WATER 390/590: Water Chemistry and Analysis

Spring Semester 2017
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 10:00 am – 11:50 am
- 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: WATR 389, 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: Friday 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	Total	Percent of Total Grade
Participation	15	15	7.5%
Homework (4)	5	20	10%
Exams (2)	35	70	35%
Lab Report			
Outline	5	5	2.5%
Introduction	5	5	2.5%
Peer review	5	5	2.5%
Methods & Stats	10	10	5%
Results & Figs/Tables	10	10	5%
Full paper	60	60	30%

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:

Assignments will be handed out throughout the semester that will address recently covered material. It may require calculations, diagrams, drawings, or using a spreadsheet to create a graph. Points will be assessed on three main criteria: 1) does the student answer the question(s); 2) is the student's argument clearly laid out and organized; 3) is the assignment legible and easy to read. Students can discuss concepts with each other but DO NOT turn in identical assignments. This includes graphs that are the same or verbiage that is identical to another student's assignment. If identical material is turned in no credit will be given to anyone involved.

Exams:

Two take-home exams will be given in class and 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. Direct comparison and 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 look alike then I will take the appropriate steps to make sure all involved parties will not receive credit.

Lab Report:

Based on the data collected 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 Lecture Schedule (could change as semester progresses):

	Date	Lecture Topic
1	Jan 23	Syllabus and Water Basics
2	Jan 25	Common units and conversions
	Jan 27	
3	Jan 30	Dissolved Oxygen
	Feb 1	
4	Feb 3	Redox Reactions
	Feb 6	
	Feb 8	
	Feb 10	
5	Feb 13	How to write a scientific paper
	Feb 15	
	Feb 17	Watershed attributes (meet in NFAC 215)
6	Feb 20	Carbon Cycle
7	Feb 22	Nitrogen Cycle
	Feb 24	
	Feb 27	
8	Mar 1	Phosphorus Cycle
9	Mar 3	Nutrient Limitations
10	Mar 6	Mass balances in aquatic ecosystems
	Mar 8	
	Mar 10	Review (***Exam I assigned)***
	Mar 13	No Class
	Mar 15	Poisoned Waters Part I
	Mar 17	Poisoned Waters Part II (***Exam I due***)
	Mar 20	**SPRING BREAK**
	Mar 22	
	Mar 24	
11	Mar 27	Thermodynamics
	Mar 29	
12	Mar 31	Acid/Base Chemistry
	Apr 3	
	Apr 5	
	Apr 7	
	Apr 10	
13	Apr 12	Carbonate Chemistry
	Apr 14	
	Apr 17	
	Apr 19	
14	Apr 21	Modeling Multiple Acid/Base Additions (meet in NFAC 215)
15	Apr 24	Precipitation/Dissolution
	Apr 26	
	Apr 28	
16	May 1	Organic Pollutants
	May 3	
	May 5	
	May 8	
	May 10	Review (***Exam II assigned***)
	May 12	No Class (***Paper due by 5:00 pm***)
Exam II Due during Finals Week on May 18th by 10:00 am		

Tentative Lab Schedule

	Week	**Lab Topic**
	Jan 23	NO LAB
1	Jan 30	Calibrating Hydrolab's
2	Feb 6	Using standards and calibration curves
3	Feb 13	Using Excel for graphing
4	Feb 20	Discuss outline for paper
5	Feb 27	Data analysis/Statistics
6	Mar 6	Collect Field Samples and *In situ* Data
7	Mar 13	Filter samples/TSS/Alkalinity
	Mar 20	**SPRING BREAK**
8	Mar 27	Persulfate digestion for TN and TP
9	Apr 3	SRP – Colorimetry with Spectrophotometer
10	Apr 10	Ion Chromatograph
11	Apr 17	DOC/DIC
12	Apr 24	Atomic Absorption – Metals analysis
13	May 1	Workshop for paper
	May 8	NO LAB