SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Chemistry

Organic Chemistry Section 01

CHEM 112A

Spring 2023 3 Unit(s) 01/25/2023 to 05/15/2023 Modified 01/30/2023

Contact Information

Instructor: Dr. Andro Rios

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Office Hours

Office hours are below and will be in person. If office hours need to be online, arrangement and zoom links will be posted on canvas. My office hours are times dedicated to assist you and students in all of my courses.

If you have a private matter to discuss, I will handle this individually. Please also realize that office hours are for all of the courses I teach, not only Chem 112A.

Wednesday, 3:00 PM to 4:00 PM, Duncan Hall 516

Friday, 1:00 PM to 2:00 PM, Duncan Hall 516

Or By Appointment

Course Description and Requisites

Chemistry of the carbon compounds, both aliphatic and aromatic, emphasizing underlying concepts.

Prerequisite: CHEM 1B (with a grade of "C" or better; "C-" not accepted).

Letter Graded

Classroom Protocols

Class Meeting Format

Note I am not calling our class meetings "Lectures". Instead, class meetings will be an active format where I first present small segments of essential content before giving you time to apply the concepts as well. I will also often provide worked examples of my own since you need to see the expectations and examples before jumping in on your own or with a classmate.

I am expecting you to use the course schedule (at the bottom of this syllabus) to read the appropriate chapter ahead of our meetings. Course slides/content introduced during class meetings will be available on Canvas so that you will have them on your devices or ready to go for our meetings.

Why this Format? I do this because I have come to learn that learning organic chemistry is very much like learning a new sport, musical instrument or any art form, i.e., it can't be done by only listening to your coach, music or dance instructor telling you how

to do it, or demonstrating their expertise. A key component is that YOU need to be able to try it out too, and to try it when it is fresh in your mind so that you can start to make connections. The other benefit for this in class format is that you have me as your "solutions manual", and you get immediate feedback. That sounds like a good deal!

So what is the take home message for class meetings? Be ready to practice organic chemistry when you come to class

Course Attendance

The key to doing well in Chem 112A is to keep up with the course material as it is covered.

Attendance in the class meeting is not mandatory, but is absolutely, positively, completely, wholeheartedly, emphatically recommended! Remember, if you could teach yourself organic chemistry, you wouldn't be here. This also provides an opportunity to ask questions and get immediate feedback. Exams will occur only during class hours, therefore attendance for testing IS mandatory.

Dates for all exams are firm, so enter these dates on your calendars now. In particular, note the final exam date: **Wednesday May 17rd from 7:15AM to 9:30AM** – do not make any other plans that prevent you from being present on that day and time (e.g. do not purchase tickets to be away on this date).

Course Goals

The goals of this course are to introduce the basic principals of organic chemistry, including nomenclature, properties, and reactions of various classes of organic compounds. The ability to recognize classes of organic molecules, to predict reaction products, to suggest synthetic approaches, and to understand reaction mechanisms will be emphasized.

Itemized Learning Objectives

1. Appreciation for the nature and scope of organic
2. Application of key concepts from general chemistry including electronegativity, bonding (ionic and covalent), hybridization of atomic orbitals, and molecular orbital theory to organic
3. Draw valence bond and Lewis dot structures for organic species, including formal
4. Draw skeletal structures for organic compounds, show stereochemistry clearly
5. Apply acid-base concepts to organic systems; predict ordering of acid or base
6. Name alkanes, alkenes, polyenes, alkynes, alkyl halides, aromatic compounds and their various derivatives using systematic (IUPAC) nomenclature.
7. Learn common names for some key
8. Use bond dissociation energies (BDE's) to calculate reaction
9. Determine oxidation states of organic
10. Draw reaction mechanisms for polar and radical
11. Recognize stereochemistry and be able to apply the Cahn-Ingold-Prelog system to designation of stereochemistry (E/Z or R/S).
12. Apply stereochemistry to determination of reaction
13. Understand the fundamentals of reaction kinetics and be able to apply to the determination of reaction mechanism.
14. Learn many of the reactions of alkanes, alkenes, polyenes, alkynes, aromatic compounds, and closely related species. Be able to both predict products and, in many cases, provide probable reaction mechanisms.
15. Employ the reactions learned in designing multistep organic
16. Learn and be able to apply the material presented in Chapters 1-11 and 14-16 in the text (McMurry, 9th edition) as well as additional topics introduced in lecture.

Course Learning Outcomes (CLOs)

Chemistry 112A satisfies the following Program Learning Outcomes for the Chemistry Department: #2 Demonstrate understanding of core concepts and to effectively solve problems in organic chemistry.

Specifically, Students will be able to recognize and name compounds from various classes of organic molecules, and to understand the unique properties, structure, reactions, and methods of identifying these compounds. Students will be expected to predict the

products of various reactions, suggest reactants to accomplish various chemical transformations and to understand and draw the mechanisms by which these reactions take place

Course Materials

Below are the required and recommended course materials

Organic Chemistry

Author: John McMurry
Publisher: Cengage
Edition: 9th
Availability: On-line Vendors Amazon, Campus Bookstore, Former O.chem students
Price: Highly variable depending on format, Renting or Buying, new, used, etc

Required to have access

I have no particular preference where or how you get this text so please do what is easiest and most economical for you. **I only require** that you **obtain access to the 9th edition** and have **access to Chapters 1 - 15** for this semester.

Model Kit For Organic Chemistry

Highly Recommended

Models sets will help for many of the chapters in this course. There are many types of organic molecular model kits so pick which ever is most economical for you. The one sold by the bookstore is actually pretty good.

Availability: Campus Bookstore or on-line retail sites (Amazon, etc.)
Price: Variable prices

Study Guide and Solution Manual for Organic Chemistry

Author: Susan McMurry
Publisher: Cengage
Edition: 9th
Availability: On-line Vendors Amazon, Campus Bookstore
Price: Highly variable depending on format, Renting or Buying, new, used, etc

Recommended

Getting immediate feedback to learn if you are on the right track from the suggested textbook problems is definitely a great study strategy. I have been told there are some errors within some of the solutions, so if something doesn't make sense reach out to me

Course Requirements and Assignments

Below are the graded assignments, forms of graded assessment and recommended extra practice or extra-credit that are included in this course

Reflection Summary : Building your class community

Learning science certainly helps you understand aspects of the natural world in a fundamental way, but yes, it can also be challenging. Aside from learning content this semester my other goal in this course is for you to grow your interpersonal network of fellow classmates for developing a sense of class community, learning, and studying during this course sequence. I also want to give you the opportunity to get to know me and feel comfortable to reach out when you need it. I will have three early assignments that will get this goal started and will be a part of your course point total.

Quizzes and Exams

Dates for all quizzes and exams can be found on this syllabus and within Canvas.

All quizzes will be submitted to Canvas and can be done collaboratively or individually.

All exams will be taken in-person and you must bring a valid student ID for student verification. Exams will be taken individually.

Extra Practice Problem Sets

Throughout the course, I will be giving you problem sets (they will not be graded) for more practice and to help prepare you for your exams.

Extra Credit Opportunities

There will likely be some extra credit assignment opportunities offered through the semester. All will be focused on highlighting the relevance or applications of organic chemistry to other sciences, or our everyday experience.

✔ Grading Information

Assignment/Grading Policy

Late or missing assignments:

- There will be **NO** make-up quizzes or exams given.
- **Absence due to travel, personal or work related issues is not a reason to miss a quiz or an exam.** The dates are already posted for these. Please make sure you make accommodations to be present for these assignments.

- If there is a **serious emergency** that was beyond your control, please email or talk to me directly about your circumstances and we can devise a method of working around the missing assignment.

Regrade Policy: If you find a grading mistake, either in the accumulation of points or in the grading itself, you have one week from when the assignment was graded to bring it to my attention. I prefer that you use my office hours for this purpose.

For any other accommodations: please refer to academic policies

Criteria

Below is the list of assignments with the associated points that will be used to determine your final point total in this course

Type	Weight	Topic	Notes
Summary Reflections	6%	Meet and Greet a New Classmate	**30 Points Total** (2@15 points each)--> **a total point worth of 3 quizzes!** This assignment is designed to help you grow your class peer network as you progress through this course, ideally, perhaps serve as a way to help you form study groups or simply just to get to know another classmate.
Summary Reflection	4 %	Meet and Greet with Andro	**20 Points Total** **-->worth 2 quizzes!** I would like to have a brief meet and greet with each of you ideally within the first few weeks of class. I would like to learn about you, your career interests, your experience so far at SJSU, perhaps events you have attended (sports, theater, music, dance, etc.). Also because I am brand new to SJSU, I would like to hear from you on best places near campus to grab a bite and relax, or things I should check out, or any advice you have for me in getting adjusted as a new Spartan. After our meeting, you will submit a simple short reflection summary to earn credit.

Type	Weight	Topic	Notes
Quizzes	20%	Collaboratively or Individually-- Your choice!	**100 points total** (10 Quizzes @ 10 points each) There will be a total of 10 quizzes that will be counted toward your grade. Quizzes will be based on lecture content/examples and questions from the suggested problems from textbook chapters (see course schedule table), or extra practice problem sets. Quizzes are open note and open book. The purpose of these quizzes are to help give you feedback on your mastery of the content so you can gauge how you are doing with the level of expectations of this course in the form of exams. **I highly encourage you to work on these quizzes collaboratively** up to a maximum of **a three person** team. Depending on the style/format of the quiz, you may need to acknowledge who your partners are so that I can give you all the same credit. **You are not required to work in a team** and you may certainly take quizzes individually.
Exams	40%	Chapter Exams	**200 Points Total** (Two of your best exams @100 Points each) There will be a total of three chapter exams taken during the semester, but only the two highest scores will be used towards your point total. The exams will be focused on the chapters covered up to that point. See Course schedule for the Dates and focus of the three chapter exams **Exam Policy:** You are required to take any two chapter Exams (all 3 Exams are not required). If you take all 3 semester Exams, the TWO highest scores will be used in the calculation of your grade. If you do not take one of the chapter exams, for any reason, this will be the score which will not be used in the grade calculation. No late or make-up exams will be given. If you miss an exam it will automatically become the exam score you drop. A second missed exam will receive a zero.
Final Exam	30%		**150 Points Total** The final must be taken to obtain a letter grade at the end of the semester. This exam is cumulative because all material from Chem 112A will be needed in Chem 112B.
500 Points	100%	Course Total	**The combined total from the above assignments for this course is 500 points**

Breakdown

- The grades will not be “curved.” You will **NOT** be competing against the class average, instead you will be competing against yourself.
- In order to estimate your current grade in this course and progress towards your course grade, keep track of your scores as the semester progresses. Note that the "class average" for a given exam is not necessarily a "C" grade. Course Grades are assigned by the grade ranges shown below, not by "curves." **Be aware that I cannot give any indication or guarantee of a course grade before the end of the semester.**
- Any modifications from the grade ranges below **will be in your favor,** but you should not expect significant variance from the ranges given below. **In assigning course grades, only one set of criteria are applied equally to all students in the class - everyone has the same opportunity as everyone else to earn their grade.** It’s not fair if I give one student a “break,” but not others.
- Note that "incomplete" grades will only be considered if you have an unexpected situation or emergency that prevents you from finishing the semester. It is required that you have completed most of the course work with a passing grade until that point. A typical situation is a medical emergency that prevents you from taking the final exam - to be considered you must provide documentation and a means to verify the emergency. Poor performance in the class or inability to keep up with the material is not an acceptable reason for an incomplete or to drop the class.

Grade	Range	Notes
A+	97 to 100%	
A	93 to 96%	

Grade	Range	Notes
A -	90 to 92%	
B +	87 to 89%	
B	83 to 86%	
B -	80 to 82%	
C+	77 to 79%	
C	73 to 76%	
C -	70 to 72%	
D+	67 to 69%	
D	63 to 66%	
D-	60 to 62%	
F	Less than or equal to 59%	

University Policies

Per University Policy S16-9 (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (https://www.sjsu.edu/curriculum/courses/syllabus-info.php). Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

A tentative schedule for the semester appears below. **The dates for the quizzes(will be posted soon), exams and the final exam are firm**, but the exact dates of the meeting topics may change based on the pace of the class, which varies considerably from year to year. You must keep up with the meeting topics to know where we are at any moment!

All meeting topics, office hours and exams will be given in-person (unless otherwise stated).

Quizzes may be taken out of class and uploaded to Canvas.

All exams will be given in-person during the scheduled exam time unless otherwise stated in class.

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf (https://www.sjsu.edu/senate/docs/S12-3.pdf).

Week #	Class Meeting Dates (T/Th) (9:00 – 10:15 AM)	Meeting Topic	Reading sections in McMurray (9th ed)	Suggested Practice Problems from McMurray **Problems** are in chapter problems **AP** are Additional Problems at end of chapter

0	Jan. 26	Course Introduction and Structure and Bonding	Chapter 1	**Problems** 1.1 to 1.7, 1.9 to 1.21 **AP:** 1.23, 1.26 to 1.34, 1.36, 1.42,1.44, 1.49 to 1.51, 1.57
1	Jan. 31	Polar Bonds, Acids and Bases	Chapter 2	**Problems** 2.1 to 2.10 **AP:** 2.26, 2.28 to 2.30, 2.33 to 2.38, 2.56
	Feb. 2	Polar Bonds, Acids and Bases Quiz 1 (Ch. 1 and 2) opens	Chapter 2	**Problems** 2.11 to 2.16 **AP:** 2.24, 2.40, 2.41, 2.43 to 2.48, 2.55
2	Feb. 7	Alkanes and their Stereochemistry	Chapter 3	**Problems** 3.1 to 3.3, 3.4 to 3.14, **AP:** 3.19, 3.20, 3.22 to 3.26, 3.27 to 3.31, 3.35 to 3.40
	Feb. 9	Alkanes and their Stereochemistry Quiz 2 (Ch. 3) opens	Chapter 3	**Problems** 3.15 to 3.18, **AP:** 3.21, 3.42 to 3.45
3	Feb. 14	Cycloalkanes and their Stereochemistry	Chapter 4	**Problems** 4.1 to 4.7, 4.9, 4.11, **AP:** 4.22, 4.27 to 4.31
	Feb. 16	Cycloalkanes and their Stereochemistry Quiz 3 (Ch. 4) opens	Chapter 4	**Problems** 4.12 to 4.16, 4.18 to 4.21 **AP:** 4.24, 4.25, 4.35 to 4.39, 4.42 to 4.46, 4.58
4	Feb. 21	Stereochemistry at Tetrahedral Centers/ Preparing for Exam 1/Problem Session	Chapter 5	**Problems** 5.2 to 5.4, 5.7 to 5.12 **AP:** 5.26, 5.32 to 5.36
	Feb. 23	**Exam 1** (Ch. 1 –4)		
5	Feb. 28	Stereochemistry at Tetrahedral Centers/	Chapter 5	**Problems** 5.14 to 5.19, 5.21 to 5.23 **AP:** 5.27, 5.28, 5.37, 5.42 to 5.49, 5.51 to 5.55, 5.66
	Mar. 2	An Overview or Organic Reactions Quiz 4 (Ch. 5) opens	Chapter 6	**Problems** 6.1, 6.2, 6.4 to 6.10 to 6.13, **AP:** 6.17, 6.18, 6.24, 6.25, 6.27, 6.28, 6.32 to 6.36, 6.39
6	Mar. 7	Alkenes: Structure and Reactivity	Chapter 7	**Problems** 7.1 to 7.7, **AP:** 7.22, 7.34 to 7.38
	Mar. 9	Alkenes Structure and Reactivity Quiz 5 (Ch. 6 and 7) opens	Chapter 7	**Problems** 7.8 to 7.21, **AP:** 7.26 to 7.28, 7.31, 7.32, 7.46 to 7.51, 7.54 to 7.59

7	Mar. 14	Alkenes: Reactions and Synthesis	Chapter 8	**Problems** 8.1 to 8.12, **AP:** 8.23 to 8.29, 8.32
	Mar. 16	Alkenes: Reactions and Synthesis Quiz 6 (Ch. 7 & 8) opens	Chapter 8	**Problems** 8.13 to 8.17, 8.20, 8.21, **AP:** 8.40 to 8.45, 8.48 to 8.53, 8.57 to 8.61
8	Mar. 21	Problem Session to Review for Exam 2		
	Mar. 23	**Exam 2** (Ch. 5 – 8)		
9	Mar. 28	**Spring Recess-No classes**		
	Mar. 30	**Spring Recess- No classes**		
10	Apr. 4	Alkynes: Introduction to Organic Synthesis	Chapter 9	**Problems** 9.1 to 9.8 **AP:** 9.14 to 9.19, 9.26 to 9.30
	Apr. 6	Alkynes: Introduction to Organic Synthesis Quiz 7 (Ch. 9) opens	Chapter 9	**Problems** 9.9 to 9.13, **AP:** 9.20 to 9.24, 9.31 to 9.34, 9.36 to 9.38, 9.40 to 9.43, 9.47 to 9.50
11	Apr. 11	Organohalides	Chapter 10	**Problems** 10.1 to 10.8 **AP:** 10.17, 10.22 to 10.25
	Apr. 13	Organohalides Quiz 8 (Ch. 10) opens	Chapter 10	**Problems** 10.9 to 10.13 **AP:** 10.18, 10.26 to 10.28,10.33 to 10.37, 10.44
12	Apr. 18	Reactions of Alkyl Halides- Nucleophilic Substitutions and Eliminations	Chapter 11	**Problems** 11.1 to 11.8, 11.10 to 11.12 **AP:** 11.39, 11.41 to 11.43, 11.45 to 11.48
	Apr. 20	Reactions of Alkyl Halides- Nucleophilic Substitutions and Eliminations Quiz 9 (Ch. 11) opens	Chapter 11	**Problems** 11.14 to 11.19 **AP:** 11.49 to 11.52
13	Apr. 25	Reactions of Alkyl Halides- Nucleophilic Substitutions and Eliminations/ Problem Session Review for Exam 3	Chapter 11	**Problems** 11.20, 11.25 to 11.30 **AP:** 11.55 to 11.57, 11.64 to 11.67, 11.67 to 11.71
	Apr. 27	**Exam 3** (Ch. 9 – 11)		

14	May 2	Conjugated Compounds	Chapter 14	**Problems** 14.1 to 14.6 **AP:** 14.16, 14.17, 14.24 to 14.30
	May 4	Conjugated Compounds and Benzene and Aromaticity	Chapter 14/ Chapter 15	**Problems** 14.7 to 14.12 **AP:** 14.20 to 14.22, 14.31 to 14.39, 14.64
15	May 9	Benzene and Aromaticity Quiz 10 (Ch. 14 & 15) opens	Chapter 15	**Problems 15.1 -15.5,15.7,15.8, 15.11, 15.12** **AP:** 15.18-15.38
	May 11	Problem Session and Preparing for Final exam		
16	**May 17th (Wednesday)** **7:15 AM - 9:30 AM**	**Final Exam** (Cumulative Chapters 1–11, 14, 15)		