

Analytical Chemistry: CHEM 321L

Spring Semester 2015

Laboratory Syllabus

Class Schedule

Laboratory Meeting Time: T (8:00-10:50 am), W (2:00-4:40 pm), or R (2:00-4:40 pm)
Location: S-050

Staff

Professor: Stephen F. Wolf
Office: Science Building, Room 051K
Office Phone: 812.237.2236
Office Hours: MWF 10-11 or by appointment
Email: wolf@indstate.edu

Course Description

Chemistry 321L is the laboratory counterpart to Analytical Chemistry CHEM 321 and serves to provide students practical hands-on experience with many of the most fundamental techniques and methods that are the foundation of classical quantitative analytical chemistry. The course covers the application of statistical analysis to experimental data, gravimetry, titrimetry, electrochemistry, chemical separations and an introduction to spectroscopy.

- Prerequisites: prior successful completion of CHEM 106 and CHEM 106L
Co-requisite: current enrollment in or prior successful completion of CHEM 321
- Course credit: 1 credit hour

Required Course Material and Equipment

- Textbook: Fundamentals of Analytical Chemistry - 9th Edition, D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, Brooks/Cole, Belmont, CA, U.S.A. (2014) ISBN-13: 978-0-495-55828-6.
- Calculator: You will need a handheld scientific calculator with the capacity for scientific notation, logarithms (log and ln) and exponentiation (e^x , 10^x , y^x).
- Scientific notebook
- Safety glasses
- Lock
- Appropriate attire
- Sharpie permanent marker

A dedicated scientific notebook is required for documenting your work in CHEM 321L. This notebook should be bound and contain non-perforated pages. The ISU bookstore stocks composition notebooks that are acceptable.

Sources of Information

- Prelab lectures
- Textbook
- Additional Handouts
- Class Web Page: <http://carbon.indstate.edu/wolf/chem321/chem321.html>

Sources of Credit

The laboratory course work will consist of performing scheduled laboratory experiments, documenting the work in your laboratory scientific notebook, performing calculations manually and on spreadsheets, and summarizing your experiment in written laboratory reports. There will also be a mid-term and final exam. Your grade (50%) will be based on the quality of your submitted laboratory reports and the accuracy and precision of the results. The mid-term and final exam constitute 40% of your grade. The final 10% will be based on "in laboratory" assessments of your performance including the quality of your Scientific Notebook.

Each laboratory session will start with a prelab discussion. These discussions begin promptly at the beginning of lab. Students who miss the prelab discussion will not be allowed to begin the experiment until they demonstrate a thorough understanding of the background and procedure for the experiment by means of a written or oral quiz. Several laboratory experiments will be graded, in part, on the basis of accuracy and precision of your results. The final laboratory report will be due during the final week of regularly scheduled classes. Laboratory report due dates will be announced in class. Reports will typically be due at the beginning of class one week after completion of the experimental portion of the work. Reports up to a week late will be accepted for partial credit. Reports that are over one week late will not be accepted for credit. Under normal circumstances a report will not be accepted unless you participated in the laboratory portion of the experiment. You will receive instruction on how to format each lab report during the prelab for each experiment.

Credit Breakdown by Category

Lab Reports	50%
Mid-term Exam	20%
Final Exam	20%
In-laboratory Assessment	10%
Total	100%

Letter Grade Assignment

Letter grades will be based on the total percentage of points obtained from the above sources of credit. The tentative scale is:

Letter Grade	Percent Score
A+	Score \geq 96%
A	$92\% \leq$ Score $<$ 96%
A-	$88\% \leq$ Score $<$ 92%
B+	$84\% \leq$ Score $<$ 88%
B	$80\% \leq$ Score $<$ 84%
B-	$76\% \leq$ Score $<$ 80%
C+	$72\% \leq$ Score $<$ 76%
C	$68\% \leq$ Score $<$ 72%
C-	$64\% \leq$ Score $<$ 68%
D+	$60\% \leq$ Score $<$ 64%
D	$56\% \leq$ Score $<$ 60%
D-	$52\% \leq$ Score $<$ 56%
F	Score $<$ 52%

This letter grade assignment scale **may be** modified at the end of the semester on a percentile basis at the instructor's discretion. This correction is **typically** based on the 96th percentile grade for the class with a maximum of a 4% correction. The letter grade assignment scale listed above represents therefore, upper-limits for the final grade assignment scale. A final grade of "A+" can only be earned if your final percent score exceeds 96%.

Preparation

It is important that you arrive to each lab on time and prepared. Prepare for each lab by reading the prelab material and familiarizing yourself with the experiment. You must attend all of the prelab discussions. These discussions begin promptly at the beginning of class. Students who miss the prelab discussion will not be allowed to begin the experiment until they demonstrate a thorough understanding of the background and procedure for the experiment by means of a written or oral quiz.

Attendance

Students who are in good health are expected to attend all laboratory sessions. However, if you are ill and potentially contagious, please do not attend class. You will be given opportunities to make up material missed due to legitimate illness. If you know ahead of time that you will not be able to attend a class, laboratory, or exam, please inform me before the absence occurs and as soon as possible. In cases of last minute emergencies, please inform me as soon as you are reasonably able. Experiments can be made up when there is a legitimate reason for missing the lab and with consent of the instructor. ***However, under normal circumstances no more than two laboratories may be made up during the semester.***

Maintaining a Safe Working Environment

Always follow the laboratory safety rules specified in prelab lectures, safety handouts, and as posted in the laboratory. Eye protection must be worn at all times after the prelab lecture. Appropriate clothing is required to work in the lab. All chemical spills need to be cleaned up immediately in order to minimize injury to others as well as to maintain laboratory equipment. Before leaving the laboratory at the end of each session, be sure to return all equipment and chemicals to their proper place and clean up your work areas.

Schedule of Experiments*

Experiment	Title
Check-in	Laboratory Introduction: Safety, Check-in, and Scientific Notebooks
1	Quantitative Techniques
2	Pipet Calibration
3	Gravimetric Determination of Cl-
4	Evaluation of Analytical Data Using Microsoft Excel (Computer Lab)
4	Preparation and Standardization of a NaOH Solution and Pooling Group Data
5	Identification of a Polyprotic Acid via Titration
6	Ion Selective Electrodes
7	Atomic Absorption Spectrometry
8	UV Vis Spectrometry
9	Gas Chromatography

*This schedule of experiments is tentative and the experiments performed and/or their order may change as deemed appropriate by the instructor. Handouts for each laboratory experiment will be provided in lecture on the Monday of the week that the experiment is scheduled.