Chemistry 304 **Organic Chemistry II Syllabus** Spring 2016

Instructor
Katherine Maloney
Associate Professor of Chemistry
Office: Rohr Science 302B
Phone: x3425
Email: katherinemaloney@pointloma.edu
Office Hours: M 10:30-12 & 3-4; W 11-12 & 1:30-3:30 in RS302B; R 8:30-11; 2-5 in RS321 (during lab); and by appointment

Course Meeting Times
MWF 8:30–9:35 am
Latter Hall 101

Required and Recommended Resources
Janice Gorzynski Smith *Organic Chemistry*, 4th Edition, and CONNECT online homework access are required (see below). The accompanying *study guide/solutions manual* is an optional but useful aid.

A *molecular model set* will be a tremendous asset for visualizing three-dimensional structures.

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.

Course Website
https://canvas.pointloma.edu/ Course: **CHE304-1 SP16 - ORGANIC CHEMISTRY II**

Suggested practice problems, exam keys, and extra copies of class handouts will be available *only* on the course website.

Introduction Problems and In-Class Exercises
A few short Introduction Problems will be assigned daily and will often be used to begin class discussion, with students presenting their solutions. The questions will be based on that day's reading assignment and will cover new material. You will work on these problems outside of class. Answers to Intro Problems will be collected to verify *participation* and *effort*.

In addition, In-class Exercises will frequently be distributed to help solidify concepts in that day's lecture. At the discretion of the instructor, these in-class exercises may also be collected to verify participation and effort.

Assignments
Problems requiring greater thought and reflection will be completed outside of class and will be due periodically throughout the course. Given the large class size and recognizing the need for rapid feedback, a portion of each assignment will be *electronic* and provided by CONNECT. If you bought a new book from the book store you already received access to CONNECT in your bundle; alternatively, a copy of CONNECT with the online textbook can be purchased online for approximately $120 (plus tax). The CONNECT format allows you to check your answer in real time. Note that the interface will only accept homework submissions up to the set due time and date.

To set up or to use your CONNECT account for this course, visit:

http://connect.mheducation.com/class/k-maloney-spring-2016

Exams
There will be one quiz (30 minutes, in class), four midterm exams (one hour each, in class) and one final (two hours). Despite focusing on recently-covered material, midterm exams are technically *cumulative* and may assume knowledge from CHE294 or earlier in CHE304.

The final exam is a *comprehensive* standardized multiple choice exam published by the American Chemical Society. You may find the ACS study guide (listed above under *Resources*) helpful as you prepare for the final. See the course schedule for exam dates.

Makeup examinations will be given only for excused absences. In such cases, appropriate documentation must be provided within two working days of the end of the excused absence.

Laboratory
An exciting set of laboratory exercises have been selected to supplement the lectures in this course. These exercises are a valuable opportunity to apply your learning in a hands-on way! A laboratory-specific syllabus and schedule will be provided on the first day of lab. At least 60% of the points possible in lab and a passing grade in the lecture are required to pass CHE304.

Attendance
Regular attendance is absolutely essential to success in CHE304. Students who miss class for any reason are ultimately responsible for anything covered in that class (including announcements). Students who miss 20% of the total class meetings (8 meetings) may be dropped from the course. See Academic Policies in the Undergraduate Academic Catalog.

Grades
Your final grade will be determined as follows:

Intro Problems + In-class Exercises	10%
Homework Assignments	10%
Laboratory	25%
Quiz + Midterm Exams	40%
Final Exam	15%
Total	**100%**

Academic Integrity
All students enrolled in this course are expected to adhere to the highest standards of academic integrity.

- Collaboration with other students on problem sets is encouraged, but it is in your interest to ensure that you fully understand the underlying material.
- Intro Problems should be completed before class. Taking notes on the Intro Problems during class is encouraged, but you should clearly indicate which parts were added in class, for example, using a different color pen.
- Use of any unauthorized aids on exams is prohibited. Any cases of cheating will be prosecuted to the full extent of university policy.
- Collaboration with other students on the experiment, data collection, and data analysis for laboratory reports is encouraged, but the report should be your own.
- Improper use of sources on lab reports is both illegal and unethical, and is grounds for a failing grade. (Note that it is possible to commit plagiarism even while citing the source. For clarification, see the instructor.)

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.

Academic Accommodations
If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information.

Strategies for success in CHE304

1. Focus on recognizing *patterns* and understanding *general concepts* that are applicable to a variety of situations rather than merely memorizing information.
2. Work practice problems (lots of them)! Extra practice problems from Smith will be posted in Connect. And *hide the answer key*. Often the most challenging part of a problem is figuring out what is being asked of you; don't skip practicing this skill!
3. Come prepared to class. The time you invest reading the assigned sections and answering intro problems before class will be repaid in full when it comes time to study for the exams!
4. Get help if you don't understand something! The instructor is here for you.

Advice from recent CHE304 students:

- Do the intro problems, they keep you up to date in the material.
- Read the book and make notecards.
- Just go into her office and talk to her, you honestly won't regret it.
- Come prepared to class with the intro problems and the reading completed. It makes class way more fun and it's easier to do the in−class assignments…and any questions you have can be cleared up right then and there.
- After the second test things start picking up so try to set aside time to understand the mechanisms before the week of the test!
- Read and work through the example problems in the chapter, treat the intro problems as a quiz for self-evaluation, and then have questions about the section ready for class.
- Be prepared to work hard but have fun.
- Keep up with the reading and talk to Dr. Maloney about how to study better.
- Be meticulous about lab reports, esp. at first.
- 1) Go to office hours and ask questions when you are lost.(Preferably before the day before an exam). 2) Don't shy away from the tutorial center. It's a resource there to help you. 3) Work with others and help each other learn.
- Try to work through every problem without giving up.
- Don't just memorize reactions; know how and why they work the way they do. Put in the work and you'll benefit.
- Really try on the intro problems don't just look for the solutions when reading. Understand what is truly happening.
- Set aside time each day for organic chemistry
- PRAY…and have fun. It's a good class.

Chemistry 304 Goals	**Chemistry 304 Outcomes**
Students will:	Students will be able to:
1. learn to speak and think in the language of organic chemistry	a. translate between the names and formulas of organic compounds, particularly aromatic compounds, carboxylic acids and derivatives, aldehydes, ketones, organometallic reagents, and amines b. 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
2. recognize the relationship between electronic structure and reaction selectivity	a. 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 b. draw curved-arrow mechanisms for a variety of chemical transformations c. explain the regio- and stereo-chemical outcome of a reaction using mechanistic reasoning
3. use steric and electronic arguments to predict the rate and product distribution of organic reactions	a. 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. b. draw reaction coordinate diagrams for common organic reactions, labeling the reactant(s), product(s), transition state(s), and any intermediates c. explain reaction rate and product distribution on the basis of relative energy of reactants, intermediates, transition states, and products of a reaction
4. understand strategies for designing efficient syntheses of target molecules	a. propose a reaction or series of reactions that would lead to a given target molecule b. justify the selection of one route over another on the basis of reaction selectivity
5. use infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy for elucidating the structure of organic molecules	a. use infrared spectral data to infer the functional groups present in an unknown carbon compound b. analyze 1D ^{1}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.

Chemistry 304 **Organic Chemistry II** Spring 2016

***Tentative* Schedule**

Class	Day	Date	Topic	Reading	Special Events
1	T	Jan 12	Review	Review Ch 1-11,13,14	
2	W	Jan 13	Review	Review Ch 1-11,13,14	
3	F	Jan 15	Reduction of alkenes, alkynes and alkyl halides	12.1-12.3, 12.5, 12.6	
	M	Jan 18	*MLK Day—No class*		
4	W	Jan 20	Oxidation of alkenes, alkynes and alcohols	12.7-12.12, 12.15	
5	F	Jan 22	Finish Redox + Quiz: Chapter 12		Assignment 1 Due (CONNECT only)
6	M	Jan 25	Radical halogenation of alkanes	15.1-15.8	
7	W	Jan 27	Radical addition & polymerization of alkenes	15.10, 15.13-15.14	
8	F	Jan 29	Resonance and allylic carbocations	16.1-16.6	
9	M	Feb 1	Conjugated alkenes and ultraviolet light	16.8-16.11, 16.15	
10	W	Feb 3	Introduction to the Diels-Alder reaction	16.12-16.14	
11	F	Feb 5	Stereochemistry of the Diels-Alder reaction	16.13C-16.13D	Assignment 2 Due
12	M	Feb 8	Exam 1: Chapters 12, 15, 16		
13	W	Feb 10	Benzene & aromaticity	17.1-17.4, 17.6-17.8	
14	F	Feb 12	Electrophilic aromatic substitution (EArS)	18.1-18.4	
15	M	Feb 15	Friedel-Crafts alkylation and acylation	18.5	
16	W	Feb 17	Directing effects in EArS	18.6-18.11	Assignment 3 Due
17	F	Feb 19	Synthesis of benzene derivatives	18.12, 18.14-18.16	
18	M	Feb 22	Properties and reactions of carboxylic acids	19.1-19.4, 19.7-19.11	
19	W	Feb 24	Oxidation and reduction of aldehydes & ketones	20.1-20.4, 20.7, 20.8	
20	F	Feb 26	Asymmetric reductions; reduction of esters, amides, and acid chlorides	20.5-20.7	Assignment 4 Due
21	M	Feb 29	Exam 2: Chapters 17-19		
22	W	Mar 2	Organometallica, part I: Organolithium and Grignard reagents	20.9-20.11, 20.14	
23	F	Mar 4	Organometallica, part II: Organocuprates and synthesis	20.13, 20.15, 20.17	
	M-F	Mar 7-11	*Spring Break—No class*		
24	M	Mar 14	Properties and synthesis of aldehydes & ketones	21.1-21.4, 21.6	
25	W	Mar 16	Reactions of aldehydes & ketones (featuring the Wittig reaction)	21.7-21.10, 21.13	Assignment 5 Due
26	F	Mar 18	Imines, enamines, and acetals	21.11-21.15	

27	M	Mar 21	Properties and synthesis of carboxylic acid derivatives	22.1-22.5, 22.10	
28	W	Mar 23	Substitution reactions of carboxylic acid derivatives	22.7-22.9, 22.11, 22.13, 22.18	
	R-M	Mar 24-28	*Easter Break—No class*		
29	W	Mar 30	Polymers	22.16, Chapter 31	Assignment 6 Due
30	F	Apr 1	Enols and enolates: Acidity of the α hydrogen	23.1-23.5	
31	M	Apr 4	Exam 3: Chapters 20-22, 31		
32	W	Apr 6	Reactions at the α carbon	23.4, 23.6-23.8	
33	F	Apr 8	The aldol reaction	24.1-24.4	
34	M	Apr 11	The Claisen reaction	24.5-24.7	
35	W	Apr 13	Conjugate addition reactions: the Michael reaction and Robinson annulation	24.8, 24.9, Review 20.15	
36	F	Apr 15	Review: Reactions of carbonyl compounds	Chapters 20-24	Assignment 7 Due
37	M	Apr 18	Properties of amines	25.1-25.5, 25.9, 25.10	
38	W	Apr 20	Reactions of amines	25.7, 25.8,-25.11	
39	F	Apr 22	Palladium-catalyzed cross-coupling reactions	26.1-26.3	
40	M	Apr 25	Exam 4: Chapters 23-25		
41	W	Apr 27	Introduction to carbohydrates & Fischer projections	28.1-28.3, 28.6	
42	F	Apr 29	*Final Exam Review*		Assignment 8 Due (CONNECT only)

7:30-10am	F	May 6	Comprehensive Final Exam		