

**Chemistry 3005**  
**Quantitative Analysis Laboratory**  
**Fall 2019**

**Course Name: Quantitative Analysis Laboratory**

**Time/Location: M 2:30-5:20 or Th 12:30-3:20 p.m. ML 144**

**Instructor: Robert Brown Office W026 Phone: 797-0545, email: bob.brown@usu.edu**

**Teaching Assistant: Jenna Bouvang (jenna.hawley@aggiemail.usu.edu)**

**Dr. Brown's Office Hours: T 3:00-4:00 PM, W 2:30-3:30 PM and by appointment.**

**Teaching Assistant office hours will be announced at the first laboratory meeting.**

*Text:* USU Department of Chemistry and Biochemistry Chemistry 3005 Laboratory Manual. A copy will be provided to each student and an electronic version will be available on Canvas.

*Required Materials:* A bound laboratory notebook; safety goggles; a laboratory coat; writing implement and scientific calculator.

*Course Content:* This course consists of 8 laboratories. Laboratories include experiments in volumetric, gravimetric, and instrumental methods of chemical analysis. Instrumental methods include: electrochemistry, emission and absorption spectrophotometry, and gas chromatographic separations.

*Course Grading:* Course performance will be evaluated based on the accuracy of reported experimental results, two laboratory notebook checks (scored based upon proper data entry, individual laboratory area housekeeping, general quality of notebook entries and answers to pre and post lab questions associated with the various experiments) and an in-class final quiz.

*Grading Points Breakdown:* Each experiment has a maximum score of 100 points. Laboratory notebook checks will count 50 points each. The final quiz is 100 points.

Maximum Points	Task
800	8 Experiments
100	Laboratory notebook checks
100	Final quiz
<b>1000</b>	<b>Total Points</b>

The maximum letter grade ranges will be: A, 90-100%; B, 80-89%; C, 70-79%; D, 60-69%; F, below 60%. These ranges may be adjusted lower but will not be raised. Grade modifiers of plus (+) and minus (-) will also be used for final laboratory letter grades. See lab manual for more details on grading and lab result due dates.

*Withdrawal Policy:* This course will follow the University policy on withdrawals stated in the current Undergraduate Catalog. Drop dates are listed in the Schedule of Classes. You must check out of the laboratory (as outlined in the laboratory manual) if you drop the class. You must clean your glassware and return your lab drawer key. **Note: failure to do so will result in a hold on your academic records until this is completed. Failure to return your lab drawer key will result in a fine (cost of replacing the drawer lock) that will need to be paid before the hold on your records will be released.**

*Missed Laboratory Policy:* Due to the number of laboratories and their associated scheduling,

there will generally be limited opportunity for students to makeup laboratories. Students are required to attend all laboratories as scheduled (see laboratory manual). **Due to space limitations and safety concerns, students may only attend the laboratory section for which they are registered unless prior approval is obtained from the Instructor.** A missed laboratory due to a documented illness, family emergency or a university-approved absence will be dealt with as to final course grade by the instructor on a case-by-case basis.

**Lab results are due** at the beginning (**first 5 minutes**) of the next regularly scheduled lab period. Late submission of laboratory results will be penalized 5 points for the first late day and up to 10 total points per week that the results are late. No repetition of experiments is permitted once a result is submitted.

**Attendance Policy:** Laboratory attendance is mandatory for successful performance in this course. Laboratory attendance is monitored each week and failure to attend without an acceptable excuse will result in a grade of zero for that laboratory.

**Student Disability Statement:** Any student with a disability that requires accommodations must contact the Instructor. The disability must be documented by the Disability Resource Center. Course materials may be requested in alternative formats.

**Service Animals in Chemistry Labs Statement:** Utah State University is committed to providing access for service dog handlers. Due to the unique nature of the laboratory environment, service animal handlers must meet with the Disability Resource Center prior to bringing a service dog into the lab. The purpose of this meeting is not to prevent you from having your service animal with you but rather to understand how to best accommodate your needs and the needs of your animal. Please contact the Disability Resource Center at 435-797-2444 or [drc@usu.edu](mailto:drc@usu.edu) to set up an appointment. Students will be required to provide approved PPE for any service animal.

**Laboratory Fee Statement:** A laboratory fee (\$75) is required for this course. The laboratory fee is used to pay for reagents, help maintain the instrumentation and replace broken glassware and covers a small portion of the lab Teaching Assistant's support.

**Assessment Statement:** The value of a quantitative chemical analysis laboratory is to develop the necessary laboratory skills to be able to perform accurate and reliable experimentation in a variety of scientific fields. Laboratory learning objectives are evaluated by comparing student results of analyzed unknowns to those reported in previous years.

**Learning Objectives:**

- Comprehend the importance of stoichiometry, chemical equilibrium and kinetics in analysis.
- Understand laboratory and chemical safety
- Formulate concepts of validation of data and experimental design
- Comprehend concept of and perform chemical measurement calibration
- Apply and assess concepts of availability and evaluation of analytical standards and formulate standardization methodology
- Demonstrate knowledge of sampling methods for all states of matter
- Use statistical methods for evaluating and interpreting data
- Assess sources of error in chemical and instrumental analysis and account for errors in data analysis
- Recognize interferences in chemical and instrumental analysis
- Apply theory and operational principles of analytical instruments
- Demonstrate practical aspects of theoretical principles discussed in the Chem 3000 course

## Experiment grading rubric - percent relative error vs. numerical grade

Score	% relative error	Score	% relative error
100	0.00	69	7.50
99	0.10	68	8.00
98	0.20	67	8.50
97	0.30	66	9.00
96	0.40	65	9.50
95	0.50	64	10.00
94	0.60	63	10.50
93	0.70	62	11.00
92	0.80	61	11.50
91	0.90	60	12.00
90	1.00	59	12.60
89	1.20	58	13.20
88	1.40	57	13.80
87	1.60	56	14.40
86	1.80	55	15.00
85	2.00	54	15.60
84	2.20	53	16.20
83	2.40	52	16.80
82	2.60	51	17.40
81	2.80	50	18 and above
80	3.00		
79	3.40		
78	3.80		
77	4.20		
76	4.60		
75	5.00		
74	5.40		
73	5.80		
72	6.20		
71	6.60		
70	7.00		

cut off for regrading

### Chemistry 3005 Laboratory Schedule (Fall 2019)

Monday Section	Thursday Section	Monday Section	Thursday Section
Aug. 26 No Lab	Aug. 29 No Lab	Sept. 2 No Lab Labor Day	Sept. 5 Lab Check-In, Lab Safety Review, Lab Basics, cleaning glassware, dry iron ore
Sept. 9 Lab Check-In, Lab Safety Review, Lab Basics, cleaning glassware, dry iron ore	Sept. 12 Lab Skills - Proper weighing, pipetting and burette reading; Begin Experiment 1 digestions	Sept. 16 Lab Skills - Proper weighing, pipetting and burette reading; Begin Experiment 1 digestions	Sept. 19 Experiment 1: Determination of Iron in an Ore, perform titrations
Sept. 23 Experiment 1: Determination of Iron in an Ore, perform titrations	Sept. 26 Experiment 2: Water Hardness, perform titrations	Sept. 30 Experiment 2: Water Hardness, perform titrations	Oct. 3 Week 1 of Rotating Labs Experiments 3-8
Oct. 7 Week 1 of Rotating Labs Experiments 3-8	Oct. 10 Week 2 of Rotating Labs Experiments 3-8	Oct. 14 Week 2 of Rotating Labs Experiments 3-8	Oct. 17 Week 3 of Rotating Labs Experiments 3-8
Oct. 21 Week 3 of Rotating Labs Experiments 3-8	Oct. 24 Week 4 of Rotating Labs Experiments 3-8	Oct. 28 Week 4 of Rotating Labs Experiments 3-8	Oct. 31 Week 5 of Rotating Labs Experiments 3-8
Nov. 4 Week 5 of Rotating Labs Experiments 3-8	Nov. 7 Week 6 of Rotating Labs Experiments 3-8	Nov. 11 Week 6 of Rotating Labs Experiments 3-8	Nov. 14 Week 7 of Rotating Labs Experiments 3-8
Nov. 18 Week 7 of Rotating Labs Experiments 3-8	Nov. 21 Week 8 of Rotating Labs Experiments 3-8	Nov. 25 Week 8 of Rotating Labs Experiments 3-8	Nov. 28 No Lab - Thanksgiving!
Dec. 2 Lab Final Quiz and Checkout Section 001 End of Labs	Dec. 5 Lab Final Quiz and Checkout Section 002 End of Labs		