

CHEMISTRY12C SYLLABUS

GENERAL INFORMATION

CHEMISTRY12C (CHEMD012C01 and CHEMD012C02) Spring 2020

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

Lecture (CRN46386/46387)	MWF	10:30AM – 11:20AM	Online Zoom
Lab Sec1	MW	7:30AM – 10:20AM	Online Zoom 8:00AM –10:00AM
Lab Sec2	MW	2:30PM – 5:20PM	Online Zoom 2:30PM – 4:30PM
Office hours	F	9:00AM –10:00AM & 12:00PM –1:00PM	Online Zoom

<https://deanza.edu/online-ed/students/remotlearning.html> Student resource hub for Canvas and Zoom

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:

- ✓ **Text Book:** *Organic Chemistry, 3e*, by David Klein (Inclusive Opt-In Access Included with Class Sign Up)
- ✓ **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)
- ✓ **Computer or laptop capable of using Zoom meetings with audio, video and chat; Canvas; viewing Web content and videos such as YouTube; E-mail** which will be the modes of remote instruction this quarter. Note that all lectures will be conducted using Zoom meeting software. Lab meetings will be conducted using Zoom meeting software on the days and times indicated. The lab Zoom sessions may vary in terms of start and end times and the instructor will provide details and advance notice. Office hours will be provided using Zoom meeting software.

Recommended:

- ✓ Molecular model kit for organic chemistry – many options available
- ✓ *Pushing Electrons, 4e*. Daniel P. Weeks

Important Dates: Please note the following dates

- ☑ **April 13: Attend the 1st lecture and lab session in order to maintain registration in this course.**
- ☑ **June 24: Final Exam date**

Online classroom courtesy: We want to achieve the highest level of learning experience in lecture and in lab and to accomplish that please refrain from using audio and video unless permitted by the instructor. All online interactions including audio, video and chat need to pertain to the course material or have relevance as determined by the instructor. Only registered students, authenticated by their name and email address, can participate in Zoom lecture and lab sessions. Students who engage in disruptive conduct will be removed from the Zoom meeting session and may be dropped from the course. Recording class 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>

Instructional and Student Resources: DeAnza 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.

- **Student Success Center:** <http://www.deanza.edu/student-success/>
- **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 can be reached at 408.864.8753.

GRADING POLICY CHEM12C Chad Miller Spring 2020

Assessment	Points	Total Points	Percent
Midterms (3)	150	450	45%
Final exam	250	250	25%
Lab exam	150	150	15%
Lab assignments	100	100	10%
Synthesis project	50	50	5%
Total		1,000	100%

Grade	% of Total Points	Grade	% of Total Points
A+	95% - 100%	B-	77% - 79%
A	90% - 94%	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			

Lab Assessments:

1. Competency in experimental principles will be assessed by a Lab exam.
2. Laboratory experience is an essential component of this course and the content will be delivered online as a remote learning experience.
3. Attendance at the first online lab meeting is a requirement to remain registered in this course.
4. All submitted written work related to the lab must be of the student's original authorship regardless if the lab activity was performed individually or with a lab partner. On occasion, students may share experimental data however all lab activities and assignments must be done individually. 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 assignments or activities that are submitted by a student that is the original work of a fellow student will result in a report to Administration as a violation of academic integrity and code of honesty.
5. Lab assignments will vary in content, format and point allocation. The instructor will provide details as they pertain to the individual lab assignments.
6. Lab assignments will be due on scheduled dates. There will be no (zero) make-up lab assignments.
7. If two (2) or more online lab sessions are missed (not attended) a grade of 'F' will result in the course. It is thus highly recommended to attend all lab sessions and not risk a non-passing grade.

Synthesis project:

1. A literature research project in organic synthesis will be a required assignment. A variety of synthetic targets will be identified by the instructor and assigned to students. Students will search the Web to identify a published synthesis. The project will be submitted as an MS Word document or Adobe PDF file and show the synthetic scheme used (referencing the authors and the online or journal source of the published synthesis) and explain the chemistry involved in each step.
2. The due date for the Synthesis project is identified in the Lab schedule.

Three (3) Midterm Exams:

1. The dates of the lecture midterm exams are defined in the Schedule. Midterms are taken during the class lecture time and students must join the class lecture Zoom meeting in order to take the midterm.
2. Scores will not be dropped and midterms need to be taken on their scheduled dates.
3. If one midterm exam is missed due to an emergency medical situation and is physician documented, the average of the two remaining midterm scores will be applied to the missed exam score. There is no make-up exam. There is no accommodation if a second midterm exam is missed; the score will be a '0'.

Final Exam:

1. The Final exam will cumulatively assess the student's ability to be conversant in the course content and familiarity with the topics that are covered in the lectures and laboratory.
2. The Final exam cannot be rescheduled, dropped from the total course grade or substituted.
3. The Final exam will be given online during a Zoom class meeting on Wednesday, June 24, 2020 at 9:15AM – 11:15AM PT.

The handling of course materials and their distribution:

This course is taught as a remote instruction class using online technologies. All course materials, including all content that is delivered to students via Canvas or E-mail in Microsoft Word format, Adobe PDF format, jpeg or other picture file formats, media format or printed materials are under private copyright. The course content is solely intended for use by registered students in this class and no other parties or companies can be given access to it. The content will not be published for general access on the public Internet. The result of copyright infringement is a legal matter.

LECTURE SCHEDULE CHEM12C Spring 2020 Chad Miller [Content subject to change; Klein 3rd ed Chapters]

Week	Day/Date	Lecture Content	Week	Day/Date	Lecture Content
1	Mon 4/13	CH20: Carboxylic acids, reactivity, synthesis, esterification	9	Mon 6/08	Modern methods in peptide synthesis, coupling, cleavage, deprotection
1	Wed 4/15	CH20: Carboxylic acid derivatives, interconversion, transformation	9	Wed 6/10	Modern methods in oligonucleotide chemistry & DNA synthesis
1	Fri 4/17	CH20: Carboxylic acid derivatives synthesis and reactions	9	Fri 6/12	Methods review of peptide/protein sequencing, synthesis, DNA synthesis
2	Mon 4/20	CH21: Enols and enolates; kinetics, thermodynamics aldol condensations	10	Mon 6/15	CH26: Lipids and biomembrane chemistry
2	Wed 4/22	CH21: Enols and enolates; aldol condensations	10	Wed 6/17	Organic chemistry of metabolic pathways
2	Fri 4/24	CH21: Enols and enolates; Claisen condensations, alkylation, annulations	10	Fri 6/19	Course review
3	Mon 4/27	CH21: Enols and enolates, conjugate addition reactions; multistep synthesis	11	Wed 6/24	Final Exam
3	Wed 4/29	Midterm 1			
3	Fri 5/01	CH22: Amines, basicity, reactivity, alkylation, elimination			
4	Mon 5/04	CH22: Amines, Cope, diazonium ion, reductive amination, synthesis			
4	Wed 5/06	Heterocycles structure and chemistry, aromatic substitutions			
4	Fri 5/08	Heterocycles structure in synthesis			
5	Mon 5/11	Pharmaceutical synthetic chemistry, syntheses of market-leading drugs			
5	Wed 5/13	Midterm 2			
5	Fri 5/15	Pharmaceutical chemical synthesis, natural product synthesis			
6	Mon 5/18	CH24: Carbohydrates, structure, aldose, ketose modifications, chirality, reactivity			
6	Wed 5/20	CH25: Amino acids structure, chemistry, synthesis			
6	Fri 5/22	Protein structure, primary, secondary, tertiary, quaternary and function, Hb			
6	Mon 5/25	Memorial Day Holiday			
7	Wed 5/27	Chemistry of enzyme catalysis, active sites, tetrahedral intermediates			
7	Fri 5/29	Midterm 3			
8	Mon 6/01	Chemistry of enzyme catalysis, serine proteases, inhibitors, drug targets			
8	Wed 6/03	Chemical methods of peptide/protein sequencing and characterization			
8	Fri 6/05	Modern methods in peptide synthesis, liquid & solid phase, protecting groups			

LAB SCHEDULE CHEM12C Spring 2020 Chad Miller [Content/dates may vary during the quarter]

Week	Day/Date	Blended Lab Content Experiments from Gilbert & Martin, Experimental Organic Chemistry, with an analysis of experimental methods & predictive spectral results, discussion of Web video demonstrations, analysis of related Web published protocols and articles and an introduction to additional, relevant techniques including fractional distillation, column chromatography, ion-exchange, reversed-phase HPLC, GC, MS. Experimental methods in protein sequencing, peptide synthesis and DNA oligonucleotide synthesis will also be examined.
2	Mon 4/20	Fischer esterification: description of the chemistry, the experimental methods, principles of GC analysis of equilibrium mixture
2	Wed 4/22	Fischer esterification: GC and NMR results, interpretation of data, calculation of equilibrium constants
3	Mon 4/27	Lecture Midterm 1 group study
3	Wed 4/29	Lab1 Synthesis of benzocaine: Theory 759-765 Procedure 764-765
4	Mon 5/04	Lab2 Aldol condensation: Theory 689-691 Procedure 691-692
4	Wed 5/06	Lab3 Robinson annulations: Theory 697-699 Procedure 700-702
5	Mon 5/11	Lecture Midterm 2 group study
5	Wed 5/13	Lab3 Robinson annulations: Theory 697-699 Procedure 700-702
6	Mon 5/18	Lab4 Sulfanilamide, part B Theory 796-803 Procedure 805-806, parts C&D Theory 796-803 Procedure 806-808 part E Theory 796-803 Procedure 809-810
6	Wed 5/20	
7	Mon 5/25	Memorial Day Holiday
7	Wed 5/27	Lecture Midterm 3 group study
8	Mon 6/01	Synthesis of ethanol from fermentation of sucrose. Reactions, fractional distillation, deviations from Raoult's Law, azeotropes
8	Wed 6/03	Lab5 Identify/characterize carbohydrates Theory 882-883 Procedure 883-886
9	Mon 6/08	Lab6 Luminol Theory 782-786 Procedure 787-789
9	Wed 6/10	Experimental methods in peptide and protein sequencing and peptide synthesis and methods in oligonucleotide chemistry and DNA synthesis
10	Mon 6/15	Synthesis Project is due. Lecture Final exam group study
10	Wed 6/17	Lab Exam

CHEM 12C SPRING 2020 SUCCESSFUL STUDY PRACTICES

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 remote learning sessions for Zoom lectures and labs and check the course Canvas site and your email for class updates. This is one of the most important recommendations I can provide. There is a significant amount of learning that takes place during each class lecture and in each lab session and the optimal way to learn and keep current with the stream of content is to attend all class and lab online/live-broadcast meetings and participate in all learning activities in class and in the labs.

1. Read text book chapters and review lecture presentation materials in advance of class.
2. Participate in class discussions, problem solving sessions and office hours.
3. Ask questions to gain clarification and a correct understanding.
4. Identify, establish and maintain a compatible study environment free of distraction.
5. If helpful, and it is my recommendation, study remotely with classmates for support.
6. Learn the material as it is presented and do not accumulate unread chapters or content.
7. Do not attempt to study too much material at any one point.
8. Do not cram before exams – pace your study and problem solving at the class tempo.
9. Try to maintain a healthy lifestyle to facilitate learning and balance school, work and life.
10. Be kind to yourself and try your best to achieve success in a world beleaguered by pandemic.

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.