CHEMISTRY CAPSTONE LABORATORY

Chemistry 434 Syllabus ---- Fall 2020

Instructor	Dr. William Simpson (NSF 186, IARC 335, 474-7235, wrsimpson@alaska.edu)
Office Hours	Mo 2:00P-3:00P, Tu 1:00P-2:00P and by appt (via Zoom)
Lecture	Fr 10:30A-11:30A, via Zoom
Lab	Mo,Tu meet in REIC 245 (later REIC 241) 6:00P-9:00P
Text:	Handouts in Class
Credits:	3 -- 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/97801179460?pwd=djVTMXJPNjRqejl2QlU3Q3liL1dRZz09 Meeting ID: 978 0117 9460 Passcode: 079625

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 (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	24, 25 Aug	COVID-procedures and instruction on safety, notebooks, figures, writing	Safe practices
2	31 Aug, 4 Sep	Exp 1: Spectrophotometric titration	UV/Vis, software, equilibrium, pH
3	8 Sep *	Continue Exp 1, work on presentation skills	
4	14, 15 Sep	Exp 2: Kinetic analysis of competing reaction mechanisms	Kinetics, Spectroscopy / UV-Vis
5	21, 22 Sep	Finish Exp 2	
6	28, 29 Sep	Exp 3: Inhibition of enzymes	Synthesis, enzyme assays
7	5, 6 Oct	Continue Exp 3	
8	12, 13 Oct	Finish Exp 3	
9	19, 20 Oct	Exp 4: Fluorescent polymer synthesis	Emission spectroscopy
10	26, 27 Oct	Finish Exp 4	

11	2, 3 Nov	Exp 5: Analysis of organics in snow	Extraction, organic analysis
12	9, 10 Nov	Finish Exp 5	
13	16, 17 Nov	Design and gather materials for Project	Your design
14	23, 24 Nov**	Exp 6: Project of your design	
15	30 Nov, 1 Dec	Finish Project	
	9 Dec	Present your project to class (final exam)	

* This week is shortened by missing Labor Day (7 Sep)
** This week contains Thanksgivings Holiday, but does to affect this Mo/Tu class.

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 Blackboard. 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 > Grade >= 80
C	80 > Grade >= 70
D	70 > Grade >= 60
F	60 > 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.

University policy on COVID-19:

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/uaf-students?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. Course specific implementation of UAF guidelines will be described at the start of the semester and will be followed throughout the class. If we UAF is impacted by COVID-19 (e.g. we shift to all distance delivery), reasonable accommodation will be made.

Disabilities statement:

I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities. If this situation applies to you, please work with the office (https://www.uaf.edu/disabilityservices/) to document your situation and we will provide reasonable accommodations. You need to inform me of this situation in the first two weeks of class so that this can be resolved early in the semester.

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/.

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 Blackboard. 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 Blackboard.

Class web page:

Our webpage is on the blackboard system, at https://classes.alaska.edu/.

Important dates:

4 Sep 2020 – Last day for student- and faculty-initiated drops with refund (course does not appear on academic record).
7 Sep 2020 – Labor day holiday (no class)
30 Oct 2020 – Last day for student- and faculty-initiated withdrawals (W grade appears on academic transcript)
25-29 Nov 2020 – Thanksgiving holiday
5 Dec 2020 – Last day of instruction
9 Dec 2020, 11:15 a.m. - 2:15 p.m. – Final Examination (Oral presentations of project results)