Chemistry 351 **Organic Structure Elucidation Syllabus** Fall 2017

Instructor
Katherine Maloney,
Associate Professor of Chemistry
Office: Rohr Science 302b
Phone: x 3425
Email: katherinemaloney@pointloma.edu
Office Hours: By appointment

Course Meeting Times
MWF 11:00 am - 12:05 pm
Rohr Science 13

Laboratory
Sator Hall 216
See *Lab Manual* for details

Textbook
Required: Pavia, Lampman, Kriz and Vyvyan, *Introduction to Spectroscopy*, 5th Edition.

Recommended: Doucleff, Hatcher-Skeers, and Crane, *Pocket Guide to Biomolecular NMR*.

Course Website
https://canvas.pointloma.edu/ Course: **CHE351-1 FA17 - Organic Structure Elucidation**

Additional readings, assignments, exam keys, laboratory materials, and extra copies of class handouts will be available *only* on the course website.

Introduction Problems
A few short Introduction Problems will be assigned daily and will often be used to begin class discussion. 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*.

Assignments
Problems requiring greater thought and reflection will be completed outside of class and will be due periodically throughout the course. (See the course schedule for due dates). In the interest of providing rapid feedback despite the large class size, only one or two of the assigned problems will be graded. *(Note that you won't be told which problem will be graded, so you would be wise to do your best on each!)* You are strongly encouraged to compare *all* your answers to the answer key, which will be posted on Canvas after the due date.

Exams
There will be one midterm exam (one hour, in class) and one cumulative final exam (two and a half hours) outside of class time. See the course schedule for the dates of the exams.

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
In the laboratory component of this course, you will apply what you are learning in class to the structure elucidation of two organic unknowns. Since you will be acquiring your own data on each instrument (of which there is typically only one), you'll need to sign-up online for times during the week to perform the lab. For lab each week, you and a partner will *(1)* acquire data using PLNU instrumentation, *(2)* perform an in-depth analysis of the data, and *(3)* answer analysis questions regarding your results. Two formal reports (one for each unknown) will also be due during the semester. Additional details regarding each aspect of the laboratory can be found in the lab manual, which will be distributed in the second week of class.

Chemistry 351 **Organic Structure Elucidation Syllabus** Fall 2017

Attendance
Regular attendance is absolutely essential to success in Chem 351. 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 (4 meetings) may be dropped from the course. See Academic Policies in the Undergraduate Academic Catalog.

Grades
Your final grade will be determined as follows:

Assignments	20%
Intro Problems	15%
Laboratory	30%
Midterm Exam	15%
Final Exam	20%
Total	**100%**

Academic Integrity
All students enrolled in this course are expected to adhere to the highest standards of academic integrity. If you are uncertain of the legitimacy of a particular action, you should contact the course instructor and request clarification.

- 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.
- You must adhere to proper use of sources in laboratory reports. If you restate an *original idea* from a source in your own words, you must cite that source. If you use *wording* from a source, you must cite the source ***and*** put the borrowed wording in quotation marks. Failure to do so is plagiarism; it is both illegal and unethical, and is grounds for a failing grade.
- Use of any unauthorized aids on exams is prohibited. Any cases of cheating will be prosecuted to the full extent of university policy.
- Assignments and exams from this course may not be committed to dorm repositories or otherwise be used to help future students.

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.

Program Learning Outcomes: CHEM PLO 2 (NMR) will be assessed directly by faculty laboratory instructors' observation of students' use of instruments.

Chemistry 351 **Organic Structure Elucidation** Fall 2017

***Tentative* Schedule**

		Date	Topic	Reading*	Special Events†	Lab§
1	T	Aug 29	Intro to organic structure analysis			
2	W	Aug 30	Mass spectrometry, part I: the molecular ion	δ Chapter 3, 1.4, 1.5		
3	F	Sept 1	Mass spectrometry, part II: fragmentation	δ Chapter 4		
	M	*Sept 4*	*Labor Day – no class*			
4	W	Sept 6	Intro to infrared spectroscopy	δ 2.1-2.6		***In lab: GCMS***
5	F	Sept 8	Interpreting IR spectra	δ 2.7-2.23		
6	M	Sept 11	Intro to ^{1}H NMR spectroscopy	***ǂ Chapter 1***, δ 5-5.7		GCMS Qs Due
7	W	Sept 13	Chemical shift and equivalence	δ Chapter 5	Assignment 1 Due	***In lab: IR***
8	F	Sept 15	Intro to spin-spin coupling	***ǂ 2.1, 2.2***, δ 5.17, 7.5, 7.6		
9	M	Sept 18	Coupling constants and exchange	δ Chapter 7, 8.1-8.3		IR Qs Due
10	W	Sept 20	Intro to ^{13}C NMR spectroscopy	δ Chapter 6		***In lab: 1D NMR***
11	F	Sept 22	Reading and writing about structure elucidation	Journal articles tba	Assignment 2 Due	
12	M	Sept 25	Midterm Exam *(MS, IR, 1D NMR)*			1D NMR Qs Due
13	W	Sept 27	^{13}C chemical shifts and DEPT	δ 6.10, 9.4, 9.5		***In lab: Unknown 2 GCMS & IR***
14	F	Sept 29	Intro to 2D NMR	***ǂ Chapter 2***, δ 9.6-9.10		
15	M	Oct 2	^{1}H-^{1}H COrrelation SpectroscopY (COSY)	δ 9.7	Assignment 3 Due	Report 1 Due
16	W	Oct 4	One-bond heteronuclear experiments: HETCOR, HSQC/HMQC	δ 9.8, 9.9		
17	F	Oct 6	Heteronuclear multiple bond correlation (HMBC)			***In lab: Unknown 2 1D & 2D NMR***
18	M	Oct 9	INADEQUATE and NOESY	***ǂ 3-3.2***, δ 6.5, 8.11, 9.10		
19	W	Oct 11	Solving structure elucidation problems	δ 9.12, Chapter 11	Assignment 4 Due	
20	F	Oct 13	Catch up day			
	M	Oct 16	*Final Exam 4:00 - 6:30 pm in Latter 102*			
	T	Oct 17				Report 2 Due

* The assigned readings shown here are tentative. A more up-to-date reading assignment can be found at the top of each day's Intro Problems. δ denotes readings from Pavia *et a l*. **ǂ** denotes readings from Doucleff *et al.*

† Assignments are due at the start of lecture.

§ Lab questions are due Monday at 5pm. Reports are due by 5pm on the days indicated above.