CHEM 330 Lab: Aquatic Chemistry Lab - Syllabus

Instructor: Al Fischer, PhD

Office Hours: By appointment; see my availability and schedule an appointment on Calendly. You will be able to choose to meet on Zoom or at my office during scheduling. (No need to email or ask - just schedule!)

Email: dfischer@wcu.edu

Availability: Email and office hours are good ways to find me; I'm typically available to respond to emails from late morning through about 9 PM during the week. I also hang out on the class Discord server.

Overview

This course in an introduction to the chemical analysis of water samples. Throughout the semester, students will work to develop both qualitative and quantitative analytical skills related to chemical analysis (both wet chemical and instrumental analysis methods), reproducible data analysis, scientific communication, and collaboration in the laboratory and field. Some prerequisite chemical knowledge will be expected (CHEM 140), but no advanced chemistry knowledge is necessary. Simultaneous enrollment in CHEM 330 lecture is expected.

Student Learning Outcomes

To achieve a satisfactory grade, students will:

1. Demonstrate proficiency in common analytical methods applied to aquatic samples.
2. Demonstrate rigorous, reproducible laboratory practice.
3. Apply common analytical methods and concepts from general chemistry to fully, accurately, and precisely characterize real-world samples.
4. Communicate analysis questions, methods, results, and conclusions using written word, pictorial figures, and data tables.
5. Demonstrate safe laboratory practices.
6. Participate effectively in group projects and demonstrate professionalism in the laboratory.

Required Course Materials

Supplemental Book: Harvey, D. *Analytical Chemistry 2.1* Chem Libre Texts (Free online!)

Lab Manual: All lab activities are posted online

Lab Notebook: A notebook with hardbound pages is required for use as a laboratory notebook. Although there are dedicated lab notebook options available, you don't not necessarily need anything fancy – a simple black and white composition notebook will work. Alternatively, if you have room left in your carbonless copy notebook from CHEM 139/140, you may use that.

Technology: Students will need a laptop computer meeting Chemistry and Physics' minimum computer requirements and should plan to bring this computer with them to lab every week.

Students will need the following software: - Vernier Logger Lite - Vernier Spectral Analysis (free) - Microsoft Office, especially Excel. ("free" through WCU – install through your WCU email if you don't already have it, ask IT for help if needed) - A blue or black pen (not pencil!) for writing in your lab notebook.

Additional Required Course Materials:

- Goggles or safety glasses with splash gaurds rated for chemical protection
- Nitrile gloves
- Appropriate clothing: closed-toed shoes, long pants, hair tie for long hair

- Permanent, felt-tipped marker (e.g. a Sharpie®)

Most materials are available from the WCU bookstore; goggles are also available from the WCU Chemistry Club (these goggles are recommended over cheaper ones). A lab coat is optional.

Students not wearing appropriate PPE will be asked to leave lab.

See "Field Work", below, for addition recommended materials.

Lab Notebooks and Data Analysis

Lab notebooks occassionally collected for review. You should follow proper laboratory notebook protocol when filling out your notebook. *Lab notebooks should be filled out during lab, not after!* Students will be required to scan their lab notebook pages and turn them in on Canvas each day when leaving lab.

Students will be provided with Excel templates for data analysis, and must turn in their templates and data files after each lab. The Excel sheets will be checked for accuracy against calculations completed by the instructor, and students will be awarded full credit for getting the *exact* right answer, to the correct number of significant digits. Partial credit may be awarded for other answers.

Field Work

Portions of this course will be conducted outdoors in the field while collecting water samples for analysis. This work may occur both on and off campus. This year, we will travel to Black Mountain, NC to collect water samples from the Swannanoa River; the analysis results will be shared with the Town of Black Mountain stormwater program. Students should make every effort to attend this field trip, and you will receive a grade for participation in the trip. Any students not attending will be required to complete a makeup assignment with equal time and effort committments as the field trip. Field work will occur rain or shine.

The following materials are recommended during sampling days. Keep in mind that all these materials may get dirty / rained on / fall in the river, etc., during field work, so don't bring your most favorite items unless you are prepared for them to get damaged.

- Waterproof shoes (preferrably knee-high boots or waders)
- Rain jacket
- Waterproof backpack
- Waterproof notebook (e.g. Rite in the Rain) and Sharpie or pencil
- Water bottle, snacks, and a picnic lunch

The Town of Black Mountain may take photos for educations / PR materials during this trip. Any students wishing not to appear in these materials should notify their instructor. Release forms will be provided to students prior to the trip.

Grading

Your grade is tied directly to the student learning outcomes for the course. Each SLO will be assessed as below. Each assignment will be categorized by SLO and used to assess your progress in achieving that objective. Your final grade will be determined by calculating the weighted average (out of 100) across all SLOs using the weightings listed in parentheses. If you are unsure how to calculate your grade please ask your instructor.

Contributions to Your Grade

1. (20%) Demonstrate proficiency in common analytical methods applied to aquatic samples.
    - Assessed by observation of lab technique and accuracy of data analysis worksheets.
2. Demonstrate rigorous, reproducible laboratory practice.
    - Assessed by inspection of laboratory notebooks.

3. (20%) Apply common analytical methods and concepts from general chemistry to fully, accurately, and precisely characterize real-world samples.
    - Assessed by inspection of lab notebooks and worksheets for accuracy, thoroughness, and data quality.
4. (15%) Communicate analysis questions, methods, results, and conclusions using written word, pictorial figures, and data tables.
    - Assessed by instructor and/or professional review of final reports on the lab project.
5. (15%) Demonstrate safe laboratory practices.
    - Assessed by an ability and willingness to follow standard safety protocols, as judged by instructor observations.
6. (10%) Participate effectively in group projects and demonstrate professionalism in the laboratory.
    - Assessed by peer and instructor evaluation

Grading Scale

Number Range	Letter Grade
97-100	A+
93-96.9	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
63-66.9	D
60-62.9	D-
<60	F

These grades indicate levels in quality from excellent to unsatisfactory. Students are responsible for knowing class attendance, withdrawal, and drop-add policies and procedures.

Turning Things In

Most assignments will be submitted electronically. Unless otherwise specified, assignments are due at 23:59:59 the night before lab and late work is not accepted. A list of anticipated assignments is available in the Canvas site for the course, but is subject to change as needed. *Canvas is the best place to track due dates!*

Submitting Assignments

When turning in assignments:

- Files should be uploaded to the assignment page on Canvas.
- Files should be of the types and quantity specified in the assignment.
- Files should be given a clear, logical filename that reflects the assignment name.
- Files may be sorted automatically by a computer. Therefore, any files not named appropriately, not in the specified format, or submitted elsewhere (e.g. email) may not be graded.
- Any electronic assignments turned in via hardcopy will not be graded.

Submissions that do not follow these guidelines may incur point deductions or may not be graded.

Late Work

Late work is not accepted in this course. Due dates are automatically enforced by Canvas. However:

- Assignments are accepted *early* and students are encouraged to submit assignments before the deadline. Extra credit of 5% per assignment is granted for assignments submitted more than 24 hours early!
- Each student is granted one exception to the late policy. You must fill out a late work exception form to use your exception. You may use this exception for any reason, but bear in mind future exceptions aren't guaranteed. All work, regardless of whether an exception has been used, must be turned in no later than the last day of classes prior to finals week.
- If you experience *extenuating circumstances* (e.g. a medical emergency, professionally diagnosed illness, or death in the family) or a *university-sponsored absence* you may ask to be considered for an extension on a case-by-base basis. Communication of the issue to your instructor and identification of when you plan to turn in the assignment are important in such circumstances. For university-sponsored absences, exceptions should be arranged *before* your absence or will not be granted.

Course Policies

COVID-19: At the time of this writing, it is expected that all lab activities will occur in person. Please avoid coming to class if you experience any cold, flu, or COVID19 symptoms, have been diagnosed with COVID19, or have been in contact with someone who's recently tested positive for COVID19.

Laboratory Behavior: Students are expected to attend each lab period and participate fully in that day's activity. Students should respect the rights of others and minimize avoidable distractions and come to lab prepared.

You should bring your laboratory notebook, paper, pen, and calculator to EVERY laboratory meeting. Please read the Lab Guide for the experiment BEFORE coming to lab. You can set up your lab notebook pages with the introduction, template procedure, and blank tables for recording lab data before you come to lab.

Never bring food or drink into the laboratory. This includes sealed bottles and items inside backpacks – leave them outside the lab! Do not chew gum, use tobacco products, or apply cosmetics in the lab. Do not place personal items inside fume hoods or where they may come into contact with chemicals. Keep walkways clear of chairs, bookbags, etc. (place them in cubbies!). Wash your hands before leaving lab, and never wear gloves or lab coats outside the lab!

The sparing use of cell phones during lab sessions is permitted but discouraged. If you must, please use your cell phone outside the laboratory, and never leave an experiment unattended to do so! Likewise, do not place your cellphone in a fume hood or on a chemical bench!

In an effort to maintain a productive work environment for all students, please refrain from playing music, videos, etc., in the classroom/laboratory.

Proper Laboratory Attire: Students must arrive to lab wearing appropriate attire. Students without appropriate attire will be asked to leave and will not be able to complete the activity for the day (and will be counted absent).

- Wear eye protection at all times (whenever you are in the room).
- Wear closed-toed shoes that fully cover your feet up to the ankle at all times.
- Wear long pants that extend over the top of your shoes at all times.
- Wear a hair tie for long hair.
- Never wear tank tops, sleeveless shirts, shorts, or sandals.

After-hours Instrument Access: You may occasionally want to conduct analyses outside of class time. The instrument lab is open from 8AM to 4PM M-F; please plan your work to fit within that time (it's OK to start a run at the end of the day and leave it to run overnight). If you are completing work outside of class you must work with a lab partner who is also familiar with the instrument you're working on. *Never work in the lab alone!* Likewise, please refrain from bringing guests into the instrument lab unless they

have specifically passed the instrument safety training. If you will require significant help on the instrument please schedule a time to meet with your instructor or the Instrumentation Specialist in advance.

Pregnancy: Certain chemicals can have severe harmful effects on unborn children. Any student who is pregnant or might have become pregnant and wished to avoid these hazards should notify her TA or instructor before conducting any laboratory work so that proper safety precautions can be taken.

Attendance: Please email your instructor *ahead of time* if you encounter circumstances that absolutely prevent you from making it to lab on time. Attendance to all class periods is mandatory. Absences from group work sessions may incur a loss of points up to a zero for the assignment and deductions in the student's group participation grade.

If you experience any symptoms of COVID-19, cold, flu, or other contagious sickness please do NOT come to class! Likewise, do not attend if you have been in contact with someone who has tested positive for COVID-19 or is suspected to have COVID-19. Please maintain diligent communication with your instructor during these situations and appropriate accommodations will be made.

Inclement Weather: Please check the University website for campus closings during times of bad weather. Your safety is a priority when traveling. Use common sense when attempting to get to campus and notify your instructor if you are unable to safely make it. Announcements will be made via e-mail if class must be canceled when the University has not officially closed.

Institutional Policies

Course Recording and Broadcasting: Course recording is bound by University Policy 122. Students should request prior permission of their isntructor before recording and class meetings.

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Accessibility Resources. Please contact the Office of Accessibility Resources, 135 Killian Annex, (828) 227-3886 or by email. Visit the OAR website at http://accessibility.wcu.edu/ for more information.

Academic Integrity Policy and Reporting Process: This course follows the guidelines set forth in WCU's Academic Integrity Policy. Refer to the policy for specific rules and sanctions!

Written work may be checked for plagiarism using computer software. Plagiarism will NOT be tolerated and will by handled according to WCU's academic honesty policy.

Community Vision for Inclusive Excellence: All members of the WCU community are expected to embrace WCU's mission of inclusive excellence. See the Community Vision for Inclusive Excellence.

Resources

Getting Help

WCU provides many resources to help students succeed. *All* students are encouraged to take advantage of resources such as the library and tutoring centers, regardless of their academic standing! A few are listed below.

- **Office Hours** - don't hesitate to ask your instructor for help! See the top of this document for more information.
- **Writing and Learning Commons (WaLC)** for help and feedback on writing. Visit tutoring.wcu.edu or call 828-227-2274.
- **Math Tutoring Center** for help with calculations and math. For more information, visit mtc.wcu.edu or call 828–227–3830.

University Dates

- **Academic Calendar** The University academic calendar can be found at here. It includes dates for all breaks, University closures, final exams, etc.
- **Final Exam:** The University final exam schedule can be found on the Registrar's webpage. Note there is no final exam for the lab portion of Chem 370 (but there may be for the lecture portion).

This syllabus and the course schedule are subject to revision as needed. Students will be notified of changes and are responsible for adhering to the modifications.