

Chemistry 248

Course Syllabus

Spring 2021

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Canvas: Chemistry 248

Virtual Office Hours: M,W 11:00 am – 11:50 am, T, R 12:00 pm – 12:50 pm on Zoom. These will be scheduled via Microsoft Bookings for 10 minute intervals. If you will need more than 10 minutes, please schedule more than one interval. The Zoom address and password are on Canvas under Zoom.

<https://outlook.office365.com/owa/calendar/DrColesOfficeHours@uwspedu.onmicrosoft.com/bookings/>

If none of these scheduled times work for you, please contact me and we can setup an alternate time.

Class Sessions

Lecture:	01	T, R	12:00 – 12:50	Online – Recordings available on Canvas
Laboratory:	01L1	M, W	8:00 - 10:50	CBB 466/476
	01L2	T, R	2:00 - 4:50	CBB 466/476

Course Description

Chemistry 248 is a course where the principles of quantitative analysis will be examined. Topics that will be covered include statistics and data analysis, acid-base equilibrium, gravimetric analysis, complexation reactions, spectroscopy, electrochemistry, and chromatography.

Required Materials

Textbook: Exploring Chemical Analysis, 5th Ed., by Daniel C. Harris. The textbook is available at text rental.

Laboratory Manual: Quantitative Analysis Experiments that is available for purchase at the bookstore.

Laboratory Goggles: These must be goggles, not glasses. They are to be purchased from the bookstore or another store.

Laboratory Notebook: Permanently bound, quadrille ruled which is available for purchase at the bookstore or other stores.

Calculator: A scientific calculator that will perform the functions $\log x$, 10^x , $\ln x$, and e^x .

Policies & Procedures

Face Coverings: At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces. Any student with a condition that impacts their use of a face covering should contact the [Disability and Assistive Technology Center](#) to discuss accommodations in classes. Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university policy and not up to the discretion of individual instructors. Failure to adhere to this requirement could result in formal withdrawal from the course.

Other Guidance for in person class:

- Please monitor your own health each day using [this screening tool](#). If you are not feeling well or believe you have been exposed to COVID-19, do not come to class; email your instructor and contact Student Health Service (715-346-4646).
 - As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.
- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom, lab, or meeting room.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

Attendance: Attendance is expected for the laboratory sessions. You are expected to watch all of the lecture recordings in order as our material builds from the previous material.

Laboratory: One of the primary objectives of this course is to introduce you to techniques of quantitative analysis. Since proper techniques are emphasized, the accuracy of your results is an important part of your grade. Overall, the accuracy of your results contributes about 50% to your grade. You will be expected to perform the experiments in your designated class period. You will be allowed to work at your own pace with specific due dates for each experiment. As long as the results are reported by the deadline, you are on schedule.

• **Be prepared.** It is important to be prepared for each laboratory period. The semester will go much more smoothly if you read the experiments and watch any pre-lab videos before coming to lab and understand the purpose and procedures that will be performed. It is also worthwhile to prepare your laboratory notebook ahead of time for your data entries. Laboratory time should be used doing experiments and not figuring out what to do next!

In some experiments there are long waiting times - you can use this time to start another part of the experiment or a new experiment. Therefore, it is also extremely important to notice when this might occur and plan your day accordingly.

Laboratory Notebook: The laboratory notebook is an important record of the work that you have performed. It is vital that the notebook be kept organized and neat. If data is recorded wrong, one line is placed through the number in error and the corrected value written next to it. It is essential that all of the data that you take be recorded in the lab notebook as the data is taken and only on the right hand page. Otherwise, data can be misplaced, lost or stolen. The laboratory notebook will be collected when each experiment report is done.

• **Organization of Lab Notebook:** (points deducted if missing item)

1. All entries must be made in **ink** which will not run or smear when wet.
2. Up-to-date Table of Contents at the beginning of the notebook. (1 pt)
3. Sequentially numbered pages on the right hand side. (0.5 pt)
4. The date and your signature at the top of each page on the first page where data are recorded, as well as at the end of the day's data. (0.5 pt)
5. On the first page and/or following pages for each experiment: the title of the experiment, purpose of the experiment, and procedure for the experiment including chemical reactions that are important. (3 pts) The data tables will follow.
6. A complete record of all data taken. All data should be labeled (with units) and should have a heading indicating what the data represent. Any errors should be marked through with only one line, dated and initialed. (1 pt labels, 1 pt units)
7. One set of sample calculations for each calculation made. (2 pts)
8. A summary of your results – tape your report sheet into the notebook.
9. Conclusions about your experiment and results. (1 pt)

An example of the organizational setup for the laboratory notebook will be distributed.

Examinations: There will be four exams each worth 100 points.

Homework: Homework assignments will be made during lectures. These will be due the week after they are assigned.

Laboratory Results: The score for this part of each experiment is based on the accuracy of the results. Each experiment is worth 100 points, with 10 points due to your lab notebook. Since there are ten regular experiments, regular laboratory reports will be worth a possible 1000 points, which will then be scaled to 500 points total.

It is possible to **Redo**, or **Recalculate** any results.

Redo - The experiment may be repeated **once** with a new unknown (if time permits). The new score will be the average of the two scores. **Redo** experiments must be completed, and turned in within three weeks of the original due date.

Recalculate - In the case of a calculation error a new report must be submitted along with an indication in your lab notebook of where the error occurred. Errors in judgment may not be used to recalculate a result. For example, you may not change your result to a median value from a mean or vice versa. You should discuss recalculations with your laboratory instructor. Your new score will be determined by subtracting ten points from your “recalculated” score. Recalculations must be submitted within one week of the original due date.

Late lab reports will have ten points subtracted from the score for each day that the lab is late. Late lab reports may not be redone or recalculated.

Formal Report: For the vanillin experiment, a formal report will be required. The sections that should be included in the report are: Objective, Introduction, Experimental, Data, Calculations, Results, and Discussion. The material that should be included in each section is described in a

separate handout. A first draft is required for the formal report which is worth 15 points. The final draft will be worth 35 points.

Electronic Resources: A Canvas course site has been set up for our course. You can access it from www.uwsp.edu/canvas and log in with your UWSP log on information. There are resources on this page to help you learn how to use Canvas. Canvas is our learning management system where all of our course information is housed. All lecture recordings, documents, exams and quizzes and announcements are posted on Canvas and may only be used by students currently enrolled in the course.

Safety: Each student is expected to work safely (as outlined by the instructor, the lab safety agreement, MSDS's, and/or label information) at all times. Unsafe behavior will not be tolerated. In the event of behavior deemed unsafe by the laboratory instructor, the instructor may dismiss the student from that day's activities. The student will not be allowed to make up that lost time. If documented unsafe behavior continues, the student may be dismissed from the course.

Grading: The course grade will be determined by the sum of the points received from the following:

Laboratory Results (10 at 100 pts ea., scaled to 500 pts total)	500
Formal Report (total from rough draft and final draft)	50
Homework (11 at ~10 pts ea.)	110
Exams (4 at 100 pts ea.)	<u>400</u>
Total points	1060

The grading scale cutoffs will be as follows: A >986 pts (93%), B: 880 (83%), C: 774 (73%), D: 668 (63%), F < 668 (63%). Grades near a cutoff may be assigned + or - designations.

Academic Responsibility: Academic misconduct will not be tolerated. Academic misconduct is defined by the UWSP Handbook Chapter 14.03(1). Anyone who engages in academic misconduct will be subject to disciplinary measures according to the UWSP handbook. The handbook chapter can be found using the following web link:

<http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf>.

Cell Phone Usage: Cell phones should be turned off and not used during class for texting or talking.

Disability Services: Students with disabilities should contact the Office of Disability Services during the first two weeks of the semester if you wish to request accommodation.

Religious Beliefs: Religious beliefs will be accommodated according to UWS 22.03, as long as you notify me within the first three weeks of the beginning of classes of the specific days which you will request relief from an examination or academic requirement.

A Few Notes

I am looking forward to a fruitful semester of teaching and learning with you in Chemistry 248. In order to help you learn the material, I have office hours which are listed. I am providing my schedule for you in case you would like to setup a time to meet that is different than my office hours. I am available to meet with students during my class preparation time depending on the day. Good luck with the semester!

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00	248 Lab 01L1 CBB 466/476		248 Lab 01L1 CBB 466/476	Research, Class Prep	Research, Class Prep
09:00		Meeting		Office Hour	
10:00		Class Prep			
11:00	Office Hour Zoom		Office Hour Zoom		
12:00	Research, Class Prep	Office Hour Zoom	Research, Class Prep	Office Hour Zoom	Research
1:00				Class Prep	
2:00					Meeting/ Seminar
3:00		248 Lab 01L2 CBB 466/476	106 Lab 01L4 CBB 230	248 Lab 01L2 CBB 466/476	
4:00					

Chemistry 248 Tentative Lecture Schedule

Date	Topic	Reading
Week 1	Class Information, Course Policies	
	Introduction to Quantitative Analysis, Measurements & Calculations	Chapters 0, 1, 2
Week 2	Errors in Analysis & Evaluation of Data: Statistics	Chapters 3, 4
	Errors in Analysis & Evaluation of Data: Statistics	Chapters 3, 4
Week 3	Titrimetric Methods	Chapter 6
	Gravimetric Methods	Chapter 7
Week 4	Chemical Equilibrium Review	
	Exam I	
Week 5	Chemical Equilibrium Review	
	Chemical Equilibrium Review	
Week 6	Acid-Base Equilibria	Chapters 8, 9
	Acid-Base Titrations	Chapters 10, 11
Week 7	Systematic Treatment of Equilibrium	Chapter 12
	Systematic Treatment of Equilibrium	Chapter 12
Week 8	EDTA Titrations	Chapter 13
	Exam II	
	Spring Break	
Week 9	Spectroscopic Methods	Chapters 18, 19
	Spectroscopic Methods	Chapters 18, 19
Week 10	Introduction to Electrochemistry	Chapters 14, 15
	Introduction to Electrochemistry	Chapters 14, 15
Week 11	Redox Titrations	Chapter 16
	Atomic Spectroscopy	Chapter 20
Week 12	Atomic Spectroscopy	Chapter 20
	Exam III	
Week 13	Analytical Separations	Chapter 21
	Analytical Separations	Chapter 21
Week 14	Gas Chromatography	Chapter 22
	Liquid Chromatography	Chapter 24
Week 15	Coulometry	Chapter 17
	Review	
Week 16	Exam IV	

Chemistry 248 Laboratory Schedule

WEEK	DATES	EXPERIMENTS	PAGES IN LAB MANUAL	REPORT DUE DATE
1	1/ 25-26	Check-in and Calibration	Handout, 39	
	1/ 27-28	Calibration of buret and pipets	39	
2	2/ 1-2	Calibration of buret and pipets	39	
	2/ 3-4	Finish Calibration		
3	2/ 8-9	Standardization of HCl	41	Na ₂ CO ₃ Report Due 2/17-18
	2/ 10-11	Sodium Carbonate Titration		
4	2/ 15-16	Prep and Std of EDTA & Mn in Steel	67	Mn Report Due 3/3-4
	2/ 17-18	Mn in Steel	75	
5	2/ 22-23	Mn in Steel		
	2/ 24-25	Vanillin in Vanilla Extract	81	First Draft Formal Report Due 3/17-18
6	3/ 1-2	Vanillin in Vanilla Extract		
	3/ 3-4	Vanillin in Vanilla Extract		
7	3/ 8-9	Ethanol by Titration	107	Ethanol Report Due 3/31 – 4/1
	3/ 10-11	Ethanol by Titration		
8	3/ 15-16	Ethanol by GC	115	GC Report Due 4/7-8
	3/ 17-18	Ethanol by GC		
	3/ 22-26	Spring Break		
9	3/ 29-30	Cu-Zn by AA	122	AA Report Due 4/14-15
	3/ 31-4/1	Cu-Zn by AA		
10	4/ 5-6	Coulometry	128	Coulometry Rept. Due 4/21-22
	4/ 7-8	Coulometry		
11	4/ 12-13	Limestone for Fe	87	Limestone Rept Due 4/28-29
	4/ 14-15	Limestone for MgO and CaO		
12	4/ 19-20	Finish Limestone		
	4/ 21-22	Acid Mixture	99	Acid Mix Report Due 5/5 - 6
13	4/ 26-27	Acid Mixture		
	4/ 28-29	Make-up		
14	5/ 3-4	Make-up		
	5/ 5-6	Make-up		
15	5/ 10-11	Make-up		
	5/ 12-13	Check-out		
16	5/17-21	Finals Week		