



College of Arts & Sciences  
Physical Chemistry I - CHEM 4301 - 001 Syllabus

Instructor: Dr. Ram Bhatta

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**Instructional Method: Face-to-Face**

**Class Hours:** MWF 8:00am -8:50am

**Class Location:** Science and Technology Building, Room# 105

Office Hours: M 10am-12pm; W 10am-11am; and by appointment

Office Location: STEM 311Y

### Course Materials

**Textbook:** Physical Chemistry: Thermodynamics, Statistical Thermodynamics, and Kinetics (4<sup>th</sup> ed) by Thomas Engel and Philip Reid (ISBN 9780136781417)

**Homework:** Homework will be assigned online from Pearson's MyLab and Mastering Chemistry.

**Note:** To register for MyLab and Mastering Chemistry, please login to your blackboard and go to your CHEM4301 course home page. Click "Tools" located on the left panel and choose "Pearson's MyLab and Mastering". Follow the instructions thereafter. Once you complete your registration, you will have access to your online homework as well as e-book. Please contact Pearson directly if you encounter with technical difficulties (contact info is given on the last page).

### Course description

Physical chemistry provides the fundamental concepts and organizing principles that underlie all aspects of chemistry and related fields. It develops rigorous and detailed explanations of central, unifying concepts in chemistry and contains mathematical models that provide quantitative predictions. Topics covered include thermodynamics, kinetic theory, solutions and phase equilibria, chemical equilibrium, photochemistry, chemical kinetics and atomic and molecular structures.

### Conceptual topics

- Kinetic theory of gases
- The Maxwell-Boltzmann Distribution
- Equations of state for the ideal and real gases; deviation of real gases from ideal gas behavior
- Understanding of heat, work and internal energy
- Laws of Thermodynamics
- Enthalpy changes; effect of temperature
- Calorimetry: Enthalpy changes and enthalpy of formation.

- Adiabatic and non-adiabatic changes
- Entropy and its determination
- Combining the first and second laws: the Helmholtz energy and the Gibbs energy
- The Gibbs energy for a reaction; temperature dependence
- The thermodynamics of mixing; phase diagram
- Ideal and non-ideal solutions
- The Gibbs energy criterion for chemical equilibrium
- The equilibrium constant for ideal versus real solutions
- Electrochemistry: the Nernst equation
- Basic chemical kinetics: rates of reaction and rate laws
- The integrated rate laws: deriving and using them
- Reaction mechanisms & consecutive elementary reactions
- Rate determining step approximation
- The steady-state approximation
- Reaction dynamics

### **Important policies and resources**

**Academic Accommodations for Persons with Disabilities:** Texas A&M University-San Antonio is committed to providing all students with reasonable access to learning opportunities and accommodations in accordance with The Americans with Disabilities Act, as amended, and Section 504 of the Rehabilitation Act. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Support Services in the Central Academic Building, Suite 210, or at (210) 784-1335 or visit <https://www.tamusa.edu/index.html> or email us at [dss@tamusa.edu](mailto:dss@tamusa.edu). Disabilities may include, but are not limited to, attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability-related needs with Disability Support Services and their instructors as soon as possible.

**Academic Learning Center:** The Academic Learning Center provides free course-based tutoring to all currently enrolled students at Texas A&M University-San Antonio. Students wishing to work with a tutor can make appointments through the Brainfuse online tutoring platform. Brainfuse can be accessed in the *Tools* section of Blackboard. You can contact the Academic Learning Center by emailing [tutoring@tamusa.edu](mailto:tutoring@tamusa.edu), calling (210) 784-1307, or visiting the Central Academic Building, room 202.

**Counseling/Mental Health Resources:** As a college student, there may be times when personal stressors interfere with your academic performance and/or negatively impact your daily functioning. If you are experiencing emotional difficulties or mental health concerns, support is available to you through the Student Counseling Center (SCC). To schedule an appointment call 210-784-1331 or visit Madla 120.

All mental health services provided by the SCC are free and confidential (as the law allows). The Student Counseling Center provides brief individual and group therapy, crisis intervention, consultation, case management, and prevention services.

Crisis support is available 24/7 by calling the SCC at 210-784-1331 (after-hours select option '2'). For more information and self-help resources, please visit [www.tamusa.edu/studentcounseling](http://www.tamusa.edu/studentcounseling)

Emergency Preparedness: JagE Alert is Texas A&M University-San Antonio's mass notification. In the event of an emergency, such as inclement weather, students, staff and faculty, who are registered, will have the option to receive a text message, email with instructions and updates. To register or update your information visit: <https://tamusa.bbcportal.com/>.

More information about Emergency Operations Plan and the Emergency Action Plan can be found here: <https://www.tamusa.edu/about-us/campus-information/safety/university-police-department/documents/emergency-operations-plan.pdf> and <https://www.tamusa.edu/about-us/campus-information/safety/university-police-department/documents/emergency-action-plan.pdf>

Download the SafeZone App for emergencies or call (210) 784-1911. Non-Emergency (210) 784-1900

Financial Aid and Verification of Attendance: According to the following federal regulation, 34 CFR 668.21: U.S. Department of Education (DoE) Title IV regulation, a student can only receive Title IV funds based on Title IV eligibility criteria which include class attendance. If Title IV funds are disbursed to ineligible students (including students who fail to begin attendance), the institution must return these funds to the U.S. DoE within 30 days of becoming aware that the student will not or has not begun attendance. Faculty will provide the Office of Financial Aid with an electronic notification if a student has not attended the first week of class. Any student receiving federal financial aid who does not attend the first week of class will have their aid terminated and returned to the DoE. Please note that any student who stops attending at any time during the semester may also need to return a portion of their federal aid.

Writing, Language, and Digital Composing Center: The Writing, Language, and Digital Composing Center supports graduate and undergraduate students in all three colleges as well as faculty and staff. Tutors work with students to develop reading skills, prepare oral presentations, and plan, draft, and revise their written assignments. Our language tutors support students enrolled in Spanish courses and students composing in Spanish for any assignment. Our digital studio tutors support students working on digital projects such as eportfolios, class presentations, or other digital multimedia projects. Students can schedule appointments through JagWire under the Student Services tab. Click on "Writing, Language, and Digital Composing Center" to make your appointment. The Center offers face-to-face, synchronous online, and asynchronous digital appointments. More information about what services we offer, how to make an appointment, and how to access your appointment can be found on our website at <https://bit.ly/WLDCCenter>.

Meeting Basic Needs: Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students (DOS@tamusa.edu) for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable them to provide any resources they may possess.

Military Affairs: Veterans and active-duty military personnel are welcomed and encouraged to communicate, in advance if possible, and special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the Patriots' Casa in-person room 202, or to contact the Office of Military Affairs with any questions at [military.va@tamusa.edu](mailto:military.va@tamusa.edu) or (210)784-1397.

Religious Observances: Texas A&M University-San Antonio recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes.

The Six-Drop Rule: Students are subject to the requirements of Senate Bill (SB) 1231 passed by the Texas Legislature in 2007. SB 1231 limits students to a maximum of six (6) non-punitive course drops (i.e., courses a student chooses to drop) during their undergraduate careers. A non-punitive drop does not affect the student's GPA. However, course drops that exceed the maximum allowed by SB 1231 will be treated as "F" grades and will impact the student's GPA.

Statement of Harassment and Discrimination: Texas A&M University-San Antonio is committed to the fundamental principles of academic freedom, equality of opportunity and human dignity. To fulfill its multiple missions as an institution of higher learning, A&M-San Antonio encourages a climate that values and nurtures collegiality and the uniqueness of the individual within our state, nation, and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University-San Antonio, in accordance with applicable federal and state law, prohibits discrimination, including harassment, on the basis of race, color, sex, religion, national origin, age, disability, genetic information, veteran status, sexual orientation, gender identity, gender expression, or pregnancy/parenting status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units.

Texas A&M University-San Antonio faculty are committed to providing a safe learning environment for all students and for the university as a whole. If you have experienced any form of sex- or gender-based discrimination or harassment, including sexual assault, sexual harassment, domestic or dating violence, or stalking, know that help and support are available. A&M-San Antonio's Title IX Coordinator can support those impacted by such conduct in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The university strongly encourages all students to report any such incidents to the Title IX Coordinator. Please be aware that all A&M-San Antonio employees (other than those designated as confidential resources such as counselors and trained victim advocates) are required to report information about such discrimination and harassment to the university. This means that if you tell a faculty member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the university's Title IX Coordinator ([titleix@tamusa.edu](mailto:titleix@tamusa.edu), 210-784-2061, CAB 439K). If you wish to speak to a confidential employee who does not have this reporting requirement, you can contact the Student Counseling Center at (210) 784-1331 or visit them in Madla 120.

Pregnant/Parenting Students: Texas A&M-San Antonio does not require a pregnant or parenting student, solely because of that status or issues related to that status, to (1) take a leave of absence or withdraw from their degree or certificate program; (2) limit the student's studies; (3) participate in an alternative program; (4) change the student's major, degree, or certificate program; or (5) refrain from joining or cease participating in any course, activity, or program at the University. The university will provide reasonable accommodations to pregnant students that would be provided to a student with a temporary medical condition and that are related to the health and safety of the student and the student's unborn child. These could include maintaining a safe distance from substances, areas, and activities known to be hazardous to pregnant individuals and their unborn child; excused absences because of illness or medical appointments; modified due dates for assignments; rescheduled tests/exams; taking a leave of absence; and being provided access to instructional materials and video recordings of lectures for excused absences, if these would be provided to any other student with an excused absence. Pregnant/parenting students are encouraged to contact the Title IX Coordinator with any questions or concerns related to their status ([titleix@tamusa.edu](mailto:titleix@tamusa.edu); 210-784-2061; CAB 439K).

Texas A&M-San Antonio has also designated the Title IX Coordinator as the liaison officer for current or incoming students who are the parent or guardian of a child younger than 18 years of age. The Title IX Coordinator can provide students with information regarding support services and other resources.

Students' Rights and Responsibilities: The following statement of students' rights and responsibilities is intended to reflect the philosophical base upon which University Student Rules are built. This philosophy acknowledges the existence of both rights and responsibilities, which is inherent to an individual not only as a student at Texas A&M University-San Antonio but also as a citizen of this country.

#### *Students' Rights*

1. A student shall have the right to participate in a free exchange of ideas, and there shall be no University rule or administrative rule that in any way abridges the rights of freedom of speech, expression, petition and peaceful assembly as set forth in the U.S. Constitution.
2. Each student shall have the right to participate in all areas and activities of the University, free from any form of discrimination, including harassment, on the basis of race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, or veteran status in accordance with applicable federal and state laws.
3. A student has the right to personal privacy except as otherwise provided by law, and this will be observed by students and University authorities alike.
4. Each student subject to disciplinary action arising from violations of university student rules shall be assured a fundamentally fair process.

#### *Students' Responsibilities*

1. A student has the responsibility to respect the rights and property of others, including other students, the faculty and administration.
2. A student has the responsibility to be fully acquainted with the published University Student Rules found in the Student Handbook, Student Code of Conduct, on our website, University Catalog and to comply with them, as well as federal, state, and local laws.
3. A student has the responsibility to recognize that student actions reflect upon the individuals involved and upon the entire University community.
4. A student has the responsibility to recognize the University's obligation to provide an environment for learning.
5. A student has the responsibility to check their university email for any updates or official university notification.

We expect that students will behave in a manner that is dignified, respectful, and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

**University Email Policy and Course Communications:** All correspondence between professors and students must occur via University email accounts. You must have your Jaguar email account ready and working. If it is not working, contact the help desk at [sahelp@tamus.edu](mailto:sahelp@tamus.edu) or at 210-784-HELP (4357). If you don't hear back within 48 hours, contact them again. They have a lot of requests during the first part of the semester, so you may need to follow up with them. Students are expected to access Blackboard for updates on the course announcements and other course materials. Discussions concerning grading/grades will not be addressed through email and will only be discussed during office hours or scheduled appointments.

**Electronic Devices during Exams.** All electronic devices must be completely stored during exams and quizzes, this does not include approved scientific calculators (see course materials). Academic misconduct and attempts to cheat during the exam will be pursued according to Texas A&M-San Antonio code of conduct policy.

**Visitors.** Only students enrolled in the course are allowed in the class. No visitors are allowed.

**AI policy: CHEM4301-001** assumes that all work submitted by students will be generated by the students themselves, working individually or in groups. Students should not have another person/entity do the writing of any portion of an assignment for them, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Texas A&M-San Antonio's standards of academic integrity.

**Tentative lecture schedule. Subject to change\***

Week #	Week of	Chapter	Assignment due
1	Jan 15	First day of class on <b>Jan 17</b> Course Introduction/Review of gas laws	
2	Jan 22	Fundamentals of Thermodynamics (Thermo 1)	HW1
3	Jan 29	Kinetic theory (Thermo 16)	
4	Feb 05	Math related to Thermo 1,16	HW2
5	Feb 12	First law (Thermo 2)	<b>Exam1; HW3</b>
6	Feb 19	State functions (Thermo 3)	HW4
7	Feb 26	Thermochemistry (Thermo 4)	
8	Mar 04	2 <sup>nd</sup> and 3 <sup>rd</sup> laws (Thermo 5)	<b>Exam 2; HW5</b>
9	Mar 11	<b>Spring break – No Classes</b>	
10	Mar 18	Chemical equilibrium (Thermo 6)	HW6
11	Mar 25	Solutions and phase equilibria (Thermo 8, 9)	HW7
12	Apr 01	Electrochemical cells (Thermo 11)	
13	Apr 8	Chemical kinetics (Thermo 18)	<b>Exam3; HW8</b>
14	Apr 15	Complex reaction mechanism; photochemistry (Thermo 19)	HW 9
15	Apr 22	Atomic structure (Quantum 1)	HW10
16	April 29	Last day of class – April 29	<b>Exam 4</b>
	May 1-7	Final exam ( <b>Actual day/time TBD by registrar's office</b> )	

\*Dates, topics and exam coverage are tentative. The instructor reserves the right to make changes as deemed necessary. Please check course announcement on your blackboard for actual schedule and due date.

**The complete academic calendar is available online:**

<https://www.tamusa.edu/academics/academic-calendar/index.html>

**Key Dates**

January 17	First day of CHEM4301-001 class
March 11-17	Spring break-no classes
March 29	Study day-no class
April 13	Last day to drop with an automatic "W"
April 20	Last day to withdraw from the University
April 29	Last day of CHEM4301-001 class
May 1-7	Final exams (Actual date TBD by registrar's office)

**Grading**

Your grade for the course will be assigned based on your performance on exams and homework assignments.

These are the only opportunities for you to earn points throughout the semester. There will be **no** opportunities for extra credit.

Exams: 4 x 100 points each	400 points
Final exam	100 points
Homeworks: 10 x 20 points each	200 points
<b>Total</b>	<b>700 points</b>

To calculate your grade, use the following equation:

$$\left( \frac{\sum(\text{Points earned})}{700} \right) * 100$$

Using the above equation, letter grades will be determined as:

<b>Letter Grade:</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>
% of Total Points:	<b>90.0 - 100%</b>	<b>80.0 - 89.9%</b>	<b>70.0 - 79.9%</b>	<b>60.0 - 69.9%</b>	<b>0 - 59.9%</b>

All homework/exam grades will be posted on Blackboard/Pearson. However, scores and percentages on Blackboard/Pearson are not to be considered as official. Students should use above formula to calculate the overall course grades.

**Exams:** Exams will be done during the class hour. There will be **no makeup examinations for unexcused absences!** Should you miss two or more exams via an unexcused absence a grade of F will be assigned. Should you have a question concerning the way that your examination was graded, or if you think that there was an error in calculation the exam score, then it is your responsibility to bring the matter to the attention of the instructor within three calendar days of the date when your exam was given. The three-day policy applies to all 100-point exams, except the last 100-point examination. Students have until the day of their final examination to bring up grading concerns. No extra examination time will be given, the only time that the students have to work on the examination is the allotted time.

**Late Work Policy.** Work is required to be turned in on time. Late work will not be accepted.



**IMPORTANT.** *Each student receives this information during the first lecture. It is your responsibility to read this material and be familiar with the course content, schedule and grading procedure.*



## Student Registration Instructions for Blackboard

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### First, open Pearson

1. Log in to Blackboard and open your course.
2. To open Pearson, select one of the following for your Blackboard version
  - Any Pearson link in the Content area.
  - **Open Pearson** under Course Content.
  - **Tools** in the left navigation and then:
    - Content Market tools and the Pearson image under Used in this course
    - **Pearson's MyLab & Mastering**
    - **Pearson Access**
  - A link such as Launch courseware, View Course Materials, or Start Studying. These links are provided by partner integrations, including VitalSource, RedShelf, and Barnes & Noble.

Ask your instructor if you need help finding Pearson in your course.

### Next, get access to your course content

1. Sign in to link your Pearson and Blackboard accounts. If you're new to MyLab and Mastering, create an account.
2. Select any available access option, if asked.
  - Enter a prepaid access code that came with your textbook or from the bookstore.
  - Buy instant access using a credit card or PayPal.
  - Select **Get temporary access without payment for 14 days.**
3. Select **Go to my course.**

We recommend you always enter your Mastering Chemistry course through Blackboard.

### Need help?

Make sure your browser is ready. Check the system requirements at <https://mlm.pearson.com/global/system-requirements/>

For Help with Mastering Chemistry for Blackboard, go to <https://help.pearsoncmg.com/integration/cg/blackboard/student/en/>