



SAINT LOUIS UNIVERSITY  
MADRID

## CHEM-2420-M01 Organic Chemistry 2

Spring 2018

**Class Days and Time:** MW 14:30 - 15:45

**Classroom:** PAH 24

**Prerequisite(s):** A grade of C- or better in CHEM-2410.

**Credit(s):** 3

**Lab: 1 credit.** Your lab grade is an entirely separate grade determined by your lab instructor, and it will appear as such on your transcript. **Lab attendance is mandatory, unless excused by illness. Missing more than three labs will be graded as F.**

**Instructor:** Tania de la Fuente

**Instructor's Email:** tania.delafuente@slu.edu

**Instructor's Campus Phone:** 91 554 58 58, ext. 268

**Office:** PAH-204

**Office Hours:** MW 13:00 - 14:00, or by appointment

### Course Description:

This course is a continuation of CHEM-2410, you will again be introduced to the fundamental principles of organic chemistry. Continuing our study of common organic functional groups, we will explore the structure and reactivity of carbonyl compounds, aromatic compounds, amines, ethers, epoxides and sulfides. Structure elucidation of organic molecules by means of NMR spectroscopy will again be emphasized. In addition, toward the end of the course, students will be familiarized with the structure, properties, and reactivity of carbohydrates, amino acids, peptides, proteins and lipids.

Organic Chemistry is not only an interesting and fascinating field of study, but application of the concepts you will learn in this course lead every day to the synthesis of important new materials and pharmaceutical drugs, and to developing sophisticated new lab experiments to understand various natural/biological processes. Most areas of modern science, especially medicine, biology and engineering, are strongly influenced by developments in organic chemistry, and the ability to synthesize and structurally characterize organic molecules greatly facilitates research in these other disciplines.

### Course Goals and Student Learning Outcomes:

#### Objectives

- a. predict the major products of organic reactions.
- b. choose reagents and conditions for syntheses of organic compounds.

- c. identify organic compounds on the basis of experimental data.
- d. suggest reasonable explanations for the outcomes of organic reactions.
- e. name organic compounds.

### Chemistry Program Objectives

- A. Students will identify the principles of modern chemistry and demonstrate their application to a range of common systems. This includes:
  - 1. Being able to perform quantitative calculations using experimental data.
  - 2. Explain the physical and chemical properties of substances based on an understanding of atomic, molecular and supermolecular structure.
  - 3. Connect observations with prior information, this includes prediction and identification of chemical/biochemical reaction products.
- B. Students will connect the theory learned in classes with procedures learned in a laboratory setting.

### Student Learning Outcomes:

Program Objectives	Student Learning Outcomes	Assessment Method
A	1. Compare and contrast the structures, properties, and reactions of aromatic compounds, carbonyl compounds (aldehydes, ketones, carboxylic acids, acyl halides, anhydrides, esters, amides), amines, carbohydrates, lipids, and amino acids. 2. Design syntheses for organic compounds and evaluate potential mechanistic problems associated with them. 3. Define Nucleophilic substitution reaction, nucleophile, substrate, and leaving group. 4. Will identify which compounds have to be activated prior to being substituted or eliminated, as well as discuss methods for activating these leaving groups. 5. Given the IUPAC name of a compound, draw its structure.	Exams, quizzes, homework and Final exam
B	Connect the theory with the lab procedures	Exams, quizzes, homework and Final exam

Saint Louis University - Madrid Campus is committed to excellent and innovative educational practices. In order to maintain quality academic offerings and to conform to relevant accreditation requirements, the Campus regularly assesses its teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose anonymized representative examples of student work from all courses and

programs is kept on file, such as assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. *Thus, copies of student work for this course, including written assignments, in-class exercises, and exams may be kept on file for institutional research, assessment and accreditation purposes.* If students prefer that Saint Louis University - Madrid Campus does not keep their work on file, they need to communicate their decision in writing to the professor.

**Required Texts and Materials:**

Textbook: Organic Chemistry by McMurry

Lab Manual: Principles of Organic Chemistry I, CHEM-2425

Molecular Model kit (optional)

**Attendance Policy:**

You are expected to attend all classes. Most students in the past have found the lectures to be helpful. If you absolutely must miss a class, it is your responsibility to get all information and material covered from your fellow students.

Students who legitimately miss an exam, due to a doctor's visit or family emergency **must provide written documentation** of the circumstances, and will be allowed to take a make-up exam. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the remaining exams. Missing more than one exam will result in an F final grade.

**Class Behavior:** The difficulty of the subject demands that we show special consideration for one another. Please make every effort to arrive on time. If you must be late or leave early, please close the door quietly and sit near the exit. Please be courteous of those around you and keep chit chat to a minimum. Cellular phones should be silenced or turned off before lectures begin. On the rare chance you have forgotten and your phone sounds during class, be polite and turn it off immediately. If you are expecting an urgent call, please seat yourself near the exit. Students who are surfing the web, texting or reading the newspaper can be asked to leave.

**End of Semester Travel Plans:** **DO NOT** make plans to leave SLU before the last day of the final exams. Tell your parents **NOT** to make reservations before that date. If plans have already been made, *change them now!!*

**Course Requirements and Grading Rationale/System:**

First Midterm: 20%  
Second Midterm: 20%  
Final Exam: 35%  
Homework: 15%  
Quizzes: 10%

**Grading scale:**

<u>100% &lt; A &lt; 93%</u>	<u>92% &lt; A- &lt; 90%</u>	
<u>90% &lt; B+ &lt; 87%</u>	<u>86% &lt; B &lt; 83%</u>	<u>82% &lt; B- &lt; 80%</u>
<u>79% &lt; C+ &lt; 77%</u>	<u>76% &lt; C &lt; 73%</u>	<u>72% &lt; C- &lt; 70%</u>
<u>69% &lt; D &lt; 60%</u>	<u>F &lt; 60%</u>	

**Spring Course Content:**

1. Structure Determination: MS & IR, Chapter 12
2. Structure Determination: NMR, Chapter 13
3. Conjugated Dienes and Ultraviolet Spectroscopy, Chapter 14
4. Benzene and Aromaticity, Chapter 15
5. Chemistry of Benzene: Electrophilic Aromatic Substitution, Chapter 16
6. Alcohols and Phenols, Chapter 17
7. Ethers and Epoxides; Thiols and Sulfides, Chapter 18
8. Aldehydes and Ketones, Chapter 19
9. Carboxylic Acids, Chapter 20
10. Carboxylic Acids Derivatives and Nucleophilic Acyl Substitution, Chapter 21
11. Carbonyl Alpha-substitution reactions, Chapter 22
12. Carbonyl Condensation Reactions, Chapter 23
13. Amines and Heterocycles, Chapter 24
14. Carbohydrates, Chapter 25
15. Amino Acids and Proteins, Synthetic Polymers, Lipids, Chapters 25, 26, 27, 31

**Course Outline**

<b>Week</b>	<b>Topic</b>	<b>Chapter</b>
1	Structure Determination: MS & IR	12
2	Structure Determination: MS & IR Nuclear Magnetic Resonance Spectroscopy	13
3	Conjugated Dienes and Ultraviolet Spectroscopy	14
3	Last day to drop without a W and to choose AU or P/NP options <b>January 21</b>	
3	<b>No Class Friday 26</b>	
4	Benzene and Aromaticity	15

5	Chemistry of Benzene: Electrophilic Aromatic Substitution	16
6	<b>First Exam February 5</b>	
6	Alcohols and Phenols	17
7	Ethers and Epoxides; Thiols and Sulfides	18
8	<b>No Classes Thurs.-Fri Feb.22-23 (Winter Break)</b>	
8	Aldehydes and Ketones	19
9	Carboxylic Acids	20
10	Last day to Drop a class with a W <b>March 9</b>	
10	<b>Second Exam March 5</b>	
10	Carboxylic Acids Derivatives and Nucleophilic Acyl Substitution	21
11	Carbonyl Alpha-substitution reactions	22
12	Carbonyl Condensation Reactions	23
13	<b>No Classes — Easter Break March 26-30</b>	
14	Amines and Heterocycles	24
15	Carbohydrates	25
16& 17	Amino Acids and Proteins, Synthetic Polymers, Lipids	25, 26, 27, 31
	<i><b>FINAL EXAM May 4, at 3:30-6:30</b></i>	

Tentative course outline. Any information on changes regarding the course content will be communicated to students in advance.

**Quizzes and Homework:** Working problems outside of class are an important and expected activity in the mastery of chemistry. Announced and/or impromptu **quizzes** will be given in class **and will count towards your final grade**. Regular **homework assignments** will be given; late homework will not be accepted and will result in a grade of zero for that assignment. These are expected to be a measurement tool for you to chart your progress and to identify your deficiencies and to give you a feel of the upcoming tests. **Homework will count towards your final grade.**

**Midterms and the Final Examination:** There will be **two midterms** and **one final examination**, spaced approximately equally throughout the semester. As the material in chemistry builds on that which has been previously covered, **each exam will be cumulative from the beginning of the semester** (*i.e.*, Exam #1 covers Chapters 1 - 3, Exam #2 covers Chapters 1 - 7, *etc.*), although the emphasis will be on material presented since the previous midterm. **The final exam is cumulative over material from the entire semester.** The material on the midterms and final examination may be taken from your textbook, lecture notes and/or handouts in class, problems worked in class, quizzes and/or homework assignments.

**Examination Dates:**

Exam #1 – Monday, Feb. 5<sup>th</sup> (during class hour)

Exam #2 – Monday, March 5<sup>th</sup> (during class hour)

Final Exam – Friday, May. 4<sup>th</sup> (3:30-6:30)

**E-mail:** Campus and course announcements will often be handled by e-mail. Students should check their “@slu.edu” e-mail regularly.

**University Statement on Academic Integrity:** Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy can be accessed on the Provost's Office [website](#) at: <http://www.slu.edu/madrid/academics>. Additionally, SLU-Madrid has posted its academic integrity policy online: <http://www.slu.edu/madrid/academics>. As a member of the University community, you are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions and appeals.

The professor will review these matters during the first weeks of the term. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program or the Academic Dean of the Madrid Campus.

**University Title IX Statement:** Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX deputy coordinator, Marta Maruri, whose office is located on the ground floor of Padre Rubio Hall, Avenida del Valle, 28 (mmaruri@slu.edu; 915-54-5858, ext. 213) and share the basic fact of your experience with her. The Title IX deputy coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you wish to speak with a confidential source, you may contact the counselors at the SLU-Madrid's Counseling Services on the third floor of San Ignacio Hall (counselingcenter-madrid@slu.edu; 915-54-

5858, ext. 230) or Sinews Multipletherapy Institute, the off-campus provider of counseling services for SLU-Madrid ([www.sinews.es](http://www.sinews.es); 917-00-1979). To view SLU-Madrid's sexual misconduct policy and for resources, please visit the following web address: <http://www.slu.edu/Documents/Madrid/campus-life/SLUMadridSexualMisconductPolicy.pdf>.

**Students with Special Needs:** In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Academic Dean's Office (San Ignacio Hall) or by going to <http://www.slu.edu/madrid/learning-resources>.

Students with a documented disability who wish to request academic accommodations must contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also must notify the course instructor that they wish to access accommodations in the course. Please contact Disability Services at [disabilityservices-madrid@slu.edu](mailto:disabilityservices-madrid@slu.edu) or +915 54 58 58, ext. 230 for an appointment. Confidentiality will be observed in all inquiries. Once approved, information about the student's eligibility for academic accommodations will be shared with course instructors via email from Disability Services. For more information about academic accommodations, see "Student Resources" on the SLU-Madrid webpage.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact Disability Services.

**Spring 2018 Course Schedule:**

<b>JANUARY</b>	
Wednesday 10	First Day of Classes
Sunday 21	Last Day to Drop a Class without a Grade W and/or Add a Class; Last Day to Choose Audit (AU) or Pass/No Pass (P/NP) Options
Friday 26	No Classes Application Deadline for Spring Semester Degree Candidates
<b>FEBRUARY</b>	
Wednesday 14	Ash Wednesday Registration for Summer 2018 Begins
Thursday 22	No Classes (Winter Break)
Friday 23	
Tuesday 27	Professors' Deadline to Submit Midterm Grades
<b>MARCH</b>	
Friday 9	Last Day to Drop a Class and Receive a Grade of W
Thursday 15	Last Day to Submit Transfer Application for Fall Semester
Monday 26	<i>Semana Santa</i> Holiday (Campus Closed)
Tuesday 27	
Wednesday 28	
Thursday 29	<i>Jueves Santo</i> (Campus Closed)
Friday 30	<i>Viernes Santo</i> (Campus Closed)
<b>APRIL</b>	
Wednesday 4	Registration for Fall 2018 Semester Begins
<b>MAY</b>	

Tuesday 1	<i>Día del Trabajador</i> (Campus Closed)
Wednesday 2	<i>Día de la Comunidad</i> (Campus Closed)
Thursday 3	Spring 2018 Final Day of Classes
Friday 4	Spring 2018 Final Exams
Monday 7	
Tuesday 8	
Wednesday 9	
Thursday 10	
Friday 11	University Housing Move-out Date
Saturday 12	Commencement
Sunday 13	Professors' deadline to submit spring 2018 final grades

### Final Exam Schedules Spring 2018

	4 May (Fr)	7 May (Mn)	8 May (Tu)	9 May (Wd)	10 May (Th)
<b>08:30-11:30</b>	Mn classes that meet at 9:00 & 9:30	Mn classes that meet at 10:00	Mn classes that meet at 11:00 & 11:30	Tu classes that meet at 9:30	Tu classes that meet at 8:00
<b>12:00-15:00</b>	Tu classes that meet at 11:00	Mn classes that meet at 13:00	Tu classes that meet at 14:30	Mn classes that meet at 12:00 & 12:30	Tu classes that meet at 12:30
<b>15:30-18:30</b>	Mn classes that meet at 14:30	Tu classes that meet at 17:00 & 17:30	Mn classes that meet at 16:00	Tu classes that meet at 16:00	Mn classes that meet at 17:30
<b>19:00-22:00</b>	---	---	Mn classes that meet at 18:30 & 19:00	Tu classes that meet at 19:00	---

**Study Hints:** You may find that this course requires more work than you have been exposed to in your studies thus far.

However, the material will be manageable if you:

use the text properly, attend all lectures, take notes, study the notes **and** text, work all problems as soon after the lecture as possible and, be prepared (and rested) for exams.

**All of this needs to be done day by day. Do not wait until just before an exam to study. You should be studying just about every day rather than trying to cram it all in a couple of days before an exam. Give your brain a chance and the time to learn the material.**

**This course is comprehensive.** There are a number of topics later in the course and in the next semester of the two semester sequence which will require a good understanding of earlier material covered. So, you need to learn material for the long-term rather than just for the exam coming up.

**Don't try to depend on just memorization; you'll find that understanding the material will serve you much better in the long run.** In this course, you will be expected to have more than just a vague or superficial understanding of the material. Understanding what I do in lecture and what you read is **only** the first step in what you need to do in order to do well in this course. You need to really know the material well and be able to do it yourself. This takes a lot of time and work. You can't just "go over" your notes and/or the text and expect to do well. You must work the problems in the text again and again until you really know it. The more senses you use while studying, the better.

**There are some useful reference books available in the library.**