

## CHEMISTRY12C SYLLABUS

### GENERAL INFORMATION

CHEMISTRY12C (CHEM D012C03) Spring 2024

Instructor: Chad Miller E-mail: millerchad@fhda.edu

Lecture (CRN 48744)	Tues Thur	12:30PM – 1:45PM	Room S46
Lab (CRN 48744)	Tues Thur	8:30AM – 11:20AM	Room SC2210
Office hours	Tues Thur	2:00PM – 3:00PM	Room TBD

**Course Description:** Course Description: An exploration of the physical properties and chemical behavior of important classes of organic compounds, focusing on amines, carboxylic acids, and carboxylic acid derivatives, with an introduction to the chemistry of lipids, carbohydrates, and proteins. Emphasis on retrosynthesis, spectroscopic structure determination, and reaction mechanism. Laboratory experiments involving the multi-step synthesis of organic compounds and the characterization of those compounds using chromatography and infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy. For chemistry majors or those in closely allied fields such as biochemistry and chemical engineering. A grade of C or better in Chemistry12B is a prerequisite.

#### Required Materials:

- ✓ **Textbook:** McMurry, Organic Chemistry, 10<sup>th</sup> ed, OpenStax  
<https://openstax.org/details/books/organic-chemistry> (PDF download)
- ✓ **Lab Text:** *Experimental Organic Chemistry: A Miniscale and Microscale Approach, 6e*, by John C. Gilbert and Stephen F. Martin (Brooks/Cole: 2015; ISBN 978-1-305-08046-1)
- ✓ OSHA-approved **Safety Goggles** (Indirect Vent, Z87)
- ✓ **Carbonless copy Lab notebook:** 100 page carbonless copy spiral bound notebook. ISBN: 1429224541
- ✓ **Standard lock for lab drawer** (or small bike lock) to lock an assigned laboratory drawer.

#### Recommended:

- ✓ Molecular model kit for organic chemistry – many options available
- ✓ Lab coat, Lab gloves (disposable nitrile or otherwise compatible)
- ✓ *Pushing Electrons, 4e*. Daniel P. Weeks

#### Important Dates: Please note the following dates

- ☑ **April 9: Attend 4/09 lecture and lab session in order to maintain registration in this course.**
- ☑ **June 27: Final Exam date. 11:30AM – 1:30PM**

**Classroom Courtesies:** We want to achieve the highest level of learning experience in lecture and in lab and to accomplish that please refrain from conducting any unrelated conversations, cell phone activity (no calls, texts, IMs, browsing or camera use) and any other behaviors that would be disruptive to yourself, others and to the instructor. Students who engage in disruptive conduct will be required to leave the classroom. Computers in the lectures and lab can only be used for activities pertaining to the course material. Recording class lectures or related activities always requires approval of the instructor.

**Attendance & Academic Integrity:** Students are expected to attend all lectures and labs. The course Grading Policy details the specifics for lack of attendance. All incidents of dishonest, unethical behavior including any cheating, copying the work of others and claiming it is your originality (also known as plagiarism), altering any graded exams, quizzes, lab reports, other classroom materials will be reported to the College Administration. It is your responsibility to recognize academic dishonesty: <http://www.deanza.edu/studenthandbook/academic-integrity.html>

**Covid-19 Policies:** Please consult the De Anza College return-to-campus web page and any announcements on your student portal that detail relevant information pertaining to the campus regulations and policies pertaining to Covid-19. <https://www.deanza.edu/return-to-campus/students.html>

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CHEMISTRY12B (CHEMD012C.03) Spring 2024

Instructor: Chad Miller E-mail: millerchad@fhda.edu

**NOTE: Copyright protection of instructor course materials:** All materials developed and/or authored by this course instructor are protected by US copyright law and may not be distributed or sold to any third parties including individuals who are not course-registered students, other individuals, companies, Web sites and content aggregators or any other party that has no valid or lawful right to possess such materials. Any such legal distribution of materials requires in advance of distribution the written consent, including signature and date, of this instructor.

**Instructional and Student Resources:** De Anza College provides a variety of resources to facilitate learning experiences including those listed below. Please visit <http://www.deanza.edu/student-services/> to learn more.

- **De Anza College Winter quarter guide:** <https://www.deanza.edu/quarter-guide/>
- **Student Success Center:** <http://www.deanza.edu/student-success/> Tutoring is available for on-site and online tutoring on a range of subject matter including chemistry. Resources are in Bldg S43.
- **Counseling and Advising Center:** <http://www.deanza.edu/counseling/> Provides support in the form of counseling and assistance on academic matters and personal challenges.
- **Disability Support Programs & Services:** <http://www.deanza.edu/dsps/> Offers support services including accommodations and educational classroom assistance designed to help students with disabilities. Resources are in the [RSS Room141](#) and can be reached at 408.864.8753.

Week	Day/Date	Lecture Content	Lab Content	Exam Dates
1	Tues 4/09	Course overview; syllabus. Carboxylic acid derivatives, interconversion, transformation	Check-in and safety. Carboxylic acids, reactivity, synthesis, esterification	
1	Thur 4/11	Carboxylic acids, reactivity, synthesis, esterification	Lab1 Synthesis of benzocaine: Theory 759-765 Procedure 764-765	
2	Tues 4/16	Enols and enolates: Aldol/Claisen condensations, alkylation, annulations	Lab1 Synthesis of benzocaine: Theory 759-765 Procedure 764-765	
2	Thur 4/18	Enols and enolates; examples and problems	Enols and enolates: conjugate addition reactions, synthesis	
3	Tues 4/23	<b>Lecture Quiz:</b> Carboxylic acids	Benzocaine lab assignment	<b>Lecture Quiz</b>
3	Thur 4/25	Midterm 1 group study: Enols and enolates	Lab2 Aldol condensation: Theory 689-691 Procedure 691-692	
4	Tues 4/30	Amines: reactivity, alkylation, Cope elimination, reductive amination	<b>Midterm 1</b>	<b>Midterm 1</b>
4	Thur 5/02	Amines and Heterocycles: structure, aromatic substitutions; indole synthesis; natural product synthesis	Lab3 Robinson annulations: Theory 697-699 Procedure 700-702	
5	Tues 5/07	Pharmaceutical chemistry: key reactions and syntheses of market-leading drugs	Lab3 Robinson annulations: Theory 697-699 Procedure 700-702	
5	Thur 5/09	Midterm 2 group study	Synthesis in pharmaceutical chemistry	
6	Tues 5/14	Natural product synthesis journal club	<b>Midterm 2</b>	<b>Midterm 2</b>
6	Thur 5/16	Natural product synthesis journal club	Natural product synthesis journal club	
7	Tues 5/21	Carbohydrates: structure, aldose and ketose modifications, chirality, reactivity	Natural product synthesis journal club gala presentations [Lab4 Assignment: Identify/characterize carbohydrates Theory 882-883 Procedure 883-886]	
7	Thur 5/23	Protein structure: primary, secondary, tertiary, quaternary; relationship to function	Amino acids: chemical structure, classification, electrophoresis, synthesis, peptide bond formation	
8	Tues 5/28	Chemistry of enzyme catalysis: active sites, mechanisms, serine proteases	Interpreting protein primary structure and implications to pathology, hemoglobin case study	
8	Thur 5/30	Midterm 3 group study	Chemistry of enzyme inhibitors and drug targets	
9	Tues 6/04	Chemical methods of peptide/protein sequencing, Edman chemistry	<b>Midterm 3</b>	<b>Midterm 3</b>
9	Thur 6/06	Modern methods in peptide synthesis: liquid-phase, solid-phase, coupling, cleavage, protecting groups	Experimental methods in peptide and protein sequencing	
10	Tues 6/11	Modern methods in oligonucleotide chemistry & DNA synthesis	Peptide synthesis, coupling, cleavage, protecting groups	
10	Thur 6/13	Methods review of peptide/protein sequencing, synthesis, DNA synthesis	Modern methods in oligonucleotide chemistry & DNA synthesis	
11	Tues 6/18	Lipids and biomembrane chemistry; Organic chemistry of metabolic pathways	Check-out <b>Lab Exam</b>	<b>Lab Exam</b>
11	Thur 6/20	Final exam group study	Final exam group study	
12	Thur 6/27	<b>Final Exam</b>		<b>Final Exam</b>

### Lab Assessments:

1. Laboratory experience is an essential component of this course, and each lab must first be prepared for in advance by submitting the 'pre-lab' assignment, then the lab must be attended and properly and

Assessment	Points	Total Points	Percent
Lab reports, safety, technique	variable	200	20%
Lab exam	100	100	10%
Lecture quiz (1)	50	50	5%
Midterms (3)	150	450	45%
Final exam	200	200	20%
<b>Total</b>		<b>1,000</b>	<b>100%</b>

Grade	% of Total Points	Grade	% of Total Points
A+	98% - 100%	B-	77% - 79%
A	90% - 97%	C+	74% - 76%
A-	87% - 89%	C	65% - 73%
B+	84% - 86%	D	55% - 64%
B	80% - 83%	F	<55%
% of total points determines the letter grade			

safely conducted followed by the timely completion and submission of a lab report/assignment.

2. The format and content of pre-lab assignments and lab reports/assignments will be described during the first lab meeting.
3. All submitted written work for the lab (i.e., pre-labs, lab reports/assignments) must be of the student's original authorship. Per instruction, students may share experimental data, however all lab reports & assignments must be individually written. Submitted work that is copied from another student will be scored as '0' (zero) points and such student will receive one warning regarding academic dishonesty. Any additional copied reports or assignments that are submitted will result in a report to Administration as a violation of academic integrity and code of honesty.
4. A pre-lab is due at the start of the lab meeting. The pre-lab will be marked as complete or incomplete; it is not scored. A student may not participate in the lab if a proper pre-lab was not submitted on its due date and time and marked as complete.
5. The lab report is typically due one week following the completion of the lab unless an alternative date is determined by the instructor. Late lab reports will not be graded. The instructor might substitute a lab assignment for a formal lab report. All such reports & possible assignments are individually weighted and account for a total of 150points.
6. There will be no (zero) make-up labs. Time and facilities will not permit rescheduling of labs for students in this course. Students need to attend each lab lecture in order to participate in each lab.
7. If a lab is missed and excused by the instructor, a lab partner data set will be provided. A second missed lab will be scored as "0" points unless excused by physician documentation. If three (3) or more labs are missed (not attended/no instructor approval) a score of '0' points will be given to the total lab score.
8. Competent lab technique, safety compliance, self-sufficiency, teamwork and housekeeping will be monitored and will account for 50 lab points.
9. Adherence to proper lab safety, instructor directives and lab cleanliness/housekeeping are critical. Improper attention to these requirements and practices can result in a drop from the course.

### Three (3) Lecture Midterm Exams and One (1) Lecture Quiz:

1. The dates of the lecture midterm exams and quiz are defined in the Schedule.
2. Midterm and quiz grades will not be dropped and need to be taken on scheduled dates and times.
3. Midterm exam grades will not be dropped. An unexcused missed midterm exam will have a point score of '0/150' points. In the event a student submits a physician letter, or otherwise instructor approved documented reason for an absence resulting in missing one midterm exam, then the Final exam will be weighted as 35% of the total grade. The Final exam score will not compensate in any manner or be adjusted for two missed midterm exams. There is no make-up lecture quiz.
4. There are no extra credit projects or activities that are scheduled for this course. The instructor retains the option of providing an unplanned exercise owing to extenuating circumstances or events.

### Final Exam:

1. The Final exam will assess the student's ability to understand the topics, principles and applications that are covered in the course.
2. The Final exam cannot be rescheduled, dropped from the total course grade or substituted.

From the American Chemical Society Safety In Academic Laboratories Guidelines, 7th Ed., the following mandatory minimum safety requirements must be followed by all students and be rigorously enforced by all Chemistry faculty:

- 1)** Chemistry Department-approved safety goggles purchased from the De Anza College bookstore (NOT safety glasses) must be worn at all times once laboratory work begins, including when obtaining equipment from the stockroom or removing equipment from student drawers, and may not be removed until all laboratory work has ended and all glassware has been returned to student drawers.
- 2)** Shoes that completely enclose the foot are to be worn at all times; NO sandals, open-toed, or open-topped shoes, or slippers, even with socks on, are to be worn in the lab
- 3)** Shorts, cut-offs, skirts or pants exposing skin above the ankle, and sleeveless tops may not be worn in the lab: ankle-length clothing must be worn at all times
- 4)** Hair reaching the top of the shoulders must be tied back securely
- 5)** Loose clothing must be constrained
- 6)** Wearing "...jewelry such as rings, bracelets, and wristwatches in the laboratory..." should be discouraged to prevent "...chemical seepage in between the jewelry and skin...".
- 7)** Eating, drinking, or applying cosmetics in the laboratory is forbidden at ALL times, including during lab lecture
- 8)** Use of electronic devices requiring headphones in the laboratory is prohibited at ALL times, including during lab lecture
- 9)** Students are advised to inform their instructor about any pre-existing medical conditions, such as pregnancy, epilepsy, or diabetes, that they have that might affect their performance.
- 10)** Students are required to know the locations of the eyewash stations, emergency shower, and all exits
- 11)** Students may not be in the lab without an instructor being present
- 12)** Students not enrolled in the laboratory class may not be in the lab at any time after the first lab period of each quarter.
- 13)** Except for soapy or clear rinse water from washing glassware, NO CHEMICALS MAY BE Poured INTO THE SINKS; all remaining chemicals from an experiment must be poured into the waste bottle provided.
- 14)** Students are required to follow the De Anza College Code of Conduct at all times while in lab: "horseplay", yelling, offensive language, or any behavior that could startle or frighten another student is not allowed during lab;
- 15)** Strongly recommended: Wear Nitrile gloves while performing lab work; wear a chemically resistant lab coat or lab apron; wear shoes made of leather or polymeric leather substitute.

Our Chemistry 12C summer six-week class necessarily will cover the course content at a rapid pace and requires focused attention, the implementation of a conducive and comfortable study environment at home or on campus, consistent study practices and an individual resolve and motivation to achieve success and demands attendance in order to succeed.

This is the third quarter of a one-year sequence of organic chemistry with the expectation that students already developed an awareness of how to manage academic challenges when taking light or heavy STEM loads. A good-natured attitude combined with motivation certainly helps keep students on track.

Attend all lectures and labs. This is one of the most important recommendations I can provide. There is a significant amount learning that takes place during each class lecture and in each lab and the optimal way to learn and keep current with the stream of content is to attend and participate in all learning activities in class and individual and team activities in the labs.

The grading policy reflects the need to maintain attendance and the requirement to plan ahead to be present for all quizzes, exams, labs and the final exam.

1. Read text book chapters and review lecture presentation materials in advance of class.
2. Participate in class discussions and problem-solving sessions.
3. Ask questions in class to gain clarification and a correct understanding.
4. Prepare for all labs by reading the lab text references in advance of the labs.
5. Identify and establish and maintain a compatible study environment free of distraction.
6. If helpful, and it is my recommendation, study with classmates to supplement private study.
7. Learn the material as it is presented and do not accumulate unread chapters or content.
8. Do not attempt to study too much material at any one point.
9. Do not cram before exams – pace your study and problem solving at the class tempo.
10. Try to maintain a healthy lifestyle to facilitate learning and balance school, work and life.

**Student Learning Outcome(s):**

- Apply the principles of thermodynamics, kinetics, equilibrium to biologically important molecules.
- Conduct spectroscopic analysis and identify structures of biologically important molecules.
- Generate stepwise reaction mechanisms of biologically important molecules.
- Design logical syntheses and structural modifications of biologically important molecules.

**Office Hours:**

T,TH 02:00 PM 03:00 PM In-Person TBD