th ed. WH Freeman. (Chapters 14-25)

Tentative Topics

Chapter 14: Fundamentals of Electrochemistry
Chapter 15: Electrodes and Potentiometry
Chapter 16: Redox Titrations
Chapter 17: Electroanalytical Techniques
Chapter 18: Fundamentals of Spectroscopy
Chapter 20: Spectrophotometers
Chapter 21: Atomic Spectroscopy
Chapter 23: Introduction to Analytical Separations
Chapter 24: Gas Chromatography
Chapter 25: High-Performance Liquid Chromatography

The text book will be used for class material in class, for some of the figures in the chapters, and for preparing for the exam material. If you have an older edition, that's fine. If you have another instrumental analysis book, it should cover the same material and you can use the notes to check that the material matches what we are doing in class.

Course objectives:

The use of instrumentation for detection and quantitative analysis of chemicals has expanded beyond the field of chemistry into biochemistry, forensics, nutrition, and engineering. Chemical instrumentation is used to detect and quantify compounds based on their chemical and physical properties. Knowledge of many different types of instrumentation, the principles behind them and how they are used is a very valuable skill and is often requested when searching for a position. Thus, the goal of this course is to introduce you to the background behind the different types of instrumentation, the ability to decide when each type is to be used and How to use it will be examined. In this course, we will mainly focus on three representative analytical techniques, **electrochemistry, spectroscopy, and chromatography**.

Studying:

This course moves extremely quickly. We will cover approximately 1 chapter per week, so it is important that you keep up with the workload. The material learned in each chapter will be used in subsequent chapters, so if you fall behind in the first few weeks, it's nearly impossible to catch up again. You are also expected to have retained the material you learned in freshman chemistry and CHM 212, especially error and mass/moles/molarity calculations. The final will require you to compare and contrast different methods, so you do need to know the specifics of each type of instrumentation as we go along.

Notes and Assignments

All class notes will be posted in the content tab of Brightspace, approximately 1 week before each lecture so you have them ahead of time to use as a guide for reviewing the chapter material. Not everything in each chapter will be covered, so use the notes as a guide as to where the focus is on each topic. All the **examples** and **exercises** in the text book should be **prerequisite to prepare for the exams**.

Office Hours:

In general, freely stop by room 374D or email me for an appointment if you want to be sure I will be there when you show up.

Disability Accommodations:

Any student with a documented disability is welcome to contact me as early in the semester as possible so that we may arrange reasonable accommodations. I have no problem making any accommodations you may need, but I need at least a week's notice to set up an alternate location for exams or quizzes. I also need documentation from Disabilities Services, so contact them first at 330 Memorial Union, 401-874-2098.

Sports or Other University Sponsored Events:

Please let me know the first week of classes if you need any accommodations made. Please let me know if you have any lab conflicts as well.

Course Grades:

The course is graded strictly by the grades you achieve on the assigned material, and exams. **There is no extra credit!** Any errors in grading must be brought to my attention within 1 week of the material being handed back. No changes in any grades will be made after that point.

Scaling:

The scale for the course is given below. All grades will be posted on Brightspace with a letter grade as you proceed through the course.

Quizzes: 20 % of Grade

After completing every chapter, we will have quizzes.

Midterm Grade: 30 % of Grade

We will have Midterm covering spectroscopy and electrochemistry. Since Midterm and final exams are based on a different area of instrumentation, no exams will be dropped. If you miss an exam for any reason you need to contact me about a makeup. The exam must be made up in the same week it is taken by the rest of the class unless you have documentation from the university regarding missing the entire week.

Tentative Exam Dates (within a week):

Midterm : Take-home exam, submission due by Tuesday, March 21st in class.

Final : Tuesday, May 9th, 11:30 am -1:30 pm

Attendance: 10 % of Grade

TA will check the attendance in every class. Absence **more than 4 times** will have a **zero point** for the attendance.

Unavoidable absence due to illness or accident etc. will need an official letter. Any personal excuse won't be acceptable.

Final: 40 % of Grade

The final is cumulative and will be based on understanding the theory, advantages and disadvantages of each type of instrumentation and a working knowledge of the hardware involved in each instrument.

Additional Important Information and Core Values

COVID Precautions Statement: The University is committed to delivering its educational mission while protecting the health and safety of our community. As members of the URI community, students are required to comply with standards of conduct and take precautions to keep themselves and others safe.

• **Universal indoor masking is required of all community members, on all campuses and in university vehicles, regardless of vaccination status.** I reserve the right in this course to continue to mandate masking in the classroom even if the university modifies or eliminates their mandate.

• We strongly recommend surgical or higher grade masks in all indoor campus spaces. Masks should be properly worn, well-fitting, and high quality.

• Students who do not comply with the indoor masking requirement will be asked to leave class and will be reported through the Student Conduct process.

• Students who are experiencing symptoms should NOT go to class/work until they have received a negative test; or if they test positive, after they have completed the required isolation period. Those who test positive for COVID-19 should follow updated isolation guidelines from the Rhode Island Department of Health and CDC. Please visit the Health Services website for the most up-to-date symptomatic testing schedule.

<u>If you are unable to attend class, please notify me prior to the start of class if you are able to.</u>

Anti-Bias Syllabus Statement: We respect the rights and dignity of each individual and group. We reject prejudice and intolerance, and we work to understand differences. We believe that equity and inclusion are critical components for campus community members to thrive. If you are a target or a witness of a bias incident, you are encouraged to submit a report to the URI Bias Response Team at www.uri.edu/brt. There you will also find people and resources to help.

Disability, Access, and Inclusion Services for Students Statement: Your access in this course is important. Please send me your Disability, Access, and Inclusion (DAI) accommodation letter early in the semester so that we have adequate time to discuss and arrange your approved academic accommodations. If you have not yet established services through DAI, please contact them to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom. DAI can be reached by calling: 401-874-2098, visiting: web.uri.edu/disability, or emailing: dai@etal.uri.edu. We are available to meet with students enrolled in Kingston as well as Providence courses.

Academic Enhancement Center: The Academic Enhancement Center (AEC) offers face-to-face and online services to undergraduate students seeking academic support **beginning Monday, January 31st, 2022**. Services are based out of Roosevelt Hall, the Carothers Library room LL004, and online. Peer tutoring is available for STEM-related courses through drop-in centers and small-group tutoring. The Writing Center peer consultants offer feedback focused on supporting undergraduate writers at any stage of a writing assignment. The UCS 160 course and one-to-one Academic Skills Consultations offer strategies for improving studying and test-taking skills. Complete details about each of these programs, up-to-date schedules, contact information, and self-service study resources are all available on the AEC website, uri.edu/aec.

● Academic Skills Development programs teach students how to manage time, study effectively, and address common academic challenges. **UCS 160: Success in Higher Education** is a one-credit course focused on developing strategic approaches to planning and studying. **Academic Consultations** are 1 to 1 meetings that help students to identify and address individual academic challenges. Students can schedule an in-person or online consultation with David Hayes on Starfish. **Study Your Way to Success** is a self-guided web portal connecting students to tips and strategies on studying and time management related topics. For information or help with scheduling, contact Dr. Hayes directly at davidhayes@uri.edu.

● **The Undergraduate Writing Center** provides peer writing support to students in any class, at any stage of the writing process: from understanding an assignment and brainstorming ideas, to developing, organizing, and revising a draft. Spring 2022 consultations are available through: 1) 25- or 50-minute **in-person appointments**, 2) synchronous **online appointments**, and 3) asynchronous **next-day written feedback.** Synchronous

appointments hosted by WC Online are video-based, with audio, chat, document-sharing, and live captioning capabilities, to meet a range of accessibility needs. View availability and book online at uri.mywconline.com. For more information, visit uri.edu/aec/writing.

Academic Integrity - Understanding the culture of source management and attribution in academe is a process of learning and relearning, with increasing complexity over time. Our goal is to better distinguish between intentional plagiarism or cheating and making mistakes. URI's Student Handbook web.uri.edu/studentconduct/student-handbook/) provides guidelines concerning academic honesty in this regard. Additional assistance is available at the Writing Center and the Academic Enhancement Center. Students are expected to be honest in all academic work. A student's name on any written work, quiz or exam shall be regarded as assurance that the work is the result of the student's own independent thought and study. Work should be stated in the student's own words, properly attributed to its source. Students have an obligation to know how to quote, paraphrase, summarize, cite and reference the work of others with integrity. The following are examples of academic dishonesty.

• Using material, directly or paraphrasing, from published sources (print or electronic) without appropriate citation
• Claiming disproportionate credit for work not done independently
• Unauthorized possession or access to exams
• Unauthorized communication during exams
• Unauthorized use of another's work or preparing work for another student
• Taking an exam for another student
• Altering or attempting to alter grades
• The use of notes or electronic devices to gain an unauthorized advantage during exams
• Fabricating or falsifying facts, data or references
• Facilitating or aiding another's academic dishonesty
• Submitting the same paper for more than one course without prior approval from the instructors