

# Chemistry 304 (Organic Chemistry II, 4 units) Spring, 2018

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Section 1: MWF 8:30-9:35 LA 102 1/09 – 4/27

Section 2: MWF 1:30-2:35 E 121 1/09 – 4/27

1. **Course Description:** Study of organic compounds by functional group families with emphasis on structures, reactions, mechanisms, stereochemistry, and synthesis. Course includes one 3.5-hour laboratory each week using microscale techniques.
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  $^1\text{H}$  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. You are required to purchase access. If you bought a new book from the book store you already received access to CONNECT in your bundle. Our section web address is <https://connect.mheducation.com/class/m-perry-all-sections-2>. A stand alone copy of CONNECT can be purchased online, which includes the e-book.

Janice Gorzynski Smith, **Study Guide / Solutions Manual to Accompany Organic Chemistry**. You might want to purchase a copy of this book.

**Preparing for Your ACS Examination in Organic Chemistry, The Official Guide**, published by the American Chemical Society is an optional but useful aid in preparing for the final exam.

4. **Molecular Models:** You will find that a set of molecular models is very useful in this course.
5. **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 out prior to class. The notes will contain blanks which you will be required to fill in during lecture. The notes may contain some information that is not in the text. I will have the notes for a given class on-line by 10:00 p.m. the day before lecture. If I fail to provide the notes by such time, I will bring copies to class. Also, you are expected to access the CONNECT online homework site.
6. **Assigned Problems:** 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 by 11:59 pm two days after the completion of a chapter in lecture. A late penalty of 10% per day past the due date will be enforced. 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.
7. **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 9% 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. You are welcome to schedule an appointment or take your chances and drop by, especially if you find these times inconvenient.

**Office Hours**

Monday: 10:45-12:00,

Tuesday: 2-3

Wednesday: 10:45-12:00

Friday: 10:45-12:30

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 quizzes worth 20 points each given over the course of the semester. These quizzes can take on different forms, which may include but are not limited to the following: take home, in-class, in-class open book, or in-class group work. These quizzes will count for 5% of your overall 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 36% 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 (849-2976) has a 24-hour message service so you may leave a message (always leave a phone 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 an American Chemical Society Exam covering the full year of Organic Chemistry. It will be all multiple choice questions. It will be worth 15% of your overall grade.
- c) **Exam Schedule:** A tentative, but reasonably accurate, schedule for the 4 hour exams and final exam is given below. Changes in exam dates 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 5 (Monday)
Exam #2	March 2 (Friday)
Exam #3	April 6 (Friday)
Exam #4	April 25 (Wednesday)
Final	May 4 (Friday 4:30-7)

12. **Laboratory:** You are required to participate in the laboratory portion of this class. The lab will count for 25% of your overall course grade. A laboratory specific syllabus will be provided with relevant course information. **You must earn at least 60% of the points possible in lab and earn a passing grade in the lecture in order to earn a passing grade for the class.**
13. **Course Grade:** Your overall course grade will be based on your performance in both the lecture and laboratory. The weighting of each course activity is shown below.

Homework	10%
Group work	9 %
Quizzes	5%
Hour exams	36%
Final	15%
Laboratory	25%

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. You must earn at least 60% of the possible points in lecture and lab to pass the course.

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	Approximate % of Lecture
1-9		Introduction	100
1-10	12	Oxidation and Reduction	100
1-12	12	Oxidation and Reduction	100
1-17	12	Oxidation and Reduction	50
	15	Radical reactions	50
1-19	15	Radical reactions	100
1-22	15	Radical reactions	100
1-24	16	Conjugation, Resonance, Dienes	100
1-26	16	Conjugation, Resonance, Dienes	100
1-29	16	Conjugation, Resonance, Dienes	100
1-31	17	Benzene and Aromaticity	100
2-2		Group Assignment/Review	100
2-5		<b>EXAM #1 (Chpt. 12, 15, 16)</b>	
2-7	17	Benzene and Aromaticity	100
2-9	18	Reactions of Aromatic Compounds	100
2-12	18	Reactions of Aromatic Compounds	100
2-14	18	Reactions of Aromatic Compounds	100
2-16	19	Carboxylic Acids	100
2-19	19	Carboxylic Acids	50
	20	Carbonyls/Organometallics	50
2-21	20	Carbonyls/Organometallics	100
2-23	20	Carbonyls/Organometallics	100
2-26	20	Carbonyls/Organometallics	100
2-28		Group Assignment/Review	100
3-2		<b>EXAM #2 (Chpt. 17-20)</b>	
3-12	21	Carbonyl Addition	100
3-14	21	Carbonyl Addition	100
3-16	21	Carbonyl Addition	100
3-19	22	Nucleophilic Acyl Substitution	100
3-21	22	Nucleophilic Acyl Substitution	100
3-23	22	Nucleophilic Acyl Substitution	100
3-26	23	Alpha Carbon Substitution	100
3-28	23	Alpha Carbon Substitution	100
4-4		Group Assignment/Review	100
4-6		<b>EXAM #3 (Chpt. 21-23)</b>	
4-9	24	Condensation Reactions	100
4-11	24	Condensation Reactions	100
4-13	24	Condensation Reactions	100

Date	Chapter	Content	Approximate % of Lecture
4-16	25	Amines	100
4-18	25	Amines	100
4-20	28	Carbohydrate Review	100
4-23		Group Assignment/Review	100
4-25		<b>EXAM #4 (Chpt. 24, 25, 28)</b>	
4-27		Final Review	100
5-4		<b>FINAL EXAM (4:30-7)</b>	

16. **Academic Accommodations:** While all students are expected to meet the minimum academic standards for completion of this course as established by the instructor, students with disabilities may require academic accommodations. At Point Loma Nazarene University, students requesting academic accommodations must file documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Once the student files documentation, the Disability Resource Center will contact the student's instructors and provide written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. This policy assists the university in its commitment to full compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities (ADA) Act of 1990, and ADA Amendments Act of 2008, all of which prohibit discrimination against students with disabilities and guarantees all qualified students equal access to and benefits of PLNU programs and activities.
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.