

CHEMISTRY CAPSTONE LABORATORY

Chemistry 434 Syllabus ---- Fall 2022

Instructor	Dr. William Simpson (REIC 186, IARC 335, 474-7235, wrsimpson@alaska.edu)
Office Hours	Mo and Tu 10:00PM-11:00AM, and by appointment
Lecture	Fr 1:00PM-2:00PM, REIC 204 or possibly Zoom
Lab	Mo,Tu meet in REIC 245 (later REIC 241) 6:00PM-9:00PM
Text:	Handouts in Class
Credits:	3cr = 1 hour lecture per week + two 3-hour = 6 hours lab per week
Prerequisites	Prerequisites: WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; CHEM F212; CHEM F202; Co-requisite of CHEM 332
Zoom link	https://alaska.zoom.us/j/86366927966?pwd=NGpIRGx2WksxSHVUODdRZW1aaWU3UT09 Meeting ID: 863 6692 7966 Passcode: 797326

Course Description (from UAF catalog):

A capstone laboratory course with three major components: 1) experiments related to concepts learned in physical, analytical and inorganic chemistry courses emphasizing kinetics, spectroscopy and thermodynamics; 2) computer use in problem solving, data analysis and word processing; and 3) technical writing with emphasis on preparation of papers for publication.

Course Overview:

Chemistry 434 is a writing-intensive "capstone" course intended for senior level chemistry majors. Students learn about experimental physical chemistry methods, perform experiments, and produce laboratory reports that accurately communicate their experimental findings. The majority of your grade comes from writing of the reports. Writing is taught by multiple revision cycles between the professor and individual students as well as collaborative revisions where students assist each other in revision cycles.

Course Goal:

The goal of this course is that students learn to communicate technical chemical methods and results via writing. This skill is key to students' professional development, whether as an academic researcher, writing papers, or as a chemical technician, writing reports, or other chemical careers.

Intended Student Learning Outcomes:

Successful students in this course will:

- Be able to study chemical problems by using modern instrumentation correctly and through understanding the numerical significance of the experimental results.
- Be able to write a scientific paper or report of sufficient organizational and writing quality to be accepted in a peer-reviewed scientific journal.
- Act as a scientific collaborator by assisting a peer in revising his or her writing and organization of a manuscript.
- Design and conduct a research project safely.

Instructional Methods:

Lecture sections held once a week (possibly via Zoom) describe theoretical and practical aspects of modern chemistry experimentation emphasizing aspects of chemistry across the discipline. Lectures also instruct students on the writing of clear, concise laboratory reports in various styles culminating with preparation of manuscripts appropriate for publication in journal articles.

The laboratory section meets twice weekly and provides time to perform the experiments along with hands-on instruction in experimental methods. Students perform a total of six laboratory experiments (two-to-three-week duration) during the semester. The last laboratory experiment involves students developing their own final project. This project is typically an extension of one of the experiments from earlier in the class but could be any project of proper level and scope.

Course Calendar and Laboratory Schedule:

Wk	Dates	LabName	Topic / Technique
1	29, 30 Aug	Safety, notebooks, figures, writing	Safe practices, notebook and literature practices
2	6 Sep *	Exp 1: Spectrophotometric titration	UV/Vis, software, equilibrium, pH
3	12, 13 Sep	Continue Exp 1, work on presentation skills	
4	19, 20 Sep	Exp 2: Kinetic analysis of competing reaction mechanisms	Kinetics, Spectroscopy / UV-Vis
5	26, 27 Sep	Finish Exp 2	
6	3, 4 Oct	Exp 3: Surface pH	Sample preparation methods
7	10,11 Oct	Continue Exp 3	Emission spectroscopy
8	17,18 Oct	Exp 4: Inhibition of enzymes – Introduction, develop SOPs	Develop SOPs

9	24, 25 Oct	Exp 4: Synthesize inhibitors (M), TLC / characterization (Tu)	Synthesis, characterization
10	31 Oct, 1 Nov	Exp 4: Kinetics (M) bad enzyme (Tu) good	Kinetic analysis
11	7, 8 Nov	Exp 4: Finish kinetics (M), discuss report (Tu)	
12	14,15 Nov	Exp 5: Analysis of organics in snow	Develop methods
13	21,22 Nov**	Exp 5: Environmental sampling Design and gather materials for Project	Do sampling and analyze
14	28, 29 Nov	Exp 6: Project of your design	
15	5, 6 Dec	Finish Project	
	6 Dec	Present your project to class (final exam)	

* This week is shortened by missing Labor Day (5 Sep)

** This week contains Thanksgivings Holiday but only the Friday lecture is affected.

The introductory material in Exp 1 involves computer skills in which you learn to write reports on the computer (using Word) and prepare scientific data for presentation (using Excel). This introductory material requires one week, while most other laboratories require approximately two weeks (four laboratory periods).

Grading:

The grading for this class is summarized in the following table and described in the paragraphs below.

Notebook and pre-laboratory calculations	7%
Writing exercises and Exp 1 written section with review cycle	8%
Four written lab reports at 12% each (Exp 2-5) -- see below for formats and revision cycles	48%
Two written "collaborator reviews" at 6% each, on Exp 3,4	12%
National chemistry major exit examination score (curved)	10%
Final project (Exp 6) design, safety planning, method, and results	5%
Oral presentation of final laboratory report	5%
Attendance, tardiness, laboratory maintenance	5%

A small amount of homework will be given to students to help familiarize them with topics discussed in the laboratory. Lab notebooks will be inspected a couple times during the

semester, at unannounced times. On the first inspection of laboratory notebooks, they will be constructively criticized and not graded. These comments are meant to assist the students in later grading of the notebook. The professor will also observe laboratory notebook usage in laboratory sections. Students must come to lab prepared to do the experiment. Calculations in the laboratory description hand-out should be carried out in the laboratory notebook.

The report for Exp 1 involves writing a short section of a manuscript that is submitted to the professor in a "draft form", commented upon by the professor, returned, revised by the student, and re-submitted in a final form. Grading is based upon the draft, the attention to detail in revision, and the final form.

Students write full laboratory reports for four experiments they perform (experiments 2-5). The first laboratory reports are written in the style of internal reports used in industry. These reports hone organizational and writing skills. Later reports consist of complete journal-style articles, readable by those not intimately familiar with the techniques used in the experiments. The Exp 2 report undergoes a draft, revision, final submission cycle just like Exp 1. The Exp 3 and 4 reports are handed in to both the professor and to another student in the class acting as a "collaborator". The collaborating student will then comment upon the draft and will submit this information to both the professor and the writer. The writer then has a chance to revise the report for final submission. The "collaborator" is graded upon the quality of their review.

This is a senior-level "capstone" course. Therefore, all students will take a chemistry major exit examination to assess the overall quality of his or her education in chemistry and our program's effectiveness in teaching. We will be using the American Chemical Society (ACS) Diagnostic of Undergraduate Chemical Knowledge (DUCK) examination. Details of taking the examination will be given in class. Your examination score will be converted on a curved scale to give 10% of your grade in this course. The examination will be given late in the Fall semester.

Students choose a final project, design an experiment (including safety considerations), and execute it. Results from the final project are presented in a short oral presentation at the end of the class. The project is partially graded on this presentation and partially graded on the design and execution of the project.

You are expected to be in laboratory I officially excuse you because you are done with the laboratory experiment AND analysis. If you chose to be excused, and later ask for a special meeting time (class/lab or outside office hours) for help with analysis of the data, I reserve the right to ask that you wait for the next class time for help. Please use the full laboratory period to your advantage. You are also expected to be on time to laboratory and class and leave your laboratory space clean and equipment put away.

Due dates and policies:

Reports must be converted to a PDF file (e.g. via "printing" to a PDF) and submitted via the class CMS (Canvas). If you do not know how to do this, please let the professor know and we will determine how to do this with computers you have access to. Note that PDF files are commonly used for submission of manuscripts, grant applications, etc., so this skill is useful. Lab reports are due one week after the experiment is completed, at the beginning of laboratory period (Tuesdays). For the reports that undergo revision cycles (Exp 1-4), comments will be

given back to the writer (in writing) at the beginning of the class on the next Friday (3 days later). The final copy of the report is then due on the following Tuesday (two weeks after the laboratory was completed). Late lab reports will be penalized 10% per day, unless prior arrangements are made. To make a prior arrangement, see Professor Simpson before the lab is due.

Grading scale:

The grading scale is listed below, using letter grades without +/- grading. I reserve the right to adjust these percentages (only in the favor of the student -- that means to lower my cutoffs) when assigning final grades.

Letter Grade	Percentage Grade
A	Grade ≥ 90
B	$90 > \text{Grade} \geq 80$
C	$80 > \text{Grade} \geq 70$
D	$70 > \text{Grade} \geq 60$
F	$60 > \text{Grade}$

Course policies:

If you have finished acquiring raw data before the lab before the period ends, you are strongly encouraged to continue working on the lab through the entire lab period given that you, possible partners, and I are available during lab time.

Students exhibiting plagiarism, cheating, or showing disruptive behavior will be disciplined following UAF policies and procedures, <http://www.alaska.edu/bor/regulation/9r/r09-02.html>

There are no makeup labs, but since each experiment is carried out over multiple weeks, we will determine how to get the experimental work done, possibly forcing some analysis to occur at home. If you know of a situation requiring you to be absent from lab, discuss it with the professor beforehand. If an accidental situation prevents you from being in laboratory, discuss it with the professor as soon as possible after the absence.

Amending this Syllabus:

Amendments and changes to the syllabus, including evaluation and grading mechanisms, are possible. The instructor must initiate any changes. Changes to the grading and evaluation scheme can be made before the add/drop date without a vote, but after that date must be voted on by the entire class and approved only with unanimous vote of all students present in class on the day the issue is decided. The lecture schedule and reading assignments (the daily schedule) will not require a vote and may be altered at the instructor's discretion. This daily schedule will be communicated via the CMS (Canvas). Grading changes that unilaterally and equitably improve all students' grades will not require a vote. Once approved, amendments will be distributed in writing to all students via the CMS (Canvas).

Class web page:

Our webpage is on the canvas system, at <https://canvas.alaska.edu/courses/9139>. Note that you can log into campus and this course should be available to you.

Important dates:

5 Sep 2022 – Labor day holiday (no class)

9 Sep 2022 – Last day for student- and faculty-initiated drops with refund (course does not appear on academic record).

4 Nov 2022 – Last day for student- and faculty-initiated withdrawals (W grade appears on academic transcript)

23-25 Nov 2022 – Thanksgiving holiday

10 Dec 2022 – Last day of instruction

12 Dec 2022 (Monday) – 1:00-3:00 PM – Final Examination (Oral presentations of project results)

Syllabus Addendum (Revised 8/22/2022)

COVID-19 statement: Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:

<https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0>

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

Student protections statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: <https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

Disability services statement: I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

ASUAF advocacy statement: The Associated Students of the University of Alaska Fairbanks, the student government of UAF, offers advocacy services to students who feel they are facing issues with staff, faculty, and/or other students specifically if these issues are hindering the ability of the student to succeed in their academics or go about their lives at the university. Students who wish to utilize these services can contact the Student Advocacy Director by visiting the ASUAF office or emailing asuaf.office@alaska.edu.

Student Academic Support:

- Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)
- UAF Math Services, uaf-traccloud@alaska.edu, Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List (https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf)

Student Resources:

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
- Student Health & Counseling [6 free counseling sessions] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Gruening 215)
- Center for Student Rights and Responsibilities (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

Nondiscrimination statement: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination. For more information, contact:

UAF Department of Equity and Compliance
1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775
907-474-7300
uaf-deo@alaska.edu

Additional syllabi statement for courses including off-campus programs and research activities:

University Sponsored Off-Campus Programs and Research Activities

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1. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/nondiscrimination.
2. Incidents can be reported to your university's Equity and Compliance office (listed below) or online reporting portal. University of Alaska takes immediate, effective, and appropriate action to respond to reported acts of discrimination and harassment.
3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: <http://alaska.edu/bor/policy-regulations/>.
5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

For further information on your rights and resources [click here](#).