Chemistry 103-06: General Chemistry I

Instructor: Dr. Patrick Lutz (he/him/his), jlutz@stlawu.edu, JHS 315
I generally respond to emails within 24 hours during the week.

Class meetings: MWF, 11:40am–12:40pm, Bewkes 303

Laboratory meetings: M/T/W/Th, 1:00–4:00pm or M/T, 5:00–8:00pm
See Prof. Jennifer Schmeisser (jschmeiss@stlawu.edu) for questions about lab scheduling.

Student hours: Monday, 3:30–5:00pm and Wednesday, 3:30–5:00pm.

Your success in this course is one of my highest priorities. The times listed above are designated as student hours, but if my office door is open (even just a little bit), feel free to knock and I'll try to help out if I have time. You are also welcome to email me to try to schedule another time to meet. If you would prefer to meet virtually, please let me know in advance so that I can make arrangements.

Welcome to General Chemistry! Chemistry is often called "the central science" because it is integral to so many areas of study, including biology, neuroscience, engineering, and environmental science. If you pay attention, you are likely to see many ways that chemistry connects to your life as we move through the semester!

For many students, CHEM 103 is a transition from high school to college learning, with the accompanying increased responsibility and decreased reliance on algorithms. This is more intellectually challenging and results in a deeper understanding of the material. Strive for conceptual understanding, clear articulation, and an ability to engage in chemical problem solving. Per NY State guidelines, for each course, you should expect to spend at least 2 hours working outside of class for every hour spent in class (that means you will likely need to spend at least 6 hours each week on CHEM 103 lecture *at a bare minimum*).

Learning goals:

1. Explain how molecular structure affects physical and chemical properties.
2. Apply physical, mathematical, and theoretical models to chemical phenomena, and evaluate the strengths and weaknesses of these models.
3. Assess the roles of energy and entropy in determining whether chemical and physical processes will occur.
4. Apply quantitative methods to chemical problems.
5. Execute experimental procedures in the laboratory and interpret data to develop scientific arguments and make predictions.

Required texts and materials:

1. SLU Chemistry Department modification of *CHEMISTRY: A Project of the American Chemical Society*. Electronic pdf files are available on Canvas at no cost, and physical copies may be purchased at the bookstore if desired.
2. Molecular model kit: HGS 1003 Alpha Organic Chemistry Basic Set (other model kits will not work for our activities!).
3. SmartWork online homework system subscription.
4. Chemistry department periodic table/constants sheet.
5. Scientific calculator.
6. Safety goggles/glasses.

Gradescope:
You will use Gradescope to receive graded quizzes/exams. You can access the Gradescope page for this course via Canvas or at https://www.gradescope.com/courses/421931.

Course format:
Course meetings will be held in-person (pandemic-permitting). I will endeavor to use a mixture of lecture and other activities; you may occasionally be asked to watch prerecorded lecture videos in order to free up more class time for active learning opportunities. The material in any such videos should be considered a core part of the course and is fair game for assessment on quizzes, exams, etc. unless otherwise noted.

We're (still) in year 3 of a pandemic; things are weird. Please let me know as soon as possible if you will need to miss class so that we can figure out how to keep you on track (and please don't come to class if you're sick!). ***The policies and procedures described throughout this syllabus are subject to change in response to changing circumstances, or just because we discover that some aspect of the course does not work as well as intended.*** Of course, I will communicate any important changes as soon as I can.

Evaluation:
Grades will be determined using the components in the table below.

weekly online homework	10%
10 quizzes	10%
3 midterm exams	35%
final exam	20%
class participation & citizenship	10%
lab assignments	15%

A partial scale for determining final grades is shown below. Note that you *must* take the final to receive a passing grade. Grades are based on your score alone; there is no "class curve" and you are not competing directly against your fellow students. It is possible that I could lower the

grade borders if aspects of the course prove more challenging than anticipated, but I will not *raise* the cut-offs.

4.0	≥ 92%
3.0	≥ 82%
2.0	≥ 72%
1.0	≥ 60%
0.0	< 60%

Note that a minimum grade of 1.75 in CHEM 103 is a prerequisite for enrolling in CHEM 104. CHEM 103 cannot be taken pass/fail.

Homework will be assigned weekly through the online SmartWork system, which you should access via the CHEM 103 *lab* site on Canvas. Unless otherwise announced, homework sets are due **each Thursday by 11:59pm**, but can and should be worked on throughout the week ahead of the deadline… you will likely have a better experience if you do not wait until the last minute to begin the homework! You will generally be given three attempts to answer each question, with a small penalty (–5%) for each incorrect attempt. In calculating your overall course grade, your lowest homework score will be automatically dropped.

The first homework assignment will be due on Thursday 8/25, so you should sign up for SmartWork ASAP. ***Be sure to use your SLU email address or you will not get credit for completing the homework*.** The fee is $35 for one semester or $60 for two years of access; if you intend to take CHEM 104 in the spring, you may wish to purchase the longer option. There is a 3-week trial period before you are required to pay, so please sign up and begin working on the first homework sets even if you think it is possible that your schedule may change during add/drop. If you have a scholarship towards course materials, check with the department that is responsible for the scholarship, as they may be able to cover the cost of SmartWork.

Quizzes: Closed-book quizzes (~10–15 min) will be given in class on most Fridays. The main purpose of these quizzes is twofold: (1) to discourage you from waiting until a few days before an exam to begin studying for CHEM 103, and (2) to provide an early warning if you do start to fall behind. (Note how each quiz is worth 1% of your overall grade, whereas each midterm exam is worth 10%! It is much easier to recover from a poor quiz performance than a poor exam performance.) In calculating your overall course grade, your lowest quiz score will be automatically dropped.

Exams: There will be three closed-book, in-class midterm exams (~60 min) and one cumulative final exam (~120 min) given on the dates listed on the course schedule. The midterms are worth a combined 35% of the final grade, and the final exam is worth 20%. Each midterm will focus primarily on the newest course material, though given the nature of chemistry, there may be some overlap. The final exam will be cumulative (and the final exam for CHEM 104 will cover all of CHEM 103 and 104).

On quizzes and exams, you can expect many questions that look similar, though not necessarily identical, to things you have (hopefully) seen before on homework, quizzes, and textbook problems. In addition, you may encounter some questions that at first glance do not seem familiar will and require you to extend course concepts in new ways – college classes are meant to challenge you, but if you try your best and seek help when you need it, you should be able to meet those challenges!

All exams and quizzes must be taken during class time on the day listed on the syllabus unless you have made prior arrangements with the instructor or there is a bona fide emergency. Please inform the instructor ASAP if any conflicts arise.

I will automatically replace your lowest midterm grade with your final exam score if the final is higher. This policy also covers missed exams: if you miss an exam without prior approval from the instructor, that counts as your lowest midterm score and will be replaced with your final exam score.

Lab: The lab is designed to give you hands-on experience with chemistry, as well as providing additional practice with the concepts that we cover in lecture. You must score at least 60% in lab to receive a passing grade for CHEM 103. More details about lab assignments will be provided by Prof. Jennifer Schmeisser and/or your lab instructor.

Class participation and group citizenship: This portion of your course grade will be evaluated in two main ways. There may occasionally be other activities that will earn participation credit (e.g., filling out surveys, bringing pre-constructed molecular models to class).

(1) We will use a response system called Plickers to help make class more interactive. You will be given a card with a QR code that you will use to respond to questions in class throughout the semester; please bring your Plickers card to each class, and let the instructor know if you lose it and need a replacement. You will receive full credit for Plickers questions as long as you respond to at least 80% of the questions throughout the semester (regardless of whether your responses are correct or not). This means that occasionally forgetting your Plickers card or missing a couple days of class will not adversely affect your grade (again, please don't come to class if you are sick!).

(2) We will often break out into small groups for activities and discussion. During these activities, you are expected to be an active participant, to work diligently with your group on the task at hand, to be respectful of others, and to seek help when you need it. I hope to be able to award all students 100% on group citizenship, so please endeavor to stick to these ideals!

Textbook problems: Each section in the textbook ends with a set of problems, and I will try to flag the problems that I think are worth your time. These problems will not be graded or collected, but are a good source of extra practice. The more of your study time that is spent actively working on problems (vs. passively rereading course notes, the textbook, etc.), the better!

Peer learning workshops: You can help your learning (and likely your grade!) by participating in a weekly workshop. This *voluntary* workshop will help you become more confident in your ability to understand chemistry and solve problems. Small groups will meet once a week for 1–2 hours to work on problems with a peer leader who has previously taken general chemistry. You will be able to practice the week's material, verbalize your thought processes, and learn from others about new ways to solve problems. However, workshops are NOT an alternative to studying and doing regular homework on your own. The leader will provide hints and possible strategies if necessary. Please don't ask the leader to show you how to do the problems; if you do not work on them seriously, you will not learn how to solve problems. Evidence from SLU and from other schools has shown that students who participate **regularly** and **actively** in this kind of workshop tend to do better on the regular exams.

Tutoring: Please visit https://www.stlawu.edu/offices/academic-advising/peer-tutoring for information about tutoring. Requests for tutors may be made using an online form; once completed, a tutor will typically be assigned to you via e-mail within a day or two. Free tutoring is available for most introductory courses and for many popular intermediate-level courses (i.e., most 100-level and selected 200-level classes).

Pearson Quantitative Resource Center (PQRC): The Peterson Quantitative Resource Center (PQRC) offers free, no appointment necessary peer tutoring across a range of courses with quantitative content in Valentine 125. The PQRC student staff of mentors is trained to assist students to develop and to improve their quantitative skills and understanding. More information about the PQRC's current hours and modes of operation can be found at the PQRC webpage: www.stlawu.edu/pqrc.

Course materials: Materials from CHEM 103 should not be distributed outside of the educational framework of this course (including and especially online) without prior permission of the instructor.

Student accessibility: It is the policy and practice of St. Lawrence University to create inclusive and accessible learning environments consistent with federal and state law. If you have already established accommodations with the Student Accessibility Services Office, please meet with them to activate your accommodations so we can discuss how they will be implemented in this course.

If you have not yet established services through the Student Accessibility Services Office but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), please contact the Student Accessibility Services Office directly to set up a meeting to discuss establishing with their office. The Student Accessibility Services Office will work with you on the interactive process that establishes reasonable accommodations.

For more specific information about setting up an appointment with Student Accessibility Services please call (315) 229-5537 or email studentaccessibility@stlawu.edu. For further information, see the website at https://www.stlawu.edu/offices/student-accessibility-services.

Student resources: If you experience difficulty during the semester that interferes with your ability to come to class or complete your work, including difficulty securing food or housing, or stress and mental health issues, I urge you to contact the Office of the Dean of Students [in person or by phone at (325) 229-5311] or Health and Counseling Center [in person or by phone at (315) 229-5392]. If the Dean of Students is consulted, they can notify all of your instructors (for all of your classes) at your request. Their services are confidential – so while they may contact your instructors on your behalf to alert them that you are experiencing difficulty, they do not disclose details to your instructors. I am also available to walk you over to the Health and Counseling Center or the Office of the Dean of Students.

Inclusivity: The course instructor is committed to cultivating an inclusive and supportive learning environment that respects and celebrates a rich variety of backgrounds and perspectives. Please speak with the course instructor or the Chemistry Department chair, Prof. Samantha Glazier, if you have an experience in this class that is not consistent with this commitment.

Academic integrity: Per the SLU student handbook, "All students at St. Lawrence University are bound by honor to maintain the highest level of academic integrity. By virtue of membership in the St. Lawrence community, every student accepts the responsibility to know the rules of academic honesty, to abide by them at all times, and to encourage all others to do the same."

The SLU handbook also states that "[i]nstructors have the duty to investigate any instance involving possible academic dishonesty." I am obligated to report any suspected violations of the honor code to the Dean or the Academic Honor Council.

If you ever have questions about what is or is not appropriate academic behavior on any component of this course, please do not hesitate to ask me.

Semester schedule: A *tentative* schedule of topics is shown beginning on the next page. Note that the exact coverage from day to day may vary a bit, but updates will be provided as necessary.

Day	Date	Topics	Suggested Reading	Assignments/ Notes
Wed	Aug 24	1 course intro; phases of matter	syllabus; 1.1	HW1 & intro survey due Thurs.
Fri	Aug 26	2 atomic models	1.2	Quiz 0 (math review)
Mon	Aug 29	3 ions and atom size	1.2; handout	*lab starts this week!*
Wed	Aug 31	4 Lewis structures	1.3–1.4	HW 2 due Thurs.
Fri	Sep 2	5 molecular geometry	1.5–1.6	Quiz 1
Mon	Sep 5	6 polarity	1.7	*peer workshops start this week!*
Wed	Sep 7	7 intermolecular forces	1.8–1.9	HW 3 due Thurs.
Fri	Sep 9	8 IMFs in biomolecules	1.10	Quiz 2
Mon	Sep 12	9 phase changes	1.11	
Wed	Sep 14	10 counting atoms	1.12	HW 4 due Thurs.
Fri	Sep 16	11 solutions	2.1–2.2	Quiz 3
Mon	Sep 19	12 ionic compounds	2.3–2.4	
Wed	Sep 21	catch-up day		HW 5 due Thurs.
Fri	Sep 23	**EXAM 1**		

Day	Date	Topics	Suggested Reading	Assignments
Mon	Sep 26	13 formation of ionic compounds	2.4	
Wed	Sep 28	14 thermodynamics of hydration	2.5	HW 6 due Thurs.
Fri	Sep 30	15 precipitation & solubility trends	2.6–2.7	Quiz 4
Mon	Oct 3	16 moles and molarity	2.8	
Wed	Oct 5	17 mass–mole–volume calculations	2.9	HW 7 due Thurs.
Fri	Oct 7	18 stoichiometry	2.10	Quiz 5
Mon	Oct 10	19 water as an acid and a base	2.11–2.12	
Wed	Oct 12	20 acids and bases; Le Chatelier	2.13–2.14	HW 8 due Thurs.
Fri	Oct 14	No Class – Fall Break		
Mon	Oct 17	21 ionization energy; electromagnetic radiation	3.1–3.3	
Wed	Oct 19	catch-up day		HW 9 due Thurs.
Fri	Oct 21	**EXAM 2**		
Mon	Oct 24	22 photons	3.4	
Wed	Oct 26	23 quantum model of an atom	3.5–3.6	HW 10 due Thurs.
Fri	Oct 28	24 electrons in atoms	3.7–3.8	Quiz 6

Day	Date	Topics	Suggested Reading	Assignments
Mon	Oct 31	25 atomic orbitals	3.9	
Wed	Nov 2	26 multi-electron atoms	3.10	HW 11 due Thurs.
Fri	Nov 4	27 periodicity	3.11	Quiz 7
Mon	Nov 7	28 isomers	4.1	
Wed	Nov 9	29 condensed structures	4.2	HW 12 due Thurs.
Fri	Nov 11	30 intro to molecular orbitals	4.3	Quiz 8
Mon	Nov 14	31 molecular geometry	4.4–4.5	
Wed	Nov 16	32 pi molecular orbitals	4.6	HW 13 due Thurs.
Fri	Nov 18	33 delocalization of electrons	4.7	Quiz 9
Nov 21–25		No Class – Thanksgiving Break		
Mon	Nov 28	34 functional groups	4.8	
Wed	Nov 30	catch-up day		HW 14 due Thurs.
Fri	Dec 2	**EXAM 3**		

Day	Date	Topics	Suggested Reading	Assignments
Mon	Dec 5	35 origin of atoms	5.1–5.3	
Wed	Dec 7	36 nuclear chemistry	5.4–5.7	HW 15 due Thurs.
Fri	Dec 9	Optional Review Session – Details TBA		
Sun	Dec 11	**Final Exam** 1:00–4:00pm		