WATER 390/590: Water Chemistry and Analysis

Spring Semester 2019
SYLLABUS

Course Information:
Lecture Time: Monday/Wednesday/Friday 12:00 pm – 12:50 pm
Lecture Location: 320 Trainer Natural Resources Building
Credits: 4
Lab Times:
- Section 1 – Tuesday 12:00 pm – 1:50 pm
- Section 2 – Monday 2:00 pm – 3:50 pm
- Section 3 – Tuesday 3:00 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: Tuesday 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	15	6.38%
Exams (6)		
Unit conversion and DO	20	8.51%
Redox chemistry	20	8.51%
Nutrients and mass balance	20	8.51%
Thermodynamics and acid/base	20	8.51%
Carbonate chemistry and precipitation/dissolution	20	8.51%
Mercury and organic contaminants	20	8.51%
Lab Reports (4)		
Site Description	25	10.64%
Nitrate & SRP	25	10.64%
Alkalinity and pH	25	10.64%
Road Salts	25	10.64%

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 write throughout the semester from the three sites you will be expected to write a 6-page paper (including figures and tables) discussing water chemistry. This paper will have a typical scientific paper format as follows: Introduction, Methods, Results, and Discussion. It will discuss how the data from each site compares and how the data compares to other sites in the scientific literature. Sections will be turned in throughout the semester to receive feedback from the instructor and from peers. A minimum of 4 references from peer reviewed journal articles is required. For graduate students, the requirements increase to a 12 page paper and a minimum of 8 references. 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	Jan 23	Syllabus and Water Basics
2	Jan 25	Common units and conversions
	Jan 28	
3	Jan 30	Dissolved Oxygen
	Feb 1	
	Feb 4	EXAM 1
4	Feb 6	Redox Reactions
	Feb 8	
	Feb 11	
	Feb 13	
	Feb 15	EXAM 2
5	Feb 18	Carbon Cycle
6	Feb 20	Nitrogen Cycle
	Feb 22	
7	Feb 25	Phosphorus Cycle
	Feb 27	
8	Mar 1	Nutrient Limitations
9	Mar 4	Mass balances in aquatic ecosystems
	Mar 6	
	Mar 8	EXAM 3
10	Mar 11	Thermodynamics
	Mar 13	
	Mar 15	
	Mar 18	NO CLASS – SPRING BREAK
	Mar 20	
	Mar 22	
11	Mar 25	Acid/Base Chemistry
	Mar 27	
	Mar 29	
	Apr 1	EXAM 4
12	Apr 3	Acid/Base Chemistry - Models
	Apr 5	
	Apr 8	
13	Apr 10	Carbonate Chemistry
	Apr 12	
	Apr 15	
	Apr 17	
	Apr 19	Computer Lab
14	Apr 22	Complexation & Precipitation/Dissolution
	Apr 24	
	Apr 26	
	Apr 29	EXAM 5
15	May 1	Mercury Cycling
16	May 3	Organic Pollutants
	May 6	
	May 8	
	May 10	
Finals Week May 16 from 8:00am – 10:00am EXAM 6		

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

	Week of:	**Lab Topic**
	Jan 21	NO LAB
1	Jan 28	Calibrating Hydrolab's
2	Feb 4	Watershed Descriptions (Bring Laptop if possible)
3	Feb 11	Standards & Calibration curves
4	Feb 18	Statistics (Bring Laptop if possible)
5	Feb 25	Using Excel to create figures and tables (Bring Laptop if possible)
6	Mar 4	Colorimetry – Ammonium analysis
7	Mar 11	Collect Field Samples & *In situ* Data
	Mar 18	NO LAB
8	Mar 25	Filter samples & TSS & Alkalinity titrations
9	Apr 1	Persulfate digestion for TN and TP
10	Apr 8	Colorimetry – SRP analysis
11	Apr 15	Ion Chromatography – Anions
12	Apr 22	Ion Chromatography – Cations
13	Apr 29	Atomic absorption – Iron analysis
	May 6	Clean up and data collection