WATER 390/590: Water Chemistry and Analysis

Fall Semester 2019
SYLLABUS

Course Information:
Lecture Time: Monday/Wednesday/Friday 12:00 pm – 12:50 pm
Lecture Location: 255 Trainer Natural Resources Building
Credits: 4
Lab Times:
- Section 1 – Wednesday 9:00 am – 10:50 am
- Section 2 – Tuesday 11:00 am – 12:50 pm
- Section 3 – Wednesday 2:00 pm – 3:50 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: Thursday 10:00 am - 12:00 pm
Location: 263 Trainer Natural Resource Building
Or by appointment if the assigned hours do not work

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
Participation	20	10%
Exams (6)		
Unit conversion and DO	20	10%
Redox chemistry	20	10%
Nutrients and mass balance	20	10%
Thermodynamics and acid/base	20	10%
Carbonate chemistry and precipitation/dissolution	20	10%
Mercury and organic contaminants	20	10%
Lab Reports (3)		
Site Description	20	10%
Road Salts	20	10%
Nitrate & SRP	20	10%

Participation:
These points will be assessed on attendance in lecture and lab and on participation during in-class discussions. However, the bulk of these points will be assessed on your active participation during labs and the successful completion of assignments during labs.

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.

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 essay/calculation 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. Most exams will be completed during class time; however, some exams may be completed outside of class time. Thus, in this format you will be working on your own. Direct comparison and working on specific calculations with other students are 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 look alike then I will take the appropriate steps to make sure all involved parties will not receive credit.

Lab Reports:
Based on the data collected by past semesters of this class you will complete 3 different writing assignments throughout the semester (see Writing Assignment document for more details). You will be required to collect/analyze data and make informed arguments regarding the connection between land use and water chemistry for local streams in central Wisconsin.

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.

Academic Misconduct:

Violations of academic integrity will result in automatic failure of the class and referral to the proper university officials. Lab reports will be submitted on 2DL and will be analyzed for plagiarism via the program Turnitin. The work a student submits in class is expected to be the student's own work and must be work completed for that particular class and assignment. Students wishing to build on an old project or work on a similar topic in two classes must discuss this with the professor. Academic dishonesty includes but is not limited to: cheating on an examination and submitting an assignment as your own work when all or part of the assignment is the work of another without proper citation. Sanctions can be applied whether the violation was intentional or not so please know how to properly cite references for a scientific paper.

For further information regarding UWSP policy please refer to Chapter 14 in the University Handbook (http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf)

Late Policy:

Assignments are considered late if they are not turned in at the beginning of lecture on the due date. Assignments can be turned in late but 1 point will be taken off for each day the assignment is late. Exams must be turned in at the beginning of class on the day specified and will be deducted 1 letter grade per day until they are turned in.

Attendance:

If you are going to miss a lecture or an exam 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.

Tentative Schedule (could change as semester progresses):

Lecture Schedule

	Date	Lecture Topic
1	Sept 4	Syllabus and Water Basics
2	Sept 6	Common units and conversions
	Sept 9	
3	Sept 11	Dissolved Oxygen
	Sept 13	
	Sept 16	EXAM 1
4	Sept 18	Redox Reactions
	Sept 20	
	Sept 23	
	Sept 25	
	Sept 27	EXAM 2
5	Sept 30	Carbon Cycle
6	Oct 2	Nitrogen Cycle
	Oct 4	
7	Oct 7	Phosphorus Cycle
	Oct 9	
8	Oct 11	Nutrient Limitations
9	Oct 14	Mass balances in aquatic ecosystems
	Oct 16	
	Oct 18	EXAM 3
10	Oct 21	Thermodynamics
	Oct 23	
	Oct 25	
11	Oct 28	Acid/Base Chemistry
	Oct 30	
	Nov 1	
	Nov 4	EXAM 4
12	Nov 6	Acid/Base Chemistry - Models
	Nov 8	
	Nov 11	
13	Nov 13	Carbonate Chemistry
	Nov 15	
	Nov 18	
	Nov 20	
	Nov 22	Computer Lab
14	Nov 25	Complexation & Precipitation/Dissolution
	Nov 27	
	Nov 29	NO CLASS – THANKSGIVING BREAK
14	Dec 2	Complexation & Precipitation/Dissolution
	Dec 4	EXAM 5
15	Dec 6	Mercury Cycling
16	Dec 9	Organic Pollutants
	Dec 11	
	Dec 13	
Finals Week December 16 from 10:15 am – 12:15 pm EXAM 6		

Lab Schedule (will most likely change based on field conditions)

	Week of:	**Lab Topic**
	Sept 2	NO LAB
1	Sept 9	Calibrating Hydrolab's
2	Sept 16	Watershed Descriptions (Bring Laptop if possible)
3	Sept 23	Collect Field Samples & *In situ* Data
4	Sept 30	Filter samples & TSS & Alkalinity titrations
5	Oct 7	Using Excel to create figures and tables (Bring Laptop if possible)
6	Oct 14	Statistics (Bring Laptop if possible)
7	Oct 21	Standards & Calibration curves
8	Oct 28	Colorimetry – Ammonium analysis
9	Nov 4	Persulfate digestion for TN and TP
10	Nov 11	Colorimetry – SRP analysis
11	Nov 18	Carbon Analysis
12	Nov 25	Ion Chromatography – Anions/Cations
13	Dec 2	Atomic absorption – Iron analysis
	Dec 9	Clean up and data collection