

**CHE3025, Physical Chemistry I:
Chemical Thermodynamics and Kinetics
Syllabus, Spring 2024, Jan. 8 – Apr. 26**



This semester of Physical Chemistry focuses on thermodynamics, equilibrium, and reaction kinetics. The fundamental goals are to understand *why* chemical systems act as they do, and how to predict what will happen in new situations. Much of this course covers ideas introduced throughout General Chemistry, but with much more detail and rigor to apply to a broader range of circumstances.

Throughout this semester, I strongly encourage you to review class work regularly, practice problems daily and ask as many questions as necessary in order to succeed. Talk to me one-on-one early and often; helping students directly is one my favorite parts of my job.

Dr. Samuel Stoneburner, Assistant Professor

Office: Rohr Science 322 (enter through 330)

Email: sstonebu@pointloma.edu

Phone: 619-849-7230

Lecture location: Latter Hall 2

MWF: 8:30 am – 9:25 pm

Final: Wed., May. 1, 7:30 am – 10:00 am

Communication: I will post information and announcements via Canvas. You should activate notifications. When I am not available in my office, the best way to reach me is by email. I will attempt to respond within one business day.

Drop-in Hours: MW, 1:15pm – 4:00pm (ends 2:30 one Wednesday a month for faculty meetings)

TR, 11:30am – 1:00pm

F, 1:15pm – 2:00pm

You do not need an appointment to meet with me during any of the above hours. If you would like to meet at another time, please email me to schedule an appointment with suggested meeting times.

Prerequisite(s): CHE 2013 (Analytical Chemistry)

PHY 1044 or PHY 2044 (General Physics I or University Physics I)

MTH 1044 or MTH 1064 (Calculus With Applications or Calculus I),

- C– or better in all prerequisite classes strongly recommended

Corequisite(s): CHE 3025L (lab, graded separately)

Course Description: Study of classical physical chemistry that includes thermodynamics, reaction energetics, chemical equilibrium, and reaction kinetics. (3 units)

Course Materials:

- *Textbook:* Engel & Reid, Thermodynamics, Statistical Thermodynamics, and Kinetics Plus Modified MasteringChemistry with eText, Pearson, 4th Edition, ISBN-13: 9780134813455 (hardcover text), 9780134813790 (looseleaf text), or a [Pearson+ monthly subscription](#) (e-text only, cheapest option)
- *Online Homework:* MasteringChemistry mlm.pearson.com/northamerica/masteringchemistry/ (bundled with text or purchased separately). Access through Canvas.
- *CHE 3026 (Quantum Chemistry) uses the Quantum Mechanics textbook of Engle and Reid, which is also included in the Pearson system for this book. If you will be taking that class next semester (if offered), you may want to get a longer subscription to save money. If you still have an active subscription from taking CHE 3026 last semester, that should still work for this book.*

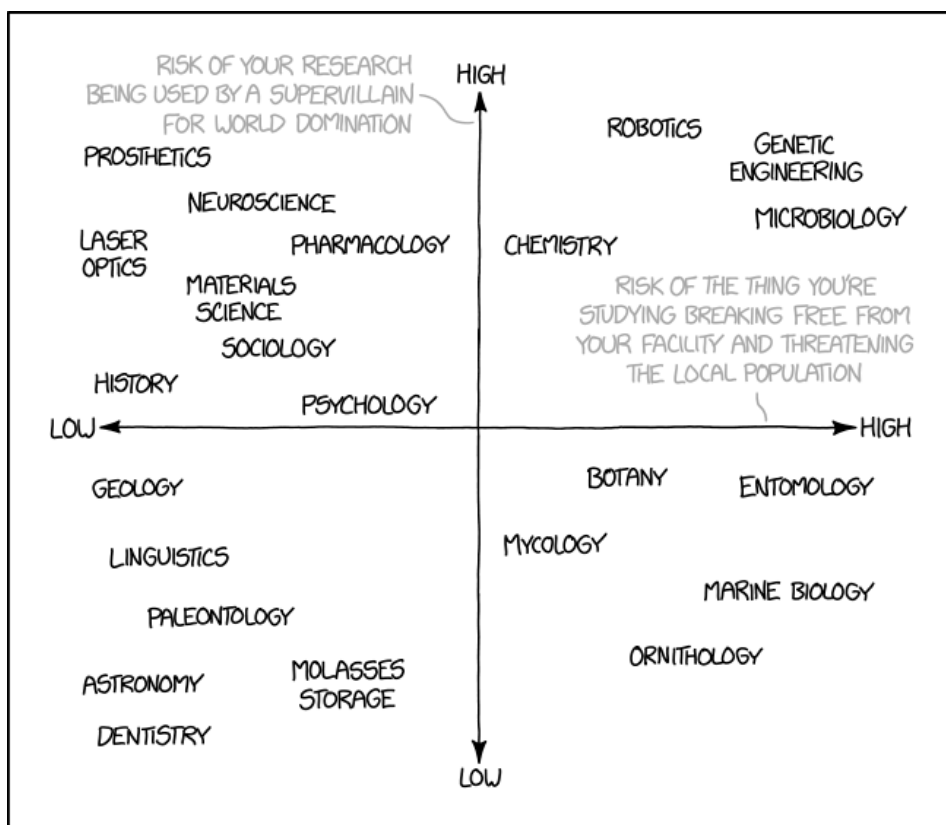
About your professor: I grew up in Michigan in the 1990s. I worked retail for 5 years, got an associate's degree during that time, and spent my spare time doing things like getting elected to the local library board and playing Settlers of Catan (although we never played Catan at board meetings, sadly). While getting my bachelor's degree I majored in chemistry and math, but my most memorable lessons were from seemingly unrelated classes like art and New Testament Greek. I moved to Minnesota for grad school, where I got married, got my four kids, and my Ph.D., in that order. Before coming to Point Loma, I taught at Messiah University in Pennsylvania for three years, most of which was during the pandemic. My hobbies include plotting to take over the entire Tri-State Area and encouraging my children to play more video games.

PLNU Mission: To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Learning Outcomes: Upon completion of this course, you will be able to:

- Appreciate the order and intricacy of God's handiwork in nature.
- Understand fundamental concepts and principles of thermodynamics, equilibrium, and kinetics.
- Explain macroscopic chemical systems in terms of microscopic properties.
- Predict properties and behaviors of chemical systems.
- Solve quantitative chemical problems.
- Identify and explain necessary assumptions or limitations in applying equations or concepts to chemical problems.
- Communicate scientific ideas and results in writing.
- Apply physical chemistry concepts to the benefit of your community.



xkcd.com/1904

Grading and Assessment

Minimum letter grades will be assigned according to the following scheme:

A-range	B-range	C-range	D-range	F-range
A: Any grade of 93.00% or above.	B+: 87.00-89.99 %	C+: 77.00-79.99 %	D+: 67.00-69.99 %	F: Any grade below 60.00% <i>or 9 absences if after Mar. 22</i>
	B: 83.00-86.99 %	C: 73.00-76.99 %	D: 63.00-66.99 %	
A-: 90.00-92.99 %	B-: 80.00-82.99 %	C-: 70.00-72.99 %	D-: 60.00-62.99 %	

Percent	Component
5 %	Attendance
5 %	Reading surveys
5 %	In-class activities (e.g., worksheets)
20 %	Mastering Chemistry online assignments
15 %	Explainer project
30 %	3 Exams (10% each)
20 %	Final Exam
100 %	Total

Extra credit: There are significant opportunities for extra credit built in to the course. There will be a few points available for a brief activity posted on Dr. Stoneburner's office door, and *some* homework assignments and exams may have extra points built in. Some of the assignments will drop the lowest grade(s) as detailed below.

Apart from these, "extra credit", "curving", "rounding up" of the final grade, or dropping of *additional* assignment scores should not be expected or requested. In most circumstances, it would be *highly* inappropriate for an instructor to offer extra credit to individual students.

Attendance: You've been in college for a while, so you know how important it is to show up to class. Our class will involve a mixture of lecture and group activities. If you are not here, you do not benefit from the experience of others, and they cannot benefit from you. [Attendance is required by PLNU policy](#) (discussed in more detail in the Policies section), so I like to give you points for it.

I will be taking attendance on Canvas at the start of every class. If you arrive late, you are responsible to check with me after class to ensure I don't have you absent by mistake. Being late will still get you 90% credit (within the first 20 minutes) and won't be counted as absences for the university attendance policy. To keep things simple as far as illness, emergencies, and athletic travel, I will drop the lowest five attendance entries at the end of the semester. I have to do this manually, so it won't show on Canvas until the end of the semester.

Reading surveys: Every day there is a reading assignment, there will be a survey on Canvas due 10:00pm the evening before where you tell me about any lingering questions you have. I will look at your responses before class (which I need time to do, hence the 10pm deadline) and I will do my best to address your questions in class that morning. I may respond directly on Canvas if I think the question is too specific or off-topic to address during class time.

This assignment is intended to be easy points that reward you for doing the reading while also helping me adjust each class to your needs. You will get credit for any responses that demonstrate reasonable engagement with the material. In other words, the only way to miss these points is to not say anything or to say something overly general like “I didn’t understand any of it” or “I don’t have any questions.” If you feel like you understood everything, tell me what was interesting, or what you are now curious about.

To give you additional flexibility for weeks when you have an exam, a deadline, other life events, or in case you forget once or twice, Canvas will drop the lowest 5 scores. This score *will* be correct throughout the semester.

I urge you to take this assignment seriously. It doesn’t need to take more than a few minutes beyond what you need to do the reading itself, and the questions I get play a large role in what I choose to spend time on during class. This is one of your best opportunities to make class time as useful as possible for you. You can get the most out of it if you apply techniques from [Dr. Sandra McGuire’s “Strategic Learning” video](#) (posted on Canvas) when you do the reading.

In-class activities: Throughout the semester there will be various practice problems and/or group worksheets. These may be scored based on accuracy, completion, or “good-faith effort”, and they may be graded individually or by group. Canvas will drop your lowest 2 scores.

Mastering Chemistry online homework (access through Canvas): The Mastering Chemistry content includes assigned homework problem. Due dates will be found within the Mastering Chemistry system and on Canvas. The deadlines will generally be 11:59pm on Mondays, Wednesdays, and Fridays (with some variances leading up to an exam).

I carefully hand-select assignments to balance two competing concerns: practice in the most relevant concepts and problem types, and the demands on your limited time. Often there were more problems that I wanted to assign than what I felt would be a reasonable amount of work. The extra problems are still in the assignments, but they are graded differently:

- *Extra credit:* If the problem was especially interesting or worthwhile, I classified it as “extra credit”. You can get extra points within your Mastering Chemistry grade for completing those. The Mastering Chemistry grade is *not* capped at 100%, so you may be able to partially make up for low scores elsewhere in the class by doing the extra credit homework problems.

- *Practice*: Other problems didn't feel special enough to give extra credit for them, but they would still be useful for you. The "practice" problems don't get credit, but they are still hand-picked as being relevant for the class. You have access to problems after the assignment is due, so you can use these problems (along with the rest of the assignment) as part of your studying.

The point values for each problem are set based on the system average times in Mastering Chemistry (i.e., you get more points for problems that are expected to take more time). There will not be extra credit problems in every assignment, but they are frequent, and when they are present they are usually worth a substantial number of points. Because there is so much opportunity for extra credit within Mastering Chemistry, there will be no "dropped" scores within the homework.

If you find yourself struggling with a problem repeatedly (e.g., 5 wrong answers to the same problem), you should come to my office hours and ask for help. A notebook with your work on previous attempts to a problem is especially helpful when you are asking for my assistance. Using a notebook also creates a written record that you can consult later as you study or seek assistance, and it can be beneficial in the event of academic integrity questions.

Explainer (public education project): With any course I teach at PLNU, I try to think about how to best connect with Christian identity. For this class, I want us to think about the responsibility we have as scientists to use our knowledge and skills for the betterment of our communities and the people therein. You will do this by identifying some real-world challenge, problem, or opportunity relevant to *your* community that you believe could be addressed in some way using any of the concepts from CHE3025.

You may define "community" as narrowly or broadly as you see fit, whether it is something within your own home or an issue of global scale, but I want you to feel some connection to it. You will then write a detailed explanation of the issue and the relevant physical chemistry concept(s) at a level suitable for the general public. The goal here is not academic formality, it is to get practice in educating nonexperts in scientific ideas that impact them. For an example of the level of helpfulness and (lack of) formality I have in mind, consider [XKCD's "What If?" blog](#).

This project will include two or three stages:

1. Topic approval (5% of overall course grade)
2. First submission of explainer (10% of your overall course grade)
3. Second submission of explainer (can replace first submission if desired, see below)

Topic approval: This will be a *description* of your topic, not an actual draft. I will look over your submission and offer feedback. I may approve it, tell you to change your topic, or approve it conditionally (pointing out potential difficulties and requiring you to either address them in your next submission or pick a different topic). If I raise any potential issues and you continue with that topic, failure to address the issues I raised will lead to a poor score on the main assignment.

First submission: See the Canvas assignment and rubric for specific requirements and criteria. When you submit the explainer, I will grade it as if it is the final submission. If you are satisfied with your grade, you can be done at that point.

Second submission: If you would like to try to improve your grade, you may submit a second attempt based on my feedback. If you make a second submission, I will grade it, and your grade will be whichever of the two submissions has the higher score. (In other words, there is no risk of your grade going down by making a second submission.)

Exams: Exam days are on the course schedule at the end of the syllabus. Exams will not be moved outside of truly extraordinary circumstances. Exams will be open-book, open-notes, open-internet. You may use any calculator or web tools you want, but you may not do anything that involves communication with another person during the exam.

Final Exam: The final exam will be on Wednesday, May 1st, 7:30 am – 10:00 am and will be a closed-book ACS exam, no calculator. PLNU policy is that the final exam is required and that it must be given at the scheduled time. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted. Travel arrangements are *not* a valid reason to request a different time.

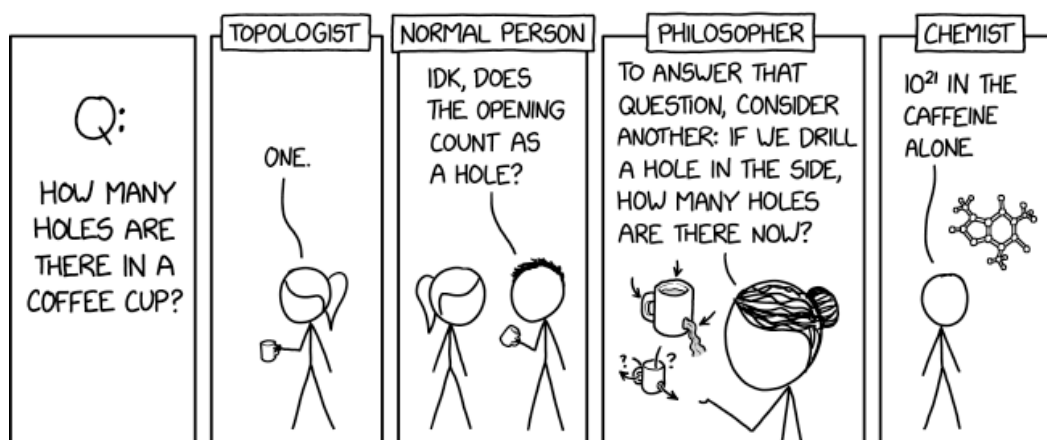
Incomplete grades: Requests for Incomplete grades (where missing work or exams are completed the following semester) are evaluated on a case-by-case basis and hold strictly to [university policy](#), which allows Incompletes “only on the basis of extraordinary circumstances clearly beyond the student’s control.” Below are some examples:

Possible justifications for an Incomplete

- Extensive COVID isolation
- Concussions or similar head injuries
- Chronic medical conditions
- A death in the family

Definitely would not justify an Incomplete

- Vacations
- Weddings
- Non-PLNU competitions
- Anything involving pets



xkcd.com/2658

Additional Notes and Policies

Incomplete/late assignments, and extensions: All assignments are to be submitted/turned in by the due date/time, including assignments posted in Canvas. You are responsible for making sure that your submission is complete and legible *in Canvas* (i.e., “corrupted” files will not be accepted).

Late work will generally not receive credit. However, if you experience an emergency close to the deadline that causes you to miss an assignment, communicate with me as early as possible and an extension may be granted.

I am usually willing to give extensions for major writing assignments, but requests must be made in advance if at all possible, and they will be considered on a case-by-case basis. I especially encourage you to ask for extensions if you need them in the last few weeks of class, where the end of the semester forces the schedule to be tighter in a variety of ways. If you need an extension on an assignment, please email me and suggest a specific new (extended) deadline that you believe would meet your needs.

Exams can be made up in many circumstances, but you must request the make-up. If you are absent on the day of an exam and you do not request a make-up, you will receive a 0. If you are aware in advance that you must be absent at the scheduled time of an exam, arrange a make-up with me as soon as you are aware of the conflict. If you have an emergency or sudden illness on the day of the exam, email me as soon as you are able. Make-ups, when necessary, must generally be taken as soon as possible after the scheduled exam time.

PLNU Attendance and participation policy: Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions (i.e., five absences for CHE 3025), the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent (i.e., nine absences for CHE 3025), the student may be de-enrolled without notice until the course withdrawal date (Mar. 22) or, after that date, receive an “F”.

The attendance grade already allows for a reasonable number of absences (5). Any reasonable accommodations for illness or athletic travel has therefore already been extended to the entire class, and no additional “excused” absences will be given. Please do not submit doctor’s notes, as that will not change the absence and such notes frequently disclose an unnecessary level of personal medical information. Please do not ask the Wellness Center to provide a note, as they do not provide that service. If you have a chronic medical condition that you anticipate may result in multiple absences, please contact the Educational Access Center (EAC) about the possibility of getting an accommodation for attendance.

Technology: The use of portable electronic devices (phones, laptops, iPads, etc.) for purposes related to the course is welcome. Using technology for unrelated purposes during class time is detrimental to your learning and to those around you. Below are some examples:

Acceptable uses of technology in class

- Taking notes
- Viewing lecture slides
- Looking up reference data
- Submitting assignments

Unacceptable uses of technology in class

- Shopping
- Watching Tiktok
- Watching the World Cup
- Doing work for other courses

Using technology to “multitask” during lab time is detrimental to your learning and inconsiderate to those around you. It is also a violation of [PLNU’s academic behavior policy](#) (see below). Repeatedly engaging in irrelevant activity may result in your being asked to leave the class, with a corresponding penalty to your grade. If you have time-sensitive need, such as registering for courses or scheduling an appointment, speak with me beforehand and reasonable accommodations will be made.

PLNU’s course-information website, Canvas (<http://canvas.pointloma.edu>), is used as a repository for course material such as grades and miscellaneous items. **Announcements will be sent out via Canvas. It is your responsibility to check Canvas regularly and to confirm that your correct email address is in the system.** Also, be prepared to interact with your instructor or the Lab Coordinator via your pointloma.edu email address. This means regularly checking your school email.

PLNU academic behavior policy: Both faculty and students at Point Loma Nazarene University have the right to expect a safe and ordered environment for learning. Any student behavior that is disruptive or threatening is a serious affront to Point Loma Nazarene University as a learning community. Students who fail to adhere to appropriate academic behavioral standards may be subject to discipline. In the context of our course, good behavior includes being present in class (mentally as well as physically), actively participating in group work, and asking questions when you need help or clarification. See [Academic Policies](#) in the online PLNU catalog for additional definitions of different kinds of disruptive behavior and for further policy information.

Sexual misconduct and discrimination: Point Loma Nazarene University faculty are committed to helping create a safe learning environment for all students. If you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, I am required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix

Language and Belonging

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may report an incident(s) using the [Bias Incident Reporting Form](#).

Spiritual care: PLNU strives to be a place where students grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If you have questions, a desire to meet with the chaplain, or if you have prayer requests, you can contact the [Office of Student Life and Formation](#).

PLNU academic accommodations policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

PLNU copyright policy: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

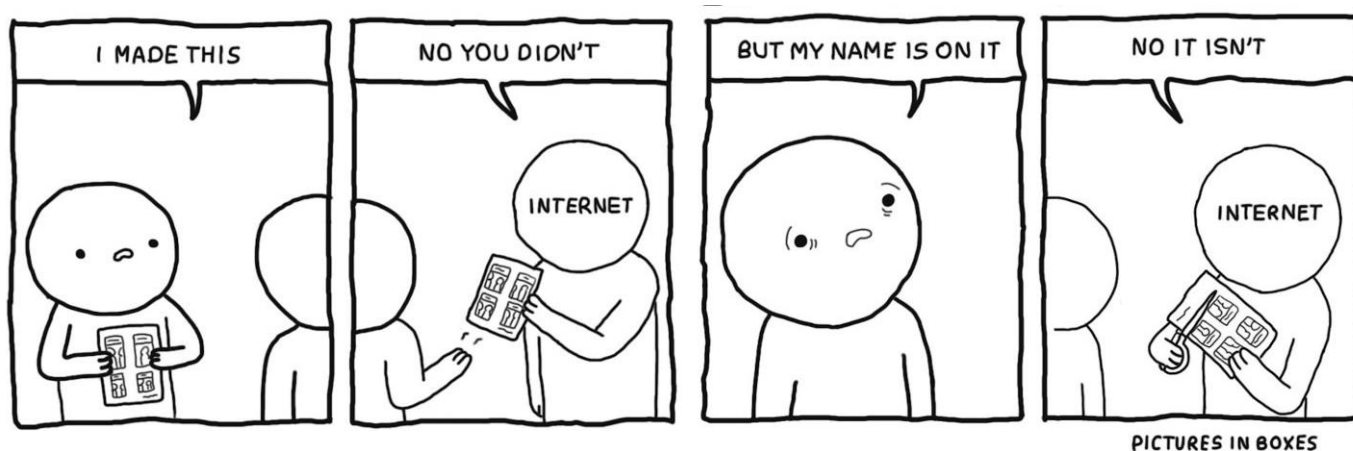
State authorization: State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

PLNU academic honesty policy: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

For written assignments, I strongly recommend keeping a backup set of files that show your draft history. These can be used to demonstrate authorship if questions of academic honesty arise.

Artificial Intelligence (AI) Policy: You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, iA Writer, Marmot, Botowski, etc.) in this course. Any work that utilizes AI-based tools must be clearly identified as such, including the specific tool(s) used. For example, if you use ChatGPT, you must cite ChatGPT including the version number, year, month and day of the query and the statement "Generated using OpenAI. <https://chat.openai.com/>".

Disclaimer: Student experiences thus far seem to suggest that relying on AI for this course is unlikely to work to your advantage.



Academic Success

Physical Chemistry is a challenging course. Doing well may require beyond what has been required in previous courses, and you will need to assess your own understanding frequently. More generally, you should employ *metacognition*, or thinking about your thinking. Ask yourself serious questions about how well you understand what you're studying, not just whether you could pass the next exam. Better yet, ask yourself if you could teach someone else... or *actually* teach someone else, whether it's a study buddy, a friend, a pet, or a rubber duck.

I strongly recommend watching “[Strategic Learning](#)”, a talk given at PLNU in 2022 by Dr. Sandra McGuire. She is an award-winning expert in chemistry and in teaching and learning. In the linked talk, she provides a lot of practical strategies AND a broader way of thinking that will help you figure out where you need to focus your efforts.

A lot of the advice you will get from me or from Dr. McGuire will feel like it will take more time than you can afford. You may actually save time over the semester as you get more practiced in good study strategies, but it is true that Physical Chemistry requires a substantial time investment.

The PLNU Credit Hour Policy states that *2 hours of preparation per 1 hour of class time is “normal”, meaning 5.5 hours per week (besides lecture itself)* for the CHE 3025 lecture course. There is no shame in needing more time. If you work strategically and put effort into learning *how* to learn, you will probably understand the content much better than the student who seems to get all the right answers in the first few minutes of trying.

You can also maximize the effectiveness of your time by giving yourself a focused environment. Do not try to “multitask” with videos or social media while you are working on chemistry. (“Multitask” is a word that really means “doing a poor job of multiple tasks simultaneously”.) I also recommend caution when consulting other resources on the internet. Even outside of the well-known hallucination problems in AI, there is an abundance of misinformation online in general. Much of it is intentional. For example, I've heard from multiple teachers who put fake answers on Chegg to catch cheaters...

Finally, know that I am here to help. If you ask me questions early and often, that goes a long way towards making sure your precious time is spent as productively as possible. I want to see you succeed, and I look forward to participating in that success.

– Dr. Stoneburner