CHEM 345: PRINCIPLES OF PHYSICAL CHEMISTRY

FALL 2025

Instructor: Dr. Tran-Ba (he/him) **Office**: SC 5301J (Office Hours)

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Office Hours: Wednesday & Friday: 11 am – 12 pm; or by appointment (via email)

COURSE TIMES AND LOCATION

Lecture: MWF, 10:00 – 10:50 am in SC 2232 (August 25th – December 8th, 2025)

No Lecture: on September 1st (Labor Day), October 17th (Fall Break), and November 26-28th (Thanksgiving Break)

COURSE COMMUNICATION

The best way to contact me is via my email address. I will do my best to reply to your email as soon as possible (within one business day). Emails received after 5:00 pm or during the weekend will be replied to on the next business day. You are encouraged to check the Blackboard site and email daily for important updates.

COURSE DESCRIPTION

This 3 credits *lecture* course is focused on 'empirical derivations of the unifying physical principles of chemistry. Topics of particular interest include the principles of thermodynamics, chemical kinetics, quantum mechanics and spectroscopy, and their applications in chemical systems. Quantitative problem solving involving integral and differential calculus is emphasized' (*from TU's course catalog*).

COURSE FORMAT

The format of this lecture course typically consists of several different learning modules including new content delivery via a few selected PowerPoint slides, derivation of important equations on the whiteboard, as well as example calculations of representative problems, highly relevant for an exam or quiz. All students are expected to attend the lecture regularly, take notes and ask questions during the lecture, but also study the course materials outside the classroom. Non-graded homework assignments should be addressed by each student because they will assist in learning and owning the course material and content.

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COURSE PREREQUISITE

A grade of '*C*' or better in the following courses:

- General Chemistry II Lecture (CHEM 132) and General Chemistry II Laboratory (CHEM 132L)
- Non-Calculus-Based General Physics I (PHYS 211) or Calculus-Based General Physics I (PHYS 241)
- Calculus for Applications (MATH 211) or Calculus I (MATH 273)

REQUIRED MATERIALS

- Textbook**:** *Physical Chemistry for the Chemical and Biological Sciences*, 3rd edition, by R. Chang
- Scientific calculator (not cell-phone based calculators and similar devices)

Optional: Solution Manual: *Phys. Chemistry for the Chem. & Biol. Sciences*, 1st edition, by Leung & Marshall

COURSE POLICY

Homework Policy. Selected homework questions will be posted on Blackboard as a problem set. I typically post the relevant homework problems before covering a given topic (see *Course Topics*). Even though this course's homework will not be collected for grading, I nevertheless strongly recommend that you work out these homework problems to the best of your ability. This will help you to succeed in CHEM 345. Additionally, I recommend that you devote a separate notebook (can be any format/type) to solve these problems. When preparing for a quiz, midterm or final exam, you will be able to use your notebook as a reference. You are invited to solve the homework questions in a small group (3 students max), or individually. If you work in a group, please make sure that you would be able to solve the problem on your own if asked to do so in an exam or quiz.

Course Attendance. Attending lectures on a regularly basis is *strongly recommended*. Some material covered in class is not covered in the textbook. Importantly, all material covered in class could be covered in a quiz and exam. Therefore, it is your responsibility to obtain copies of any missed material from a colleague if not otherwise available on Blackboard. Make sure also to arrive on time and stay for the entire duration of each class, to avoid missing out on any relevant material for an exam or quiz. If you must leave earlier or arrive later, please email me in advance to notify me about this unavoidable circumstance.

Cell Phone Policy. Any non-emergency use of cell phones such as calling, texting, or using the phone calculator etc. during the lecture is not recommended. You must turn off your cell phone or place it in a silent mode before entering the classroom. The use of a smart phone during the exams will be treated as academic dishonesty and will be strictly sanctioned.

DEPARTMENT POLICY

Statement on Academic Dishonesty. Academic dishonesty is described in Towson University's Student Academic Integrity Policy and is to be followed by all students, faculty, and staff. Any student who is found to be responsible for academic dishonesty will be assigned a penalty up to and including a grade of zero for the involved academic work. And any suspected academic dishonesty will be reported to the department chairperson and to the Office of Student Conduct & Civility Education for further investigation.

Statement on Accommodations for Students with Disabilities. Students with approved accommodations must submit their DSS memos to the instructor *the first week of class*. It is the student's responsibility to present this paperwork and to follow up regarding accommodations that require instructor participation (e.g. testing accommodations). Please contact Disability Support Services with any further questions.

Statement on Classroom Diversity and Inclusion. The students, faculty, and staff at TU 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 a classroom 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. For further information regarding the diversity and inclusion policies of Towson University, please see TU's Strategy 1:Exposure to Diversity, the Fisher College of Science & Mathematics Diversity Action Plan, and the Chemistry Department Diversity Action Plan.

Copyright Notice. Your instructor retains all copyrights to all original materials distributed in this course (including, hard copies and electronic copies of lecture slides, notes, practice problems, assignments, and exams). Reposting, selling, or otherwise distributing these materials in any fashion at any time is prohibited.

Statement on Disruptive Behavior. Disruptive behaviors are not acceptable. When students' behaviors become disruptive to class, students will be removed from the classroom immediately. Depending on the nature and level of disruptive behaviors, the instructor may report students to the CARE team of Student Affairs Office. If the incident occurs before the final withdrawal date, students must withdraw from the course. If the withdrawal period has expired, students will receive the earned grade up to the date on which the incident occurs.

EVALUATION AND GRADING

Grades will be based on 500 pts, earned through quizzes and exams, as shown below:

Evaluation	Description	Contribution to Final Grade
Quiz	Quiz #1 on Friday, September 5th	20 pts
	Quiz #2 on Friday, October 3rd	20 pts
	Quiz #3 on Friday, November 7th	20 pts
Exam	Midterm #1 on Monday, September 22nd	100 pts
	Midterm #2 on Monday, October 13th	100 pts
	Midterm #3 on Monday, December 1st	100 pts
	Final exam on Monday, December 15th, 8:00 am – 10:00 am	140 pts
Total Points		**500 pts**

Midterm Policy. All in-class midterm exams will be taken on the scheduled date, as shown in the table above. All midterm exams are a closed-book; students are allowed to use their own one-page (front-only) hand-written formula sheet. **No make-up exam will be given.** If you miss a midterm exam due to an unavoidable and *documented* reason, your percentage final exam score will also be your percentage score of the missed midterm exam. If you miss a second and third midterm exam, your missed midterm exam scores will be zero.

Quiz Policy. All quizzes will be taken *in-person* on the scheduled date, as shown in the table above. Additional information about the quizzes will be shared with you later in the semester. Please note that **no make-up quiz will be given**. If you miss a quiz due to an unavoidable and *documented* reason, the average score of the other two quizzes will be used to replace the missed score of the quiz. If you miss the second (and the third quiz), the score for the missed quiz will be zero.

Final Exam Policy. The final exam will be taken on the scheduled date and time, as shown in the table above. The final exam is closed-book; students are allowed to use up to four (three midterm & one extra) one-page (front only) hand-written formula sheets. **No make-up final exam will be given**. If you miss a final exam, your grade will be on hold until the final examination has been retaken in one of the subsequent semesters.

Final Course Grade. Final grades will be assigned based on the total points earned in this course. The final letter grades will be based on the grading scale shown below. **Final Course Grade:** Final grades will be assigned based on the total points earned in this course. The final letter grades will be based on the grading scale shown below. There is no 'curve' for this course. For additional details please go to TU's Grades and Grading Policies.

% of Total Points Earned	Minimum Total Points	Final Grade
≥ 90.0	450	A
87.0 – 89.9	435	A^-
85.0 – 86.7	415	B^+
80.0 – 84.9	400	B
75.0 – 79.9	375	B^-
70.0 – 74.9	350	C^+
65.0 – 69.9	335	C
60.0 – 64.9	300	D^+
55.0 – 59.9	275	D
≤ 54.9	Below 275	F

COURSE TOPICS

Topics	Textbook Chapter	Approximate Coverage in Test						
		Qz1	Md1	Qz2	Md2	Qz3	Md3	Final
Gas laws	2	■	■					■
Gas models, equipartition of energy theorem	2-3	■	■					■
First Law of Thermodynamics	4		■					■
Second Law of Thermodynamics	5			■	■			■
Third Law of Thermodynamics	6				■			■
The Gibbs energy	5, 6, 7					■	■	■
Chemical equilibria, Electrochemistry	8, 9, 10						■	■
Chemical Kinetics	12							■

Abbreviations used: Qz – Quiz, Md – Midterm