WATER 390/590: Water Chemistry and Analysis

Spring Semester 2021
SYLLABUS

Course Information:

Lecture Time: Asynchronous
Lecture Location: Virtual
Credits: 4
Lab Times:

Section 1
- Cohort A – Tuesday 12:00 pm – 12:50 pm
- Cohort B – Tuesday 1:00 pm – 1:50 pm

Section 2
- Cohort A – Monday 2:00 pm – 2:50 pm
- Cohort B – Monday 2:00 pm – 2:50 pm

Section 3
- Cohort A – Tuesday 3:00 pm – 3:50 pm
- Cohort B – Tuesday 4:00 pm – 4:50 pm

Lab Location: 261 Trainer Natural Resources Building
Prerequisite: CHEM 106 or 117, and CNR or Biology major

Instructor Information:

Dr. Kyle Herrman
Email: Kyle.Herrman@uwsp.edu (*preferred contact method*)
Office: 263 Trainer Natural Resources Building
Office Phone: 715-346-4832

Office Hours:

Time: Monday 1:00pm – 2:00 pm

A recurring Zoom appointment will be sent out to all students from this class for this time period. I will be available at noon each week at this time. This virtual office hour is entirely optional. If no one joins me in the first 15 minutes I will most likely sign off.

If this time does not work, then please send me an email and we can setup a separate time to meet.

Course Objective:

The objective of this class is to expose students to the principles of water chemistry in human dominated landscapes. This will be accomplished using direct instruction methods during lecture and hands-on experience in the lab and in the field. In addition, you will learn how to create a well-organized scientific paper that addresses water chemistry data using statistics and citations from peer reviewed journal articles. After completing this course a student will be able to interpret the water chemistry data from an aquatic ecosystem and be able to properly collect, prepare, and process water samples for analysis. We will cover a variety of topics ranging from thermodynamics to unit conversion to carbonate chemistry so it is vital that students stay up to date on lecture topics and seek help if they are unsure of any course material. DO NOT wait until the last minute to get help because all of the material we will cover throughout the semester is comprehensive.

Learning objectives:

- Describe how chemical, physical, and biological characteristics can influence water chemistry in aquatic ecosystems
- Develop quantitative, statistical, and analytical skills integral to water resources
- Properly collect, process, preserve, and analyze water samples
- Recognize the role of water chemistry and how it is used to evaluate aquatic ecosystems
- Create an articulate, grammatically correct, and well-organized technical paper in which data is presented with statistics and citations are used to justify findings
- Describe how water chemistry evolves throughout the hydrologic cycle with particular attention to delivery to surface water bodies

Required text:

None. The book assigned at the bookstore is a text that will help you with basic chemistry concepts if you need a refresher.

Grades:

Scale:

A	93-100	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	<60

Assignments:

	Points	Percent of Total
Exams (6)		
Unit conversion and DO	20	8%
Redox chemistry	20	8%
Nutrients and mass balance	20	8%
Thermodynamics and acid/base	20	8%
Carbonate chemistry and precipitation/dissolution	20	8%
Mercury and organic contaminants	20	8%
Lab		
Lab Reports (5)	50	21%
Statistics Worksheet	10	4%
Watershed Description	10	4%
Technical Paper	50	21%

Homework:

There will be no homework assignments due for credit in this class. There will be multiple practice examples posted on the class website and this will give you more opportunities to practice prior to exams. It will be up to you to stay current with material and seek help if you are not understanding concepts.

Exams:

You will complete multiple exams throughout the semester and they will consist of multiple choice, calculation, and short answer questions. Exams will not be graded on a curve, but partial credit will be given as long as the student clearly answers questions in an organized manner that I can follow. Direct comparison and/or working on specific calculations with other students is NOT allowed. You are free to discuss general approaches to problems with other students, but YOU and YOU ALONE must solve each problem. If I notice that solutions from two or more students are too similar or if graphs/files look alike then I will take the appropriate steps to make sure all involved parties will not receive credit. You will be given 75 minutes to complete your exam and on the days outlined in the syllabus schedule the exam will be available from noon to 5pm that day. You must have reliable internet during your exam period because you will need up upload file, pictures, and view images clearly on Canvas.

Lab Reports:

Throughout the semester you will be completing several lab reports that will document results from either that week or a collection of weeks. I will ask that these reports be uploaded into Canvas and will either consist of Excel files, data tables, and possibly brief write ups describing the findings.

In addition, we will analyze data and make informed arguments regarding the connection between land use and water chemistry for local streams in central Wisconsin. This will require you to compare water chemistry data from two streams by running proper statistical tests and examining watershed characteristics. Finally, you will write a short paper describing your findings.

Graduate Student Requirements:
Graduate students will have to complete a 10-page paper where they must compare the water chemistry between Mill Creek and the Plover River. There is a minimum of 8 citations from peer reviewed scientific journals references for this assignment. More details will be given later in the semester regarding format and style.

Classroom Civility:
Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, or demeaning. The instructor has primary responsibility for and control over classroom behavior and maintenance of academic integrity.

Inform Your Instructor of Any Accommodations Needed:
If you have a documented disability and verification from the Disability and Assistive Technology Center and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to Disability Services and meet with a Disability Services counselor to request special accommodation before classes start.

The Disability and Assistive Technology Center is located in 609 Albertson Hall and can be contacted by phone at (715) 346-3365 (Voice) (715) 346-3362 (TDD only) or via email at datctr@uwsp.edumailto:datctr@uwsp.edu

Statement of Policy
UW-Stevens Point will modify academic program requirements as necessary to ensure that they do not discriminate against qualified applicants or students with disabilities. The modifications should not affect the substance of educational programs or compromise academic standards; nor should they intrude upon academic freedom. Examinations or other procedures used for evaluating students' academic achievements may be adapted. The results of such evaluation must demonstrate the student's achievement in the academic activity, rather than describe his/her disability.

If modifications are required due to a disability, please inform the instructor and contact the Disability and Assistive Technology Center in 609 ALB, or (715) 346-3365.

Commit to Integrity:
As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

UWSP Academic Honesty Policy & Procedures:
Student Academic Disciplinary Procedures
UWSP 14.01 Statement of principles

The board of regents, administrators, faculty, academic staff and students of the university of Wisconsin system believe that academic honesty and integrity are fundamental to the mission of higher education and of the university of Wisconsin system. The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards must be confronted and must accept the consequences of their actions.

UWSP 14.03 Academic misconduct subject to disciplinary action.
(1) Academic misconduct is an act in which a student:
(a) Seeks to claim credit for the work or efforts of another without authorization or citation;
(b) Uses unauthorized materials or fabricated data in any academic exercise;
(c) Forges or falsifies academic documents or records;
(d) Intentionally impedes or damages the academic work of others;
(e) Engages in conduct aimed at making false representation of a student's academic performance; or
(f) Assists other students in any of these acts.

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

Attendance:

If you are going to miss an assigned due date for an excused purpose please contact me as soon as possible. If you have a documented absence then due dates can be extended. However, if you do not have an approved excuse for your absence then the appropriate late policies will be applied.

Late Policy:

Assignments are considered late if they are not turned in at the time listed on the assignment. I will however allow assignments to be turned in late, but 1 point will be taken off for each day the assignment is late. Exams must be completed by the time and day specified. If an exam is taken late 2 points will be taken off for each day, it is late.

Tentative Schedule (could change as semester progresses):

Lecture Schedule

Date	Lecture Topic
Jan 25	Syllabus and Canvas Introduction
Jan 27	Water Basics
Jan 29	Unit conversions
Feb 1	Common units and conversions
Feb 3	Dissolved Oxygen
Feb 5	
Feb 8	**EXAM 1 (noon to 7pm)**
Feb 10	Redox Reactions
Feb 12	
Feb 15	
Feb 17	
Feb 19	**EXAM 2 (noon to 7pm)**
Feb 22	Carbon Cycle
Feb 24	Nitrogen Cycle
Feb 26	
Mar 1	Phosphorus Cycle
Mar 3	
Mar 5	Nutrient Limitations
Mar 8	
Mar 10	Mass balances in aquatic ecosystems
Mar 12	
Mar 15	**EXAM 3 (noon to 7pm)**
Mar 17	Thermodynamics
Mar 19	
Mar 22	*NO CLASS SPRING BREAK*
Mar 24	
Mar 26	
Mar 29	Acid/Base Chemistry
Mar 31	
Apr 2	**EXAM 4 (noon to 7pm)**
Apr 5	Acid/Base Chemistry - Models
Apr 7	
Apr 9	Carbonate Chemistry
Apr 12	
Apr 14	
Apr 16	
Apr 19	
Apr 21	Mixed Models
Apr 23	Complexation & Precipitation/Dissolution
Apr 26	
Apr 28	
Apr 30	**EXAM 5 (noon to 7pm)**
May 3	Mercury Cycling
May 5	
May 7	Organic Pollutants
May 10	
May 12	
May 14	
Finals Week **EXAM 6 – Monday May 17 (noon to 7pm)**	

Lab Organization

All in person lab section will be split into 2 cohorts. For example, a lab section that meets from 2pm to 4pm will have two starting times. Half of the students in the lab section will start lab at 2pm and be done by 2:50pm while the other half of the students in the lab section will start at 3pm and be done by 3:50pm. For all labs there will be mandatory material all students MUST watch prior to lab. This will detail what you are expected to accomplish during your 50-minute exercise in the lab. Failure to watch the lab will result in your not being prepared and unable to complete the week's exercise.

Students completing labs online will be responsible for the same material as students completing labs in person. Students must watch the materials prior to lab and a "first person" video will be uploaded to Canvas providing a virtual demonstration of the lab for that week. Based on the data collected from the video, lab reports should be submitted in a similar format as the students on campus.

Virtual labs will be done remotely for all students. For these labs, videos will be uploaded on Canvas and will demonstrate that week's exercise. These labs pertain to the lab report and will outline statistics and how to analyze watersheds using online tools.

Lab Schedule (tentative)

	Week of:	**Lab Topic**
	Jan 25	NO LAB
1	Feb 1	Calibrating Hydrolab's
2	Feb 8*	Dissolved oxygen reaeration
3	Feb 15*	Filtration and total suspended solids
4	Feb 22*	Alkalinity titrations
5	Mar 1*	Standards and calibration curves
6	Mar 8	Colorimetry – Nitrate analysis
7	Mar 15	Colorimetry – Ammonium analysis
	Mar 22	NO LAB – SPRING BREAK
8	Mar 29*	Colorimetry – Soluble reactive phosphorus
9	Apr 5*	Persulfate digestion for total phosphorus and total nitrogen
10	Apr 12*	Statistics (Virtual Lab)
11	Apr 19*	Watershed Description (Virtual Lab)
	Apr 26	Open lab for carbonate models
12	May 3	Create figures and tables (Virtual Lab)
	May 10*	Open lab for technical paper