

CHEM 220: Analytical Chemistry Lecture

Fall 2025

INSTRUCTOR: Dr. Shannon Stitzel (she/her/hers)

Office: Science Complex 3301C

Email (best way to contact me): sstitzel@towson.edu

I make every effort to reply to emails promptly (typically within one business day).

Emails received after 5:00 PM on Friday can anticipate a reply by the following Monday.

Office Phone: 410-704-2948

Student Hours:

Location: Science Complex 3301C and on zoom by request

Wednesdays 12:30 PM – 1:30 PM

Fridays 10:30 AM – 11:30 AM

Other times by appointment

Internet Communication:

Many important files and other useful information will be posted on Blackboard. You are encouraged to check Blackboard after each class meeting. Additional information will be communicated to you via your university email account. You are advised to check this email account frequently for important updates regarding this course.

CLASS TIME AND LOCATION:

Tuesday and Thursday (9:30AM – 10:45 AM)

Science Complex 2321

COURSE DESCRIPTION:

In this course, we will examine the theory and practice of quantitative chemical analysis. You will learn how professional chemists determine the composition of solutions and materials in both simple and complex samples. Topics include: (1) statistical analysis and effective communication of scientific data, (2) equilibria in aqueous solutions (including activity effects, polyprotic acids/bases, buffers, and titrations), (3) chromatographic separations, (4) spectrophotometry, and (5) electrochemistry.

REQUIRED MATERIALS

Items denoted with a hash mark (#) must be brought to each class session.

- Textbook: *Quantitative Chemical Analysis*, 10th edition, by Harris and Lucy.
ISBN-10: 1319164307; ISBN-13: 978-1319164300.
 - This textbook is also required for CHEM 310, so I advise against renting this book if you plan to enroll in CHEM 310 in the future.
- The PointSolutions App with active subscription (available at [Google Play](#) and [iTunes Store](#)).#
 - Your app *must* be linked to a registered subscription in order for your entries to be saved. Details on how to create a PointSolutions account and purchase a subscription can be found here: <https://support.echo360.com/hc/en-us/sections/17523764667149-Participant>
- Scientific or graphing calculator#
 - Phones may *not* be used as a calculator during exams.

COURSE PREREQUISITES

Grade of "C" or better in General Chemistry II lecture (CHEM 132) and laboratory (CHEM 132L).

CHEM 220 assumes you have a **working knowledge** of several concepts from general chemistry, including concentrations (e.g., molarity), unit conversions, stoichiometry, and chemical equilibria (e.g., strong/weak acid-base reactions). To check your understanding of these concepts, I strongly encourage you to complete the ***Prerequisite Skills Packet*** (available on Blackboard), which includes suggested Refresher Readings to help you review key ideas. We will rely on these concepts throughout the course, beginning with the first problem set. Therefore, I recommend that you work through the *Prerequisite Skills Packet* by the first week of the semester.

COURSE OBJECTIVES

After completing this course, you should be able to:

- Apply the analytical process to solve quantitative chemical problems
- Describe how analytical chemists can collect and evaluate data for quantitative analyses, including assessments of accuracy, precision, linearity, and sensitivity
- Analyze data sets using appropriate statistical techniques and error propagation
- Calculate the concentrations of chemical species under equilibrium conditions in aqueous solutions, including corrections for activity coefficients
- Explain the main principles of chromatography, electrochemistry, and spectrophotometry

ATTENDANCE POLICY

Most lecture sessions will include graded in-class questions (via PointSolutions App) for which attendance is required. **No make-up** assignments will be given. Some material covered in class is not covered in the textbook and may appear on exams. If you must miss a lecture, it is your responsibility to contact a colleague (and to check Blackboard) to obtain copies of any missed material.

Out of respect for your busy schedules, the instructor makes it a priority to start class on time and to finish class on time. Please demonstrate mutual respect for your classmates and for the instructor by arriving to class on time and remaining for the duration of each class. If an unavoidable circumstance requires you to arrive late or leave early, please inform the instructor (ideally in advance) via email.

POLICY CONCERNING ELECTRONIC DEVICES

Research has shown that taking notes *by hand* improves learning relative to typing notes on an electronic device (e.g., a laptop). Research has also shown that using electronic devices during class can significantly decrease your performance on exams and adversely affect the performance of your classmates. Therefore, except when responding to in-class questions, the **use of electronic devices** (including, but not limited to, cell phones, earbuds, and computerized watches/wristbands) **during class is prohibited**. Cell phones must remain in silent mode. Students violating this policy will be asked to leave and grade reductions may be imposed.

CLASSROOM DIVERSITY AND INCLUSION

The students, faculty, and staff at Towson University represent a diverse and vibrant community of learners and scholars. As a community, we value the unique contributions of each individual and promote active participation in all aspects of the learning process by each community member. Your instructor supports Towson University's goal of fostering a diverse and inclusive educational setting. Your instructor strives to create an educational environment built upon the principles of mutual respect and support. Toward this end, all members participating in this course are expected to demonstrate respect for all other members of the class, both within and outside of the classroom. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liaison, [Dr. Cindy Zeller \(czeller@towson.edu\)](mailto:Dr. Cindy Zeller (czeller@towson.edu)).

For further information regarding the diversity and inclusion policies of Towson University, please see [Towson University's Office of Inclusion and Equity](#), [the Fisher College of Science and Mathematics Diversity Action Plan](#), and the [Chemistry Department Diversity Action Plan](#).

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

If you may need an accommodation due to a disability, please contact me privately as soon as possible to discuss your specific needs. A memo from Accessibility & Disability Services is required. It is your responsibility to present this paperwork in a timely fashion and to follow-up regarding accommodations that require my participation (e.g., testing accommodations). If you think accommodations might be appropriate, you are encouraged to contact Accessibility & Disability Services (Phone: 410-704-2638 or <https://www.towson.edu/accessibility-disability-services/>).

ACADEMIC INTEGRITY

The reputation of Towson University and the intrinsic value of your academic degree hinge on the personal integrity of each member of the TU community. Toward this end, your instructor assumes a proactive role in preventing and reporting academic integrity violations. Examples of academic integrity violations include, but are not limited to, all forms of: cheating, plagiarism, unauthorized collaborations, alteration of graded assignments, forgery, falsification of data, lying, facilitating academic dishonesty, and unfair competition. You are encouraged to review the entire [Student Academic Integrity Policy](#).

Unless explicitly authorized by the instructor, you may not reference, review, or otherwise rely on assignments (including, but not limited to, problem sets and exams) authored by others, including assignments authored by students who were enrolled in CHEM 210 or CHEM 220 in a previous semester.

For *some* activities in this course, collaboration with your colleagues is encouraged. Examples are provided below to clarify what levels of collaboration are acceptable.

Acceptable Collaboration Activities:

- Working in groups to determine what key concepts or general strategies may be relevant to a problem set question. Then, each member of the group works alone when preparing their responses to the assignment.
- Answering a colleague's question in a manner similar to how the instructor would answer the question (i.e., helping your colleague to understand the concepts *without* giving away the answers).
- Working in groups on ungraded practice problems.

Unacceptable Collaboration Activities:

- Viewing another student's final version of a problem set.
- Asking a colleague questions similar to, "Is this the final answer you arrived at?"
- Seeking (or providing) answers to exams.
- Consulting with a colleague on clicker questions designated to be completed individually.
- Using spreadsheets that you did not develop.
- Submitting work that does not reflect your *individual* effort and understanding.

All academic integrity violations will be penalized (up to and including a grade of "F" for the course for each student involved). Letters detailing the specifics of any academic integrity violations will be entered into the academic file of each student involved in such conduct, which may result in additional sanctions (e.g., suspension or expulsion from the university). If you have questions regarding how best to avoid academic integrity violations, please consult with your instructor.

LECTURE TOPICS

Topic	Textbook Chapter*
Introduction to Chemical Analysis	Chapters 0 and 1
Calculating, Propagating, and Reporting Uncertainty	Chapter 3
Statistics for Analytical Measurements	Chapter 4
Quality Assurance and Calibration Methods	Chapter 5
Ionic Strength and Activity Effects	Chapter 8
Buffers	Chapter 9 (primarily section 9.5)
Polyprotic Acids and Bases	Chapter 10
Acid-Base Titrations	Chapter 11
Analytical Separations and Chromatography	Chapter 23
Spectrophotometry: Absorption of Light by Molecules	Chapter 18
Electrochemistry	Chapter 14

* Reading Assignments: The reading assignments associated with each chapter are provided in the reading guides, which will be posted on Blackboard in the "Recommended Readings and Problems" section.

EVALUATION AND GRADING

The contributions to final course grades are as follows:

<i>Evaluation Item</i>	<i>Point Contribution to Course Grade</i>
Problem Sets (9 + Syllabus quiz)	40
In-Class Questions (PointSolutions)	115
Exam 1 (Thursday Sept. 18 th)	100
Exam 2 (Tuesday Oct. 14 th)	100
Exam 3 (Tuesday Nov. 4 th)	100
Exam 4 (Tuesday Nov. 25 th)	100
Cumulative Final Exam (Thursday Dec 11 th , 8:00 AM)	145

Problem Sets: Approximately nice graded problem sets will be given during the semester, in addition to a syllabus quiz. Problem sets will be graded for completion. Problem sets will be submitted to our Blackboard course and are due *at the specified date and time listed* for each assignment. **Late problem sets will not be accepted. No make-up problem sets will be given.** You are, however, welcome to submit problem sets early.

In-Class Questions: The purpose of this is to give you extra problem-solving practice, additional review for exams, and immediate feedback on the effectiveness of your studying. You must be present to receive credit for in-class questions. **No make-up questions will be given.** Most class meetings will include

several in-class questions. In-class questions will require the use of the PointSolutions App (see Required Materials on page 1). A maximum of 115 points can be earned for in-class questions, which includes participation points and accuracy points.

Exams: Exam dates are shown in the table above. **No make-up exams will be given.**

- Exam Expectations: To minimize distractions, the instructor reserves the right to deny entry into exams for any student arriving late. During exams, students may not leave the room and must remain in their seats at all times prior to submitting their exam unless permission to leave is given by the instructor. Students may not access any electronic devices during exams (excepting approved calculators). Students in violation of these policies will receive a grade of "zero" on the exam and may be subject to additional academic penalties described in the Academic Integrity section above.
- Missed Exams: If you miss an exam due to an unavoidable circumstance (e.g. illness), your percentage score earned on the final exam will replace the percentage score for the missed exam. FYI, leaving campus early for travel is NOT an acceptable reason to miss an exam. You must contact Dr. Stitzel via email within 24 hours of missing an exam to explain your circumstances (or before the exam if circumstances allow). Lack of timely communication will result in a grade of "zero" for a missed exam.

Final Exam

The final exam is cumulative and comprises the multiple-choice ACS Analytical Chemistry exam scheduled for **Thursday, December 11th at 8 am.**

RE-GRADE POLICY

If you believe a grading error has been made on an exam or on any other graded assignment, you must notify the instructor via email *within 2 days* of receiving the grade. In your email, you must clearly explain your rationale for requesting that the exam or assignment be re-graded. If a re-grade request is accepted, the instructor reserves the right to carefully re-grade the entire exam or assignment.

FINAL COURSE GRADES

Final grades will be assigned based on the following scale. There is no "curve" for this course. As such, you are not in competition with your colleagues.

≥ 93.0 %	A	≥ 77.0 %	C+
≥ 90.0 %	A-	≥ 70.0 %	C
≥ 87.0 %	B+	≥ 67.0 %	D+
≥ 83.0 %	B	≥ 60.0 %	D
≥ 80.0 %	B-	< 60.0 %	F

Important Dates to Remember:

Withdraw Deadline	11/03/2025 (Monday)
Thanksgiving Break	11/26/2025 – 11/30/2025
Final Day of Classes	12/08/2025 (Monday)
Final Exam	12/11/2025 (Thursday) 8:00 AM

COPYRIGHT NOTICE

Your instructor retains all copyrights to all original materials distributed in this course, including (but not limited to) hard copies and electronic copies of: lecture slides, notes, practice problems, worksheets, assignments, answer keys, and exams. Reposting, selling, or otherwise distributing these materials in any fashion at any time is prohibited.

POTENTIALLY USEFUL RESOURCES AT TU

- Natural Sciences Tutoring: <https://www.towson.edu/tutoring-learning/course-support/tutoring/natural-science.html>
- Tutoring and Learning Center: <https://www.towson.edu/tutoring-learning/>
 - *NOTE:* You are expected to fully attempt all problem set questions (or any other graded assignment) before tutoring staff at TU will assist you. The staff can help clarify concepts, but they will not solve graded problems for you, which would disadvantage you in preparation for exams. In short, do not let anyone do the thinking for you.
- Academic Advising Center: <https://www.towson.edu/academicadvising/>
- Department of Chemistry & Forensic Science Homepage: <http://www.towson.edu/chemistry/>

SYLLABUS SUBJECT TO CHANGE

Although your instructor strives to adhere to the syllabus in its current form, all information, schedules, and policies outlined herein are subject to change. Any changes will be announced via email and/or via Blackboard.