

# CHEM 3451 Quantitative Analysis

## Fall 2025

### Course Description

CHEM 3451 Quantitative Analysis introduces students to the theory and practice of the quantitative aspects of the basic analytical chemistry. Topics to be discussed in lecture include solution preparation, statistical analysis, equilibrium calculations, titration analysis, electrochemistry, spectrophotometry, and introductory instrumental analysis.

(Notice: CHEM 3451 requires extensive calculations based on chemical equilibriums)

### Communication

Instructor: Dr. Timothy Stephens

Office Hours: Tuesdays and Thursdays 11:00 am - 12:00 pm in Chemistry 264.

Email: [Timothy.Stephens@unt.edu](mailto:Timothy.Stephens@unt.edu)

If you have a private question, please contact me via email only and I will respond within 24 hours on weekdays (usually sooner). Please do not expect a response over the weekend.

**DO NOT use Canvas Inbox to contact me. Messages sent in Canvas will not be read.**

When emailing your Instructor or TA, you MUST include your Full Name and Course Number to receive a response.

My primary means of communication with the entire class will be through the Announcements feature of Canvas. Your TA will also be utilizing this feature for mass communications throughout the semester.

### TA Information

Name: MK Altafi

Email: [MohammadKazemAltafi@my.unt.edu](mailto:MohammadKazemAltafi@my.unt.edu)

Office Hours: Tuesdays 1:00 - 2:00 pm in Chemistry 362, Thursdays 12:00 - 3:00 pm in Chemistry 231 (CRC)

## Required Texts, Technology, and Other Materials

- "Fundamentals of Analytical Chemistry", 10th edition, by Skoog, West, Holler, and Crouch
- You are required to have a stable internet connection to upload all homeworks. Internet outages and unstable connections will not grant extensions on assignment due dates.
  - If you do not have access to a stable internet connection at home, or you are unsure if your connection is stable, you are always welcome to utilize the computers available on the UNT Denton campus to complete your assignments.

## Course Objectives

Upon successful completion of this course, learners will be able to (*numbered in order of presentation*):

- Introduce Quantitative Analysis (QA) as a measurement science that bridges various scientific disciplines and applies to wide range of real-life applications.
- Enhance understanding of statistical analyses and quality assurance applications.
- Learn practical applications of various volumetric and gravimetric analyses.
- Introduction of modern instrumental analyses and its applications.

## Grading

Grading is based on the exams and homework extra credit. Exams are weighted as follows:

Regular Exams: 60 % of final grade

Homework: 20 % of final grade

Final Exam: 20 % of final grade

Final percent Average   Letter Grade

90.00 – 100.+ %        A

80.00 – 89.99 %        B

70.00 – 79.99 %	C
60.00 – 69.99 %	D
Below 60.00 %	F

The percentages listed on Canvas will always be an incorrect representation of your grade in the course. The reason for this is because Canvas does not count missed assignments when calculating your percentage in the course. If you miss a lot of assignments, but do well on one or two, Canvas will list the assignments you completed and will show a high percentage in the course. This is incorrect because I look at the total number of points that you earned. Meaning that if you miss an assignment, those zero points are still calculated in your total points earned. To see an accurate representation of your grade in the course, you will need to add up all the points you have earned on Canvas and divide by the total points available for all the assignments up to that point in the semester.

## Late Work

**I will not accept late work in this course.** Canvas will lock submissions for an assignment once the due date has passed. Extensions will only be granted if a student has a [university-excused absence](#) and provides documentation within one week after the due date has passed.

## Attendance

Class attendance is required and will be monitored periodically. Students who miss the class are responsible for all the missed class materials that may not be addressed by the instructor in a subsequent class.

## Exam Attendance

Plan your schedule accordingly. If you must miss an exam, permission (with proper documentation) must be obtained in advance. Medical absence requires proper doctor's statement and follow UNT Authorized Absence Policy. (06.039 Student Attendance and Authorized Absences)

Once a student has turned in their exam, no other copies of the exam will be distributed. If a student arrives to the exam after the first student has turned in their exam, their absence from the exam will not be excused.

## Grade Disputes

You are required to wait 24 hours before contacting me to dispute a grade. Within that time, I expect that you will review the assignment details and reflect on the quality of the work you turned in. If you would still like to meet, email me to set up a meeting (I cannot discuss grades over email). You should come to our scheduled meeting with specific examples that demonstrate that you earned a higher grade than you received. If you miss your scheduled meeting, you forfeit your right to a grade dispute. If you do not contact me to schedule a meeting within seven days of receiving your grade, you also forfeit your right to a grade dispute.

## Homework

Homework will be assigned in Canvas. Submit your completed homework in Canvas. No credit will be given for late homework or direct copy from solution manual. Due dates for assignments will be announced in class so that they are due approximately one week after the completion of the material.

## Tips on How to do well in CHEM 3451

1. Team study is a proven effective way to do well in this class. Find a COVID-safe way, make friends and work together now!
2. Pre-view (i.e. read ahead, preview lecture related materials on Canvas) the chapter(s) before attending the class, especially for new concepts like statistical analysis, etc.
3. Get familiar with your textbook! Look what is included in Appendixes including \*Solutions to Exercises; \*Answers to Problems.
4. To excel in Quantitative Analysis (Analytical Chemistry) requires 1) understanding the important concepts, 2) apply them to “hand-on” problem solving exercises that often requires calculations with chemical equilibrium concepts.
5. Our lecturing time is rather limited. Both important concepts and selected examples will be covered in the class. However, do not expect all types of questions tested will be covered exactly in the class. It is simply NOT possible to cover all types of calculations and problems within the limited class time. It is your responsibility to work on all problems as described in 6 and 7 below. We will be happy to provide as much help possible per requests.

6. What will be tested from textbook? Study chapter examples (covered the answer, verify your understanding of the problem, Do you know how to solve the problems?). Do the Test Yourself after each chapter examples. Practice on Exercises and verify the answers at the end of the book. Work on Assigned Problems and verify with answers from a solution manual. Mark/collect those problems you have difficulty with for the quick review/practice right before the exam.
7. What will be tested other than textbook?
  1. Lecture examples (take notes)
8. Most of exam problems (>70%) will be taken from 6 and 7. Exam questions may not copy exactly, but will be similar. Remaining 20- 30% will be from lecture examples and other sources.
9. Practice before exam: Before the exam, make up a simulated exam (put in some of those marked problems you have difficulty earlier) and give yourself one hour and half on the simulated exam.
10. Helpful tip! After each exam, make sure you understand the relevant subjects you may miss and can really do the old exam problems. Make good correction notes will be handy for the comprehensive final exam, where some selected old exam questions with slight modification may be tested again.

## Schedule

Week	Topic	Note
1	Chapter 1, 2	
2	Chapter 3	
3	Chapter 4	
4	Chapter 5	<b>Exam 1: September 11</b>
5	Chapter 6	
6	Chapter 7	
7	Chapter 8	<b>Exam 2: October 2</b>

8	Chapter 9	
9	Chapter 10	
10	Chapter 11	
11	Chapter 12	<b>Exam 3: October 30</b>
12	Chapter 15	
13	Chapter 16	
14	Chapter 17	<b>Exam 4: November 20</b>
15	Review for Final Exam	
16	Final Exam (Comprehensive)	<b>December 11th 8:00 am - 10:00 am</b>

## Academic Integrity

Academic integrity states that your work and every aspect of your work was produced with the highest of integrity and is free from cheating and plagiarism, that your work does not include any material that was fabricated, that your work and your records were not falsified via forgery, that you did not sabotage another academic's work, and that you did not facilitate another academic in violating academic integrity guidelines. Violating academic integrity policies is sometimes also called academic dishonesty. In this course, you are going to be held to the highest standards of academic integrity. You are going to be expected to uphold these principles with yourself, your fellow students, your TA, and your instructor.

Academic integrity is applied to any submission or activity that has your name on it, regardless of whether you violated these policies or not. Let me walk through an example. You are working on a group project and decide to split the report writing to different sections with each member writing a section. Your section is properly cited, but another section is flagged for a lot of plagiarism violations. Because your name is on that assignment, you are assuming responsibility that the entire assignment is free of any academic integrity violations along with every other group member. That means that every member of the group (including yourself) will be held responsible for the academic integrity violation and you all will share the same punishment for that violation.

## Cheating

UNT defines cheating as the following (Source: [UNT Policy 06.003 Student Academic Integrity](#)):

"Cheating' means the use of unauthorized assistance in an academic exercise, including but not limited to:

use of any unauthorized assistance to take exams, tests, quizzes, or other assessments;

use of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;

use, without permission, of tests, notes, or other academic materials belonging to instructors, staff members, or other students of the University;

dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor;

any other act designed to give a student an unfair advantage on an academic assignment."

Working with a partner or small group to complete assignments is encouraged. Your submission must be your own and in your own writing. Additionally, using resources such as Chegg.com, ChatGPT, other large language or AI models, or even a student's work from a previous semester to complete your assignments is not allowed and will be considered cheating. I also completely understand that there will be times when you need to look something up or find a certain value to complete an assignment. Your instructor will give you these resources throughout the semester as needed to help you with your assignments. If a resource is linked or explicitly listed here on Canvas, it is considered an authorized source for you to utilize for your assignments.

Cheating on exams is far more common in lecture courses. Talking during an exam (except when asking the instructor or TA a question), looking at another student's exam, and copying answers are all considered cheating. Additionally, using unauthorized notes, "cheat sheets," videos, or unauthorized electronic devices will also be considered cheating in this course. Calculators are the only authorized electronic devices allowed during exams.

## Fabrication

UNT defines fabrication as "falsifying or inventing any information, data, or research outside of a defined academic exercise" (Source: [UNT Policy 06.003 Student Academic Integrity](#)). Fabrication of data is a serious offense in any scientific field because it can have

drastic implications for the public. In chemistry, this can include transforming your data to match what you think is expected to happen instead of finding an explanation for what happened. For this course, you will NEVER be penalized for having what you may consider "incorrect data." However, if your data does not seem like it was generated properly, you will be questioned about how your data was acquired. Another common source of fabrication in this course has to do with references on assignments. If you list a reference or state that a source is cited in an assignment, but then that information is not provided in the assignment, that is considered fabrication of your sources.

## Facilitating Academic Dishonesty

UNT defines Facilitating Academic Dishonesty as "helping or assisting another in the commission of academic dishonesty" (Source: [UNT Policy 06.003 Student Academic Integrity](#)). This is one of the most common violations of academic integrity in CHEM 1430 and is one of the hardest for many students to recognize. Most students who are accused of facilitating academic dishonesty do so out of the best of intentions. The best way I know to explain this type of violation is to walk through the following very common scenario that occurs in every chemistry course I have taught. Names are fictitious and are not meant to represent specific students.

Legolas and Gimli work together on every experiment. One week, Gimli is absent from class and missed the explanation for how to do a problem in the homework. Gimli asks Legolas to share his notes so that Gimli can still complete the homework assignment. Legolas emails Gimli the finished homework assignment, which Gimli then submits as his own.

In this scenario, Gimli would be accused of cheating and possible plagiarism because he submitted Legolas' work as his own. Legolas would be accused of facilitating academic dishonesty because he knowingly shared his completed assignment with Gimli, thus facilitating Gimli's cheating. Even though Legolas most likely had the best of intentions in helping his friend, he still violated UNT's policy about facilitating academic dishonesty.

## Forgery

UNT defines forgery as "intentionally falsifying or altering a score, grade, or official academic University record or the signature of another" (Source: [UNT Policy 06.003 Student Academic Integrity](#)). This is probably one of the least common occurrences of an academic integrity violation. It is more common in other courses where assignments are submitted and graded on paper. Because homework assignments are submitted and graded on Canvas, it is nearly impossible for a student to forge their grade or score on those assignments. There have been students who forge signatures for official documentation

and records. The most common form of forgery that I have encountered involved forging a doctor's signature to falsify an excused absence. I have also had students get caught forging a false obituary and funeral program. These violations incur a much harsher penalty than a simple academic integrity violation because these potentially also incur a student code of conduct violation at UNT in addition to the academic integrity violation.

## Plagiarism

UNT defines plagiarism as the following (Source: [UNT Policy 06.003 Student Academic Integrity](#)):

"'Plagiarism' means use of another's thoughts or words without proper attribution in any academic exercise, regardless of the student's intent, including but not limited to:

the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement or citation, or

the knowing or negligent unacknowledged use of materials prepared by another person or by an agency engaged in selling term papers or other academic materials."

Plagiarism is often one of the more difficult aspects of academic integrity to navigate but is also one of the more common forms of academic integrity violations that is reported. The main reason why plagiarism is so difficult for many academics to navigate is because it encompasses the unintentional misattribution of some other work within your own. Below is a link to a series of articles posted on Scribbr that are a great source to learn about the different forms of plagiarism, how to avoid plagiarism, plus the article gives some great tips for how to paraphrase ideas from other sources. To navigate to other articles, there is a menu in the upper left side of each article with links to the others in the series.

Link to Scribbr Articles: <https://www.scribbr.com/category/plagiarism/>

There are many software packages and websites available to help identify potential sources of plagiarism and to help academics avoid the traps of unintentional plagiarism.

For this course, I utilize TurnItIn to assess potential plagiarism. This tool is integrated directly into Canvas. You are welcome to utilize this tool when submitting your work.

Shortly after you submit an assignment with TurnItIn, you will receive a similarity report that will mark passages and phrases that the system believes may have been plagiarized. I promise, as your instructor, to always review these reports before I make any decisions about whether you might have plagiarized or not.

For this class, I wanted to share some of the examples of plagiarism that I have reported to UNT in the past. This is not exhaustive and is meant to be an example of plagiarism specific to this course.

- Direct copying from a Wikipedia article without quoting or using internal citations.
- Attaching an image of a lab partner's hand drawn graph or figure to their data submission.
- Uploading a postlab question response that the student completed in a previous semester before having to drop the course and retake it.
- If you are retaking this course, you do not have permission to upload the exact same material you previously submitted
- Paraphrasing and using the same phrasing as a lab partner in writing the postlab question.
- I understand that there may only be a certain number of ways to state results. This example, the student paraphrased a postlab question that required individual critical thinking and evaluation of the results.
- Not including internal citations for your sources.
- Not including a list of sources that are cited in your assignment.

## Sabotage

UNT defines sabotage as "acting to prevent others from completing their work or willfully disrupting the academic work of others" (Source: [UNT Policy 06.003 Student Academic Integrity](#)). While this violation may seem like something that does not occur often, it can be more common than you might expect because of the second half of the definition clause. "Willfully disrupting the academic work of others," when applied to a chemistry course, it can be as simple as a student being too loud or disruptive when they are asked to lower their voice or stop. (In this example, I want to drive home that being loud in the classroom is completely unintentional for so many scenarios. You will not be in trouble for being loud so long as it is not disruptive to other students work. What makes this an academic integrity issue is if a student is *repeatedly* asked to be quiet so that other students can focus and the loud student refuses to comply.)

## Consequences for Violating Academic Integrity Policies

In this course, I take academic integrity very seriously. Every potential violation of UNT's academic integrity policy will be dealt with in a swift and immediate manner. For every

violation, the student will be notified by their UNT email of the potential violation. That student is then required to respond by email within seven calendar days of the email from your instructor to schedule a meeting to discuss the possible violation. At that meeting, the student will need to bring evidence and support to show that they did not violate UNT's academic integrity policies. Your instructor will present their evidence and consider both sides before deciding on any potential penalties. If penalties are to be sanctioned against the student, the instructor will file a report with the UNT Academic Integrity Officer. Once that report is filed, the student will be notified of any future actions that can be taken. If the student does not respond within seven calendar days from the notification of a possible academic integrity violation, the instructor will file a report with the UNT Academic Integrity Officer and sanction a minimum penalty of zero points for the assignment with no option to resubmit the work for a higher grade.

Students found using ChatGPT or other large language (AI) model to complete their assignments will receive zero points for the entire assignment.

## ADA Accommodation

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking reasonable accommodation must first register with the Office of Disability Access (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with a reasonable accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request reasonable accommodations at any time, however, ODA notices of reasonable accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. For additional information, refer to the Office of Disability Access website at <http://www.unt.edu/oda>. You may also contact ODA by phone at (940) 565-4323.

## Emergency Notification and Procedures

If the university closes due to an emergency, I will post an Announcement on Canvas as soon as possible with instructions for you to complete the missed material. Each

emergency is going to be different, so I will consider what is happening while posting these Announcements. Since the situation may change at a moment's notice, please refer to the most recent Announcement during these emergencies in case I do not have the ability to delete older Announcements in time. If I am unable to access Canvas, I promise to post an Announcement with instructions as soon as I am able.

## Technical Assistance

UNT IT Help Desk

Email: [helpdesk@unt.edu](mailto:helpdesk@unt.edu)

Live Chat: <https://it.unt.edu/helpdesk/chatsupport>

Phone: 940-565-2324

In Person: Sage Hall, Room 330

Hours and Availability: Visit <https://it.unt.edu/helpdesk> for up-to-date hours and availability

For additional support, visit Canvas Technical Help (<https://community.canvaslms.com/docs/DOC-10554-4212710328>)

## Student Support Services

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- Student Health and Wellness Center (<https://studentaffairs.unt.edu/student-health-and-wellness-center>)
- Counseling and Testing Services (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- UNT Care Team (<https://studentaffairs.unt.edu/care>)
- UNT Psychiatric Services (<https://studentaffairs.unt.edu/student-health-and-wellness-center/services/psychiatry>)
- Individual Counseling (<https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling>)

## Other student support services offered by UNT include

- Registrar (<https://registrar.unt.edu/>)
- Financial Aid (<https://financialaid.unt.edu/>)
- Student Legal Services (<https://studentaffairs.unt.edu/student-legal-services>)
- Career Center (<https://studentaffairs.unt.edu/career-center>)
- Multicultural Center (<https://edo.unt.edu/multicultural-center>)
- Counseling and Testing Services (<https://studentaffairs.unt.edu/counseling-and-testing-services>)
- Pride Alliance (<https://edo.unt.edu/pridealliance>)
- UNT Food Pantry (<https://deanofstudents.unt.edu/resources/food-pantry>)

## Academic Support Services

- Academic Resource Center (<https://clear.unt.edu/canvas/student-resources>)
- Academic Success Center (<https://success.unt.edu/asc>)
- UNT Libraries (<https://library.unt.edu/>)
- Writing Lab (<http://writingcenter.unt.edu/>)
- MathLab (<https://math.unt.edu/mathlab>)

## Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)

The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

## Emergency Notification & Procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

## Retention of Student Records

Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student's records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University's policy. See UNT Policy 10.10, Records Management and Retention for additional information.

## Acceptable Student Behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT's Code of Student Conduct (<https://deanofstudents.unt.edu/conduct>) to learn more.

## Rules of Engagement

Rules of engagement refer to the way students are expected to interact with each other and with their instructors. Here are some general guidelines:

- While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis of race, color, national origin, religion, sex, sexual orientation, gender identity, gender

expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law will not be tolerated.

- Treat your instructor and classmates with respect in any communication online or face- to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use “I” statements to share thoughts and feelings. Try not to speak on behalf of groups or other individual’s experiences.
- Use your critical thinking skills to challenge other people’s ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as “YELLING!”
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using “text-talk” unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

See these Engagement Guidelines (<https://clear.unt.edu/online-communication-tips>) for more information.

## Access to Information - Eagle Connect

Students’ access point for business and academic services at UNT is located at: [my.unt.edu](https://my.unt.edu). All official communication from the University will be delivered to a student’s Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail Eagle Connect (<https://it.unt.edu/eagleconnect>).

## Student Evaluation Administration Dates

Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-

reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website (<http://spot.unt.edu/>) or email [spot@unt.edu](mailto:spot@unt.edu).

## Survivor Advocacy

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct. Federal laws and UNT policies prohibit discrimination on the basis of sex as well as sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking and/or sexual assault, there are campus resources available to provide support and assistance. The Survivor Advocates can be reached at [SurvivorAdvocate@unt.edu](mailto:SurvivorAdvocate@unt.edu) or by calling the Dean of Students Office at 940-565-2648