

# Chemistry 2096 (Organic Chemistry II, 3 units) Spring, 2020

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**Rohr Science 366**

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**Section 1:** MWF 8:30-9:25 E 122 1/14 – 5/01

**Section 2:** MWF 11-11:55 E 122 1/14 – 5/01

1. **Course Description:** Study of organic compounds by functional group families with emphasis on structures, reactions, mechanisms, stereochemistry, and synthesis. Course includes, as a co-requisite, one 3.5-hour laboratory each week using microscale techniques (CHE2096L).
2. **Course Learning Outcomes:** The following outcomes are expected and will be assessed on exams and quizzes:
  - a) learn to speak and think in the language of organic chemistry
    - i. translate between the names and formulas of organic compounds, particularly aromatic compounds, carboxylic acids and derivatives, aldehydes, ketones, organometallic reagents, and amines
    - ii. identify important named reactions in organic synthesis, including the Diels-Alder reaction, Friedel-Crafts alkylation & acylation, Sharpless epoxidation, Grignard reaction, the aldol, Claisen and Michael reactions, the Robinson annulation, and the Suzuki and Heck reactions
  - b) recognize the relationship between electronic structure and reaction selectivity
    - i. provide the starting materials, reagents, or products of common reactions of alkanes, alkenes, alkynes, alcohols, benzene derivatives, organometallic reagents, carboxylic acids and their derivatives, aldehydes, ketones, and amines
    - ii. draw curved-arrow mechanisms for a variety of chemical transformations
    - iii. explain the regio- and stereo-chemical outcome of a reaction using mechanistic reasoning
  - c) use steric and electronic arguments to predict the rate and product distribution of organic reactions
    - i. predict the relative stability of species (including alkenes, radicals, cations and anions) on the basis of arguments such as resonance, inductive effects, conjugation, hyperconjugation, etc.
    - ii. draw reaction coordinate diagrams for common organic reactions, labeling the reactant(s), product(s), transition state(s), and any intermediates
    - iii. explain reaction rate and product distribution on the basis of relative energy of reactants, intermediates, transition states, and products of a reaction
  - d) understand strategies for designing efficient syntheses of target molecules
    - i. propose a reaction or series of reactions that would lead to a given target molecule
    - ii. justify the selection of one route over another on the basis of reaction selectivity
  - e) use infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy for elucidating the structure of organic molecules
    - i. use infrared spectral data to infer the functional groups present in an unknown carbon compound
    - ii. analyze 1D <sup>1</sup>H NMR data – including chemical shift, integration, and splitting information – to infer the electronic environment, equivalence, and proximity of hydrogen atoms in an organic compound

**Program Learning Outcomes:** CHEM PLO 2 (GC, IR) and BCHM PLO 3 (GC, IR) will be assessed directly by faculty laboratory instructors' observation of students' use of instruments.
3. **Texts:** Janice Gorzynski Smith, **Organic Chemistry**, 5<sup>th</sup> edition, McGraw-Hill Publishing, 2017. You are expected to purchase a copy of this text.

**CONNECT Allocation:** This is a web based homework site. If you purchased CONNECT access last semester it should be good through this semester. A stand alone copy of CONNECT can be purchased online, which includes the e-book. Our section web address is:

<https://connect.mheducation.com/class/m-perry-all-sections-5>

4. **Internet Resources and Communication:** You will be required to access this course on Canvas. I will place chapter notes for the class on this sight that you will have to print. Sections of the notes will be completed in videos that you will watch before coming to each class. The notes may contain some information that is not in the text. If filled out correctly, your notes should serve as an excellent chapter summary for review. I will generally have the notes for a given class on-line by 5:00 p.m. the day before we begin the chapter in class. Also, you are expected to access the CONNECT online homework site.
5. **Assigned Problems:** There will be a set of assigned problems due at the beginning of each class from the material covered in the pre-class videos. These problems will count for 10% of your course grade.. In Addition, you will be assigned a set of homework for every chapter to be completed online at the CONNECT web site. The assignment for each chapter includes all of the possible questions and will be due no earlier than 11:59 pm two days after the completion of a chapter in lecture. You will be graded out of 100 points per assignment, which correlates to 10 problems. These assignments are invaluable in preparing you for the in-class exams. I strongly encourage you to solve as many problems as possible as working problems is the only practical way for learning the material, and you should try your best to solve the problems before looking at the solutions. The online homework will count for 10% of your overall course grade.
6. **Group Work:** You will be required to perform some in-class work in groups. These groups will consist of 3-4 students and will be assigned in the beginning of the semester. Group work will consist of short assignments and quizzes as well as exam review. Group work will count toward 10% of your overall course grade.
7. **Christian Practice:** There ought to be something different about a course taken at PLNU when compared to an institution that is not faith based. This difference, at least for Organic Chemistry, is not in content. It is, instead a difference in the class community. I desire for our class to be one in which the needs of others in the class are considered by the community. You will draw a name of a classmate early in the semester, and you will be asked to pray for them throughout the semester. You will be required to fill out a log that includes the times you have prayed for this student as well as times that you have encouraged a classmate or helped them in some way. You will hand this log in at the end of the semester and will be required to have at least 10 entries. This log will count for 80 points. In addition, you will be required to write a brief reflection on the overall assignment. This will also be worth 20 points. This Christian practice, love of neighbor, assignment will be worth 5% of your overall course grade.
8. **Office Hours:** I will make every effort to be available in my office during the times I've indicated below for office hours. I will hold office hours in my office or I will post my location. You are welcome to schedule an appointment or take your chances and drop by my office, especially if you find these times inconvenient.  

**Office Hours**  
Monday: 3-4,  
Tuesday: 10:30-12  
Wednesday: 1:30-2:30  
Friday: 1:30-3
9. **Help Sessions:** I will do my best to schedule some class time prior to each exam for me to answer any questions that you might have.
10. **Quizzes:** There will be four (memorization based content) quizzes worth 10 points each given over the course of the semester. There will also be three post-exam quizzes throughout the semester worth 20 points each. Quizzes will count for 10% of your course grade.

11. **Examinations:**

- a) **Major Exams:** Exams will cover material in the text and the lecture material as well as any other assigned material. There will be 4 major exams worth 100 points each. These will count for 40% of your overall course grade. There will be no exam scores dropped. Exams will be comprehensive but material covered since the previous exam will be emphasized. **If you are caught cheating, you can be given a zero on that quiz or exam, and may be subject to further action as stated in university policy. Makeup examinations will be given only for excused absences provided the appropriate documentation is provided within the time frame (2 working days of the end of the excused absence). This is an absolute deadline by which you must notify me of any excused absence!** I would certainly appreciate it if you contact me the day of the examination or before the examination if you must miss an exam for any reason. My phone (619-849-2976) has a 24-hour message service so you may leave a message (always leave a number where you may be reached). If you are unable to call me then have your roommate, parents, etc. make the contact for you. If you find that there are errors in the grading of your exam, you will have two class periods after the exam has been returned to submit your exam for re-grading.
- b) **Final Exam:** A mandatory final exam will be given at the time dictated by the University schedule. The final will be a standardized test produced by the American Chemical Society covering the full year of Organic Chemistry. The final will count for 15% of your overall course grade.
- c) **Exam Schedule:** A schedule for the 4 hour exams and final exam is given below. Although it should not be necessary, changes in exam dates, if required, will be announced at least two days in advance. If you miss class and do not find out about the changes, that is your problem and it is not a valid reason for requesting a make-up exam. The date for the final exam is firm as set by University policy.

Exam #1	February 10 (Monday)
Exam #2	March 6 (Friday)
Exam #3	April 6 (Monday)
Exam #4	April 29 (Wednesday)
Final	May 6 (Wednesday 4:30-7)

12. **Laboratory:** You are required to register and attend CHE2096L as a co-requisite for this course. If you drop the lab, you may be required to drop the course as well. This lab is worth 1 unit and will be graded independently. You will receive a separate lab syllabus.
13. **Course Grade:** Your overall course grade will be based on your performance in lecture. You will receive a separate grade for the laboratory. The weighting of each course activity is shown below.

Note Problems	10%
Homework	10%
Group work	10%
Quizzes	10%
Christ. Practice	5%
Hour exams	40%
Final	15%

Letter grades will be assigned at the end of the course based on your percentage of total possible points, according to the following APPROXIMATE scale:

A	90 – 100%
B	80 – 90%
C	70 – 80%
D	60 – 70%
NC/F	< 60%

(+) and (–) grades will be assigned within each bracket. (There is no A+ grade.) CHE294L is graded on a Credit/No Credit basis.

14. **Attendance:** Attendance will be taken and will be used for advising purposes. If your absence is not excused, then you will get a zero for any group work done on that day. If you miss 20% of the total class meetings (8), you can be dropped from the course.

15. **Course Syllabus:** Listed below is a syllabus with approximate lecture coverage and approximate examination points indicated.

Date	Chapter	Content	Pre-Class Video
1-14		Introduction	N/A
1-15	12	Oxidation and Reduction	12.1
1-17	12	Oxidation and Reduction	12.2
1-22	12	Oxidation and Reduction	15.1
	15	Radical reactions	
1-24	15	Radical reactions	15.2
1-27	15	Radical reactions	15.3
1-29	16	Conjugation, Resonance, Dienes	16.1
1-31	16	Conjugation, Resonance, Dienes	16.2
2-3	16	Conjugation, Resonance, Dienes	16.3
2-5	17	Benzene and Aromaticity	17.1
2-7		Group Assignment/Review	N/A
2-10		<b>EXAM #1 (Chpt. 12, 15, 16)</b>	
2-12	17	Benzene and Aromaticity	17.2
2-14	18	Reactions of Aromatic Compounds	18.1
2-17	18	Reactions of Aromatic Compounds	18.2
2-19	18/26.2	Reactions of Aromatic Compounds	18.3
2-21	19	Carboxylic Acids	19.1
2-24	19	Carboxylic Acids	20.1
	20	Carbonyls/Organometallics	
2-26	20	Carbonyls/Organometallics	20.2
2-28	20	Carbonyls/Organometallics	20.3
3-2	20	Carbonyls/Organometallics	20.4
3-4		Group Assignment/Review	N/A
3-6		<b>EXAM #2 (Chpt. 17-20)</b>	
3-16	21	Carbonyl Addition	21.1
3-18	21	Carbonyl Addition	21.2
3-20	21	Carbonyl Addition	21.3
3-23	22	Nucleophilic Acyl Substitution	22.1
3-25	22	Nucleophilic Acyl Substitution	22.2
3-27	22	Nucleophilic Acyl Substitution	22.3
3-30	23	Alpha Carbon Substitution	23.1
4-1	23	Alpha Carbon Substitution	23.2
4-3		Group Assignment/Review	N/A
4-6		<b>EXAM #3 (Chpt. 21-23)</b>	
4-8	24	Condensation Reactions	24.1
4-15	24	Condensation Reactions	24.2
4-17	24	Condensation Reactions	24.3

Date	Chapter	Content	Pre-Class Video
4-20	25	Amines	25.1
4-22	25	Amines	25.2
4-24	28	Carbohydrate Review	28.1
4-27		Group Assignment/Review	N/A
4-29		<b>EXAM #4 (Chpt. 24, 25, 28)</b>	
5-1		Final Review	N/A
5-6		<b>FINAL EXAM (4:30-7)</b>	

16. **Academic Accommodations:** While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. ([DRC@pointloma.edu](mailto:DRC@pointloma.edu) or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

17. **University Mission:** Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.
18. **Copyright:** Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.
19. **Academic Honesty:** Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.