CHEM 330 Lecture: Aquatic Chemistry - 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

Environmental aquatic chemistry is the branch of environmental chemistry that deals with chemical phenomena in water. Aquatic chemistry is concerned with the chemical processes affecting the distribution and circulation of chemical compounds in natural waters. One goal is to describe and predict the chemical behavior of oceans, estuaries, rivers, lakes, groundwater, and soil water systems, and to describe the processes involved in water treatment. The study of aquatic chemistry draws on the fundamentals of chemistry but is also influenced by other sciences, especially geology and biology.

This course is an introduction to environmental aquatic chemistry. It is a hybrid between a traditional quantitative analysis course and aquatic chemistry course, focusing on both the analytical and theoretical aspects of aquatic chemistry. Topics such as colorimetric, gravimetric, titrimetric, and instrumental analysis will be covered along with the distribution, fate, transport, and reaction kinetics of chemical species in the aquatic environment. It is expected that students will have taken CHEM 139 and CHEM 140 (the General Chemistry sequence) prior to enrolling in this course; CHEM 232 (Quantitative Analysis) is recommended but not required. Simultaneous enrollment in CHEM 330 Lab is expected.

Student Learning Outcomes

- Recognize the different types of chemical analysis that can be applied to water.
- Critically evaluate the quality of analytical data using statistical methods.
- Recall how various wet chemistry and instrumental methods of analysis work.
- Solve chemical problems that relate to aquatic systems, including problems dealing with stoichiometry, units and dimensional analysis, pH, and similar topics.
- Relate how the structure, physical properties, and chemical properties of a compound can be used to predict its behavior in aqautic ecosystems.
- Illustrate how chemical phenomena in aquatic systems extend beyond those systems to affect plants, animals, humans, political policy, etc.

Required Course Materials

Text Book: Weiner, Eugene R. *Applications of Environmental Aquatic Chemistry*, 2nd Edition. CRC Press. (WCU rental book available at bookstore)

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

Additional Text Resources:

- Benjamin, Mark M. *Water Chemistry*, 2nd Edition. Waveland Press.
- Radojevic, Miroslav and Vladimir N Bashkin. *Practical Environmental Analysis*, 2nd Edition. RSC Publishing.

Lab Manual: All lab activities are posted online.

Miscellaneous: A scientific calculator **not** on a phone (for exams, a TI-XX will work but a simple $10 Casio *fx*-300 will work just as well).

Technology: Students will need a laptop computer meeting Chemistry and Physics' minimum computer requirements with Microsoft Office installed. Microsoft office is available for "free" through WCU; please visit Technology Commons or submit an IT help ticket if you don't know how to install it. A web browser and internet connection capable of streaming video will be necessary for submitting homework assignments and accessing course materials.

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 – please see the lab syllabus for a list of recommended materials to bring with you to the field.

Grading

Your final grade for the semester will be weighted thusly:

- Cumulative Grade: 90%
- Discretionary: 10%

Your **cumulative grade** will be calculated as the total points you earned divided by the total points available (x 100%). For exams, quizzes, and classwork, each question or assignment will specify the number of points available.

Discretionary points are determined at the end of the semester based on participation, effort, attendance, and overall respect for your peers/classmates, your instructor, and their time, both inside and outside the classroom.

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.

Grading Technology

Some items may be graded by computer software. Any answers not in the specified format will not be graded. Written work may be checked for plagiarism using computer software. Plagiarism will NOT be tolerated (see Academic Integrity section, below). Due dates/times are automatically enforced by Canvas.

Turning Things In

Most assignments will be submitted electronically. Unless otherwise specified, assignments are due at 23:59:59 on the due date 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. Due dates/times are automatically enforced by Canvas.

Submitting Assignments

When turning in assignments:

- Files should be uploaded to each 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.

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

Technology use in the classroom: Several studies have shown that hand-written notes are most beneficial in helping students retain information, and my observation has been that laptops and other electronic tend to be more of a distraction than a benefit during lecture. Thus, students are **strongly encouraged** to take notes with paper and pencil and asked to refrain from using laptops and other mobile devices during lecture. Likewise, cell phones should not be used during class – set a schedule to automatically put them on do not disturb during lecture and leave them in your backpack or purse! Tablets, cell phones, and computers are never allowed out during an exam.

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 and cold, flu, or COVID19 symptoms, have been diagnosed with COVID19, or have been in contact with someone who's recently tested positive for COVID19.

Attendance: Attendance to all class periods is expected. Please email your instructor *ahead of time* if you encounter circumstances that absolutely prevent you from making it to class. Students are responsible for covering any material they miss while absent on their own, and are further responsible for any work they

miss while absent. Due dates are not extended because a student was absent, unless otherwise agreed upon between the student and instructor in advance.

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 these resources, 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.
- **Counseling and Psychological Services (CAPS):** CAPS is here to help if you're experiencing mental health worries such as anxiety, depression, insomnia, trouble concentrating, relationship problems, and more. If you aren't sure if CAPS can help, it's best to try it out! For more information about CAPS, visit https://www.wcu.edu/experience/health-and-wellness/caps/index.aspx or call 828-227-7469. Additionally, you may call the Western NC 24-hour crisis line at 888-315-2880 or the Suicide Prevention Lifeline at 800-273-8255.

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.