CHEM 8: Introductory Organic Chemistry

Science is everywhere. It is not something you can step around or over and say, "that's science" and" I'm not about science." Science is about you. - Neil DeGrasse Tyson

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Office Hours: Tuesday - 2 p.m. to 4 p.m. (Rm 318)

Class Meetings:

Tuesday and Thursday: 12 p.m. to 1:30 p.m. (Lecture: Lindley 304)
Thursday: 2 p.m. to 3 p.m. (Lab Lecture: Lindley 304)
Thursday: 3 p.m. to 6 p.m. (Lab: Lindley 321)

Class Description:

Living in a world of chemistry, molecules are everywhere. For this reason, knowledge of organic chemistry is highly useful for everyone as a familiarity with organic chemistry gives a greater appreciation of our physical world. Mastery of organic chemistry provides an essential foundation for future scientists, engineers, health professionals, food scientists, and nutritionists.

These different fields draw upon organic chemistry to develop and study new molecules for use in drugs and drug delivery (medicinal chemistry and health sciences), organic light emitting diode (OLED) TVs (materials chemistry), and plastics (polymer chemistry). Furthermore, organic chemists discover new ways to synthesize complex molecules found in nature using only commercial chemicals (natural product chemistry) and study the molecules of food to improve taste, texture, and flavor (food and wine chemistry). Furthermore, knowing the structure and reactivity of molecules plays an important role in the chemistry of what we eat (food science and nutrition). Lastly, organic chemists use computer modeling to understand and predict the structure and reactivity of molecules (computational chemistry).

In this class we will learn about organic molecules. We will first learn about their structure, nomenclature, and physical properties. Next, we will learn about their reactivity and learn how to predict the product for a given reaction. Finally, we will apply this knowledge to better understand and appreciate biochemical molecules such as carbohydrates, proteins, lipids, and nucleic acids. In the laboratory, we will gain hands-on experience learning new chemical techniques, purifying molecules, synthesizing molecules, and using chemical instrumentation to prove that we synthesized the desired product.

Learning organic chemistry will allow you to gain a familiarity with molecules both in terms of their structure and reactivity. This will allow you to confidently look at both everyday and new molecules and apply your chemical understanding to better understand the function of molecules that are important to your life. In this class, I aim to select examples to highlight how organic chemistry is all around you. This application to daily-life chemistry is what excites me about organic chemistry and makes it a fun and rewarding class to teach. I hope you will share this excitement in your learning of organic chemistry!

Learning chemistry takes hard work. However, with the proper work, anyone can be very successful. That means you!

Physical and Mental Health:

Should you experience any physical or mental health issues, know that all of us at SRJC care about your well-being. SRJC's Student Health Services (SHS) has nurse practitioners and mental health therapists available. Confidential sessions are provided via secure Zoom or in-person. Sessions are free for SRJC students taking credit or non-credit classes, and some providers can converse with you in Spanish if you prefer. SHS also has on-site covid rapid testing and vaccinations available also at no cost. To start the process for any type of physical or mental health appointment contact Student Health at (707) 527-4445 or email studenthealthservices@santarosa.edu. More information about all that Student Health Services provides is available at shs.santarosa.edu.

Distance Learning Access and Accommodations:

It is the mission of the Santa Rosa Junior College to support inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or to accurate assessment of achievements, such as time-limited exams, inaccessible web content, or the use of non-captioned videos—please notify me as soon as possible. Students are also welcome to contact the Disability Resources Department (DRD). DRD is a resource for students that provides authorization for academic accommodations, training and access to assistive technology, and collaborates on strategies for academic success. I do **not** provide accommodations without an appropriate letter from the DRD **as well as** a conversation with you to determine how we will implement such accommodations.

Making it Stick:

Many students believe that they can study whenever they choose, including delaying studying until just before an exam, *i.e., cramming.* Studying is best performed by combining the "7 3 2 1 rule" and by simply getting enough and the right kind of sleep. The "7 3 2 1 rule" is a memory technique where you initially study a topic today (day 1), then review it again tomorrow (day 2), the day after tomorrow (day 3), and finally, one week later (day 7), essentially spacing out your revisions to better retain information over time; it's a form of *spaced repetition learning*. The key benefit of this method is that by revisiting the information at increasing intervals, your brain is more likely to encode it into long-term memory. This technique is particularly useful for learning large amounts of information, like vocabulary or factual details, where consistent review is important. In other words, chemistry is a subject which requires cumulative knowledge over time and is most effectively studied to build such information into one's memory over time.

Sleep is another important aspect of long-term learning. During deep sleep, new memories are sorted, categorized, and stored in different parts of the brain. During REM sleep, new memories are related to existing memories, which can help you wake up with new perspectives or solutions. Also, during REM sleep, your brain compresses time to rehearse skills you've practiced during the day, which can help you improve them.

Here are some tips to improve your sleep and memory retention:

- **Create a schedule**: Go to bed and wake up at the same time each day, including weekends.
- **Create a restful environment**: Keep your bedroom cool, dark, and quiet. You can use blackout curtains and a white noise machine.
- **Limit screen time**: Avoid using screens for at least an hour before bed.
- **Avoid stimulants**: Limit caffeine and nicotine, especially in the evening.
- **Exercise regularly**: Get physical activity but avoid exercising close to bedtime.
- **Eat well**: Eat a healthy diet with lots of fruits, vegetables, lean proteins, and whole grains.
- **Relax before bed**: Try reading a book, taking a warm bath, or doing some light yoga or meditation.
- **Limit naps**: Limit naps to 30 minutes and don't nap after midday.

Student Learning Outcomes:

Upon successful completion of this course the student will be able to:

1. Identify and explain the basic concepts, terminology, and theories of organic chemistry and biochemistry.
2. Relate the molecular level structures of organic and biological compounds to their physical and chemical properties.
3. Explain and predict reactivity of organic compounds using reaction mechanisms.
4. Investigate concepts in the laboratory through analysis of experimental observations.

The student learning outcomes as stated in the official SRJC Course Outline of Record may be found at: https://portal.santarosa.edu/SRWeb/SR_CourseOutlines.aspx?Semester=20243&CVID=49784

Prerequisites:

Course completion of CHEM 3A *or* course completion of CHEM 42

Recommended Preparation: Course completion of ENGL 1A

Required Course Materials:

- Textbook: Brown, William H. and Poon, Thomas. *Introduction to Organic Chemistry*, 6th Edition ISBN: 978-1-119-10696-8
- Laboratory Manual: *Chemistry 8 Lab Manual*, Santa Rosa Junior College, (Spring 2025).
- Laboratory Technique Textbook: Zubrick, J. W. *The Organic Chem Lab Survival Manual: A Student's Guide to Techniques (10th Edition)*, Wiley, (2016). ISBN: 9781118875780 (Available in library reserve)
- Laboratory Notebook: A stitch bound notebook will suffice. The pages of this notebook must remain intact throughout the class. Every page, front and back, must be numbered, leaving a couple of pages at the beginning for the table of contents.
- Laboratory Safety Equipment: Safety goggles and laboratory apron. Use of goggles and aprons from a prior SRJC class will suffice. Do not purchase new ones if you already have such a set of PPE.

Library Course Reserves:

Title	Author	Edition	Call Number
Organic Chemistry	Brown and Poon	6th	TBD – check library
Organic Chem Lab Survival Manual	James W. Zubrick	11th	QD 261. Z83 2020

Attendance:

Attendance is MANDATORY for lecture. I understand many of you may have work and/or family obligations in addition to circumstances that may quickly change. Attendance is <u>important and required</u> for all students for LAB. THERE WILL BE NO MAKE-UPs ON LABS OR EXAMS FOR ANY REASON OTHER THAN A DOCUMENTED MEDICAL EXCUSE. Missing more than two labs will result in an "F" for the entire course, regardless of the student's performance in the class.

Academic Standard:

Your learning in this class hinges upon all work being original and something you can stand behind and be proud of. Plagiarized work or any form of academic dishonesty deprives you of this learning experience. All cases will be given zero credit and will be reported to the Vice President of Student Services.

Communication with other students during exams is prohibited and all electronic devices capable of communication (phones, smart watches, etc.) must be stored away and turned off. All questions and comments are to be directed only to the instructor. Laboratory experiments are often completed in pairs, but the data must be recorded by each student: it is not acceptable for one student to record all the data and then have the other student copy everything at the end of the lab.

Reading Assignments:

The lecture is designed to help you understand the material presented in the textbook. You must read the book either before or right after class. Lecture alone will not cover all the required material. To gain all this material you need to read the book AND do the homework. Make sure to do the reading before starting the homework. This will SAVE you time and increase your learning.

Homework Quizzes:

Learning organic chemistry is like learning to play a new musical instrument. Just as a musician must devote regular practice time daily to mastering the instrument and developing musical proficiency, you too must regularly practice organic chemistry. Furthermore, regular and consistent practice is what allows one to move from being proficient to being a master. The first learning of the material will teach you the major concepts, but through practice and asking many questions will help you, like a professional musician, master the material and have a command of organic chemistry. Collaboration on homework is highly encouraged. However, simply copying another student's work deprives you of the learning experience and necessary practice. It is also highly recommended that you start all assignments early so you can have ample time to think about the material and ask questions: hours of work distributed over a week are more useful than the same number of hours packed into a single day.

Weekly homework will be assigned but will not be collected for credit. Rather, every day at the beginning of class (12 p.m.) we will have a 5–15 minute homework quiz that covers the prior class's material. The quiz questions will be drawn from the homework assignment. If you get stuck on a homework question and give it a good attempt, please come to office hours to ask questions. I am happy to help!

Laboratory Coursework:

Chemistry is very similar to cooking in the sense that there are several techniques one must learn for laboratory work in organic chemistry. In cooking, you must first learn how to cook safely (wear oven mitts etc.) and in the lab we will also start with chemical safety. Because chemical safety is important for you and the lab community, elements of chemical safety may be included on the exam.

Ultimately, the goal of cooking is to make a dessert, such as a decorated five-layer ice cream cake. To make this cake you must first learn how to use cooking utensils, cake pans, an oven, an ice cream machine, decorating tools, and (very importantly!) how to clean up the kitchen when you are done. However, in culinary school you will not be asked to make this cake on the first day. You will master cakes, ice cream, and cake decorating all separately before combining these techniques to make a spectacular cake. The same applies in organic chemistry. We will start by analyzing and purifying molecules, and then gradually move to more complex experiments such as multi-step synthesis. Because each experiment draws upon the previous techniques learned it is important to understand the theory and practice of what we learn each week AND review your lab coursework in parallel with your lecture coursework.

Lab Quizzes:

To support coming to lab fully prepared, there will be a lab quiz on average once every two weeks. This quiz may cover topics such as the goal of the experiment, the procedure, and the associated lab theory. It is your responsibility to proactively review the lab materials (and assigned lab-technique/theory readings) to make sure you understand the lab before class. If you are confused about the lab, please visit me in my office hours and I am happy to help review the lab with you!

Class Participation:

Organic chemistry is a subject that is best learned by doing. This requires constant and engaged participation both in AND out of class. Science is a communal subject where discovered knowledge is slowly built upon by others. The result is a collective body of knowledge that is the product of many, many, hard-working people. Thus, it is important to clearly communicate your scientific ideas and work together toward a common goal or objective. You will find that this process of learning is highly engaging, stimulating, and fun! If any student misses more than 10% of the total class time, the instructor reserves the right to drop the student from the class.

The purpose of lab work is to reinforce your learning and understanding of the lecture material in addition providing you with the necessary workplace laboratory skills. It is important that you do the following to make the best use of your lab time:

1. Read the experiment at least three times and look up terms unfamiliar to you before lab. Look up pictures for unfamiliar laboratory equipment either in your lab textbook or online (imagine trying to prepare for cooking a batch of cookies without knowing what a stand mixer looks like).
2. Arrive on time, dressed appropriately (closed-toe shoes and long pants).
3. Always wear safety goggles!
4. Follow all lab safety regulations.
5. Turn in your lab reports. *Late labs will be marked down by 20% percent for each day late*. *Labs turned in after class starts (8:00 a.m.) will be marked down by 10%.* No labs will be accepted by email.

Attending lab is mandatory. PLEASE DO NOT MISS LABS. No incomplete grades (I) will be given when missing labs. To pass the course, no more than TWO (2) missing lab reports are allowed. **If you are 20 minutes late (or more) for the pre-lab lecture, you may be dismissed from the lab: the lab lecture includes important safety information that must be discussed prior to starting lab.**

The lab notebook is where you will document ALL your laboratory observations. In government and industry work, lab notebooks are legal documents that on occasion have been subpoenaed. **You may not write on a piece of paper and then copy it into your lab notebook**. All sample calculations must also be written directly in the lab notebook. To prepare you for future work in a laboratory, we will follow the same standards, and you will be graded on the maintenance of your lab notebook: all observations must be recorded as you collect it and not later; writing is only to be done in permanent pen; any errors are to be crossed out with a single line and not scribbled over. Please do not worry about the lab notebook looking like an art notebook! It is expected that you will cross out words or entire sections. The lab report is where you will use your skills as a graphic designer to make the data presentable. For more detailed information on keeping a good laboratory notebook, *please see the handout "Lab Notebook Guidelines"*.

No food is allowed in the lab. All food and beverages must be always stored in a backpack or bag. You may take breaks for food, but this must be outside of the lab, and you must not have your gloves on while eating.

Exams:

There will be three exams and a final exam. NO MAKE-UP EXAMS WILL BE GIVEN IN THIS COURSE. If an exam is missed, a score of zero will be recorded. An exam will be excused only if proper documentation is provided.

The score of the lowest exam will be replaced by the score of the final exam if the final exam score is higher. In the case where an exam receives a 0 due to academic dishonesty, the score of 0 will not be replaced.

Accommodations for Students with Disabilities:

Students needing academic accommodation based on a disability should contact the Disability Resources Department (DRD) located on the 3rd Floor in Bertolini Hall. When possible, students should contact the DRD within the first two weeks of the semester as reasonable notice is needed to coordinate accommodations. Once contacting the DRD, please provide me with the authorization letter as soon as possible and see me in office hours to discuss the accommodations. For more information, please visit drd.santarosa.edu or call at (707) 527-4278.

Student Conduct:

We will conduct ourselves in a manner which reflects our awareness of common standards of decency and the rights of others. All students are expected to know the Student Conduct Policy and adhere to it in this class. Students who violate the code may be suspended from two classes and may be referred to the Conduct Dean for discipline. The Student Conduct Policy can be found at: https://student-conduct.santarosa.edu/

Emergency Evacuation Plan:

In the event of an emergency during class that requires evacuation of the building, please leave the class immediately, but calmly. Our class will meet at the lawn area between Baker, Lindley, and Bech to make sure everyone is out of the building safely and to receive further instructions. If you are a student with a disability who may need assistance in an evacuation, please see me during my office hours as soon as possible so we can discuss an evacuation plan.

Copies of the highlighter-yellow Emergency Preparedness & Response Guide are posted throughout the building and contain detailed information on emergency situations and safe procedures. Any type of emergency can and should be reported to the District Police Department at (707) 527-1000.

Grading:

This class is graded based on the following percentages for different evaluation categories. The evaluation categories are weighed as follows:

Evaluation Category	Percentage
Exams	40%
Homework Quizzes	20%
Labs	25%
Lab Quizzes	5%
Final Exam	20%

Final course and letter grades are assigned as follows:

Letter Grade	Percentage
A	≥ 89%
B	≥ 78%
C	≥ 67%
D	≥ 50%
F	Below 50%

To pass CHEM 8 you must earn above 50% for BOTH the lecture and lab components. Students may vary in competency levels and abilities based on their prior backgrounds. Students can expect to acquire these abilities only if they honor all course policies, attend class meetings regularly, complete all assignments in good faith and on time, and meet all other course expectations.

Important Dates:

Date	Activity
January 19, 2026	Martin Luther King Jr. Holiday (No classes)
January 118, 2026	Last day to register/add without instructor's signature/add code
January 25, 2026	Last day to drop a semester-length class and be eligible for a refund
February 1, 2026	Last day to register/add WITH the instructor's signature or add code Last day to drop a class without "W" symbol
February 12, 2026	Professional Development Activities Day (No Classes)
February 13, 2026	Lincoln's Birthday Holiday (No Classes)
February 16, 2026	Washington's Birthday Holiday (No Classes)
March 15–March 22, 2026	Spring Break (No Classes)
March 31, 2026	Cesar Chavez/Dolores Huerta Day (No Classes)
April 19, 2026	Last day to drop a class with "W" symbol
May 21, 2026	Cumulative Final Exam 10 AM – 12:45 PM

Tentative Lecture Schedule:

Week	Week Beginning (Monday)	Day	Topic	Textbook Chapter
1	Jan. 13	Tuesday	Introduction to Organic Chemistry	Intro
		Thursday	Skills Review – Lewis Structures	0
2	Jan. 19	Tuesday	Skills Review – Bonding Concepts Hybridization	0
		Thursday		
3	Jan. 26	Tuesday		
		Thursday	Skills Review – Molecular Polarity and IMF	0
4	Feb. 2	Tuesday		
		Thursday	Organic Structures, Physical Properties of Organic Molecules	1
5	Feb. 9	Tuesday	***Exam #1***	
		Thursday	*No Class - Washington's Birthday Holiday*	
6	Feb. 16	Tuesday	Organic Structures, Physical Properties of Organic Molecules	1
		Thursday	Alkenes and Cycloalkanes	3
7	Feb. 23	Tuesday		
		Thursday	Alkenes and Cycloalkanes, Acids and Bases	3, 2
8	Mar. 2	Tuesday	Acids and Bases	2
		Thursday		
9	Mar. 9	Tuesday	Chemistry of Alkenes and Alkynes	4. 5
		Thursday		
Spring Break				
10	Mar. 23	Tuesday	Chemistry of Alkenes and Alkynes	4, 5
		Thursday	Chirality	6
11	Mar. 30	Tuesday	*No class – Cesar Chavez / Delores Huerte Holiday*	
		Thursday	***Exam #2***	
12	Apr. 6	Tuesday	Chirality	6
		Thursday	Haloalkanes	7
13	Apr. 13	Tuesday		
		Thursday	Alcohols	8
14	Apr. 20	Tuesday		

		Thursday	Amines	10
15	Apr. 27	Tuesday		
		Thursday	***Exam #3***	
16	May 4	Tuesday	Aldehydes and Ketones	12
		Thursday	Carboxylic Acids and Their Derivatives	13, 14
17	May 11	Tuesday	Polymers	16
		Thursday		

Cumulative Final Exam: Thursday, May 21 from 10:00 a.m. to 12:45 p.m.

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement and-or to ensure better student learning.

Laboratory Schedule:

Week	Topic
1	Intro/Lab Safety/ Locker Check-In
2	Identification of an Unknown Liquid
3	Recrystallization and Melting Points
4	IR Spectroscopy and Functional Groups
5	***No lab due to PDA Day – no classes***
6	Analysis of Gasoline by GC-MS
7	Steam Distillation of Anise Seed
8	Synthesis of Nerolin
9	Dehydration of 3-methyl-3-pentanol
10	Molecular Modeling (Stereochemistry Dry Lab)
11	Thin-Layer Chromatography of Analgesics
12	Nucleophilic Substitution Reactions
13	Synthesis of Lidocaine
14	Synthesis of Lidocaine
15	Synthesis of Lidocaine
16	Saponification
17	Locker Check-Out/Cleanup

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