

# SYLLABUS

## CHEM 331 I Spring 2021

**Instructor:** **Name:** Dr. Allegra Liberman-Martin (pronouns: she/her/hers)  
**Email:** libermanmartin@chapman.edu  
**Office Hours:** TBA

**Textbooks/Materials:** Organic Chemistry (w/Wiley Plus Card & SSM/SG), Author: Klein, Publisher: John Wiley & Sons, Incorporate, Edition: 3rd, Year Published: 2017 (**required**)

**Supplemental Instructors (SI):** TBA

**Course Description:** Prerequisites, Chem 230, 230L. CHEM 331 is the second semester of a two-semester (one year) lecture course in organic chemistry; a continuation of learning some of the fundamentals of organic chemistry. Topics of discussion will again be structure and properties of organic compounds, with additional functional groups, nomenclature, stereochemistry, and spectroscopic methods of analysis. There will be an emphasis on the relationship between structure, functionality and reactivity in organic compounds; as well as the reaction mechanism for many of these organic reactions. Synthetic organic chemistry will be an important part of this course.

**Course-Wide Intended Learning Outcomes:** At the end of this course, each student will be able to:

- Describe, and give examples of the basic principles, concepts, and theories from the second semester of organic chemistry, including the central role of the scientific method and the importance of observation.
- Apply reasoning skills acquired in the classroom to solve problems through assigned homework sets, guided inquiries and laboratory exercises.
- Apply the scientific method to evaluate and analyze data and draw conclusions based upon that analysis.

**Program-Wide Intended Learning Outcomes:** In addition to the above learning outcomes, CHEM 331 supports, in part, the learning outcomes for the B.Sc. in Chemistry:

- Apply the scientific method to solve problems
- Demonstrate written, visual and oral presentation skills to communicate scientific knowledge
- Apply critical thinking and analytical skills to design and execute a scientific experiment, thoroughly analyze the results, and arrive at well-reasoned scientific conclusions.
- Demonstrate an understanding of core knowledge in chemistry

### Success Strategies

Your deep understanding of fundamental organic chemistry concepts coupled with frequent and consistent practice of conceptual and algorithmic problems is crucial for success in this course. And as we progress through the course material, you will build on, and reinforce, fundamental concepts from previous chapters. As a result, your instructor has designed this course to encourage necessary daily practice. In addition, here are some additional best-practices that you are encouraged to implement:

- Dedicate 2–3 hours to studying and solving organic chemistry problems every day.
- Attend each class prepared to solve more problems. Ask questions!
- Attend office hours frequently with specific questions on concepts or problems you have attempted.
- Attend Supplemental Instructor (SI) Sessions Once Per Week: All SIs are students who not only excelled in the course in previous years but are also trained to teach effectively. Each SI will engage you in instructor-approved practice problems. They will also answer any ongoing questions you have.

### Class Structure

Class sessions will be held on Zoom (link provided on course Canvas page).

**Prior to each class time**, you will be expected to:

- Do the **pre-lecture readings** and/or watch the **pre-lecture videos** made by the instructor, and
- Take the **pre-lecture quiz**.

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When you log into the Zoom class, you will be expected to:

- Download the **in-lecture worksheet** from Canvas.
- Think critically, communicate with your instructors and your peers, and solve the worksheet problems.
  - **To ensure an active and vibrant class, your visual and audio presence is expected. Please plan to have your webcam turned on and be prepared to speak during discussions and breakout sessions.**

After each class, you will be expected to:

- Solidify your learning by solving the **suggested problems**.
- Attend **office hours** and **SI sessions** with questions you have on any of the concepts introduced in the pre-lecture materials, in-lecture worksheets, or in the suggested problems.

### Evaluation

Your grade in this course is based on attendance and participation, pre-lecture quizzes, in-lecture quizzes, three lecture exams, and a final cumulative exam.

Assessment	Date	Weighting (%)
Attendance + Participation	Frequently (In class)	5
Pre-Lecture Quizzes	Frequently (24 hrs before class)	10
In-Lecture Quizzes	Weekly	15
Lecture Exam 01	Fri., Feb. 19, 12:00 – 1:15 pm	16
Lecture Exam 02	Fri., Mar. 19, 12:00 – 1:15 pm	16
Lecture Exam 03	Fri., Apr. 30, 12:00 – 1:15 pm	16
Final Cumulative Exam	Section 03 (M/W/F 10–10:50am): Wed. May 19 10:45 am – 1:15 pm Section 04 (M/W/F 11–11:50am): Wed., May 19, 1:30 – 4:00 pm	22

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### Pre-Lecture Quizzes:

An online quiz will be assigned before every class (except on review days and exam days). Pre-lecture quizzes will be posted on Canvas  $\geq 24$  hours before the upcoming class and will be due at 9:00 am on the day of class. Use pre-lecture quizzes to assess your understanding of the assigned pre-lecture reading/video. There are no make-up quizzes and your lowest six pre-lecture quizzes will be dropped.

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### Attendance and Participation:

Unless otherwise arranged, you are expected to attend each Zoom session at your scheduled class time and participate fully in the in-lecture exercises and discussions. To foster this, I will record your participation during in-class polls and group work – each of which will be worth 1 point. These will appear as "complete/incomplete" in the grade book; however, they do count toward your grade. Your accumulated attendance and participation points are worth 5% of your total grade. Excused absences with documentation (due to illness, religious holidays, or an official University event) do not lower your attendance and participation score. In addition, up to three unexcused absences are permitted without a grade penalty during the semester.

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### In-Lecture Quizzes:

During each Friday class session (except on exam days and the last day of the semester), a 10-minute Canvas quiz will be given. Each Friday quiz could contain material covered in the prior week (Friday the previous week and Monday and Wednesday earlier in the week). In-lecture quizzes are designed to provide practice with the technology and style of questions you could encounter on an exam. Ten in-lecture quizzes will be given throughout the semester, and your lowest two in-lecture quiz scores will be dropped.

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**Alternate Meeting Times for Lecture Exams:** It is my goal to give students enough time to demonstrate their knowledge during lecture exams. To support this goal, the three lecture exams for this course will be administered via Zoom to all students taking CHEM 331 on the following Friday dates from **12:00 pm to 1:15 pm: February 19, 2021; March 19, 2021; and April 30, 2021.** Note that the exam testing period is not during the regular class time and there will be no organic chemistry classes on these dates. Unless otherwise arranged, students are required to attend the scheduled test periods in order to take the lecture exams. All efforts have been made prior to the beginning of this course to accommodate students with potential conflicts of the exam times with other courses. However, if you foresee conflicts with other courses during Add/Drop period, please let me know as soon as possible.

**Please contact me to schedule your exam if you have testing accommodations.**

**Make-Up Policy for Lecture Exams ONLY:** The only reasons that qualify for a make-up exam are: (1) serious illness with proper documentation (i.e., doctor's note or Dean of Students' Letter), or (2) required attendance at an OFFICIAL University event with written notification to the professor PRIOR to the exam and as early as possible.

**Progressive Improvement Exam Scoring:** To encourage consistent study habits throughout the semester and lower stress levels surrounding exams, I use an exam scoring system that encourages progressive improvement. If you score higher on an exam directly after an exam with a lower score, your score on the prior lower exam will be increased to the average of the two scores. For example, if you receive a 60% on Exam 01 and an 80% on Exam 02, your Exam 01 score will be retroactively raised to 70%. Note that Exam 03 and the Final exam have no effect on Exam 01. This policy includes the ability of the cumulative final exam to impact a lower score on Exam 03. Also, note that a lower score on a later exam will never lower an earlier exam score.

**Extra Credit Policy:** After Lecture Exams 01, 02, and 03, a link to a post-exam survey will be provided. This survey is designed to help you to analyze your exam performance and find strategies that work best for you in learning the material. Completing the post-exam survey one time after a given lecture exam will result in 1% of extra credit being added to your exam percent score. There are no additional extra credit opportunities for this course.

### Course Grading Rubric:

Score (%)	Grade	Score (%)	Grade
92.5 - 100	A	72.5 - 76.9	C
89.5 - 92.4	A-	69.5 - 72.4	C-
87.0 - 89.4	B+	67.0 - 69.4	D+
82.5 - 86.9	B	62.5 - 66.9	D
79.5 - 82.4	B-	59.5 - 62.4	D-
77.0 - 79.4	C+	< 59.5	F

### Exam and In-Lecture Quiz Authorizations:

You are authorized to use your textbook, your notes, a calculator of your choice, and any material your instructor has provided to you while completing exams and in-class quizzes. You are not authorized to speak with anyone other than your instructor (including classmates, family members, friends, etc.) or use the internet (beyond the course Canvas page) while completing exams. All exams and in-class quizzes will be given through the course Canvas website and will be proctored in Zoom (link provided through Canvas). During the exam/quiz, you must be on Zoom with your webcam (either on a computer or cell phone) turned on and your face visible.

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**Course Policy on Unauthorized Assistance in Exams and In-Lecture Quizzes:** The organic chemistry faculty take cases of academic integrity violations very seriously. All suspected academic integrity violations for any in-class quiz, lecture exams, or the final cumulative exam will be investigated fully according to Chapman's Academic Integrity Policy. See below for the baseline sanctions for any academic integrity violation in each assessment.

Assessment	Baseline Sanction for Academic Integrity Violation
In-Lecture Quiz	A zero on all in-class quizzes
Lecture Exam	An 'F' in the course
Final Cumulative Exam	An 'F' in the course

**Course Electronic Access:** Course materials including the syllabus are available on Canvas. The Canvas site will be the primary repository of all documents for this class including lecture notes, lectures, solutions, and handouts.

**Academic Integrity Policy:** Chapman University is a community of scholars that emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work and academic dishonesty of any kind will be subject to sanction by the instructor/administrator and referral to the university Academic Integrity Committee, which may impose additional sanctions including expulsion. Please see the full description of Chapman University's policy on Academic Integrity at [www.chapman.edu/academics/academicintegrity/index.aspx](http://www.chapman.edu/academics/academicintegrity/index.aspx).

**Students with Disabilities Policy:** In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Disability Services Office. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services at (714) 516-4520 or visit [www.chapman.edu/students/student-health-services/disability-services](http://www.chapman.edu/students/student-health-services/disability-services) if you have questions regarding this procedure or for information or to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for an accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.

**Equity and Diversity Policy:** Chapman University is committed to ensuring equality and valuing diversity. Students and professors are reminded to show respect at all times as outlined in Chapman's Harassment and Discrimination Policy. Please see the full description of this policy at <http://www.chapman.edu/faculty-staff/human-resources/eoo.aspx>. Any violations of this policy should be discussed with the professor, the dean of students and/or otherwise reported in accordance with this policy.

**Student Support at Chapman University:** Over the course of the semester, you may experience a range of challenges that interfere with your learning, such as problems with friend, family, and or significant other relationships; substance use; concerns about personal adequacy; feeling overwhelmed; or feeling sad or anxious without knowing why. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. You can learn more about the resources available through Chapman University's Student Psychological Counseling Services here: <https://www.chapman.edu/students/health-and-safety/psychological-counseling/>

**Laptop Rental Program:** An automated laptop rental kiosk is available in the Student Union, which is free to all Chapman students with a valid ID. You can swipe your ID card, take a laptop anywhere on campus, and return it within the 4-hour time limit. There are six Dell laptops and six Macbook Pro laptops available to rent.

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**All Gender Restrooms:** To find Chapman University's all-gender restrooms, click on Restrooms on the drop-down menu of the interactive campus map at <https://www.chapman.edu/about/maps-directions/campus-map/index.aspx>. All-gender restrooms are labeled and identified across campus.

**Food Pantry Assistance:** If you or a student you know could benefit from access to the food pantry or would like more information on the food pantry program, contact the Dean of Students at (714) 997-6721.

Week	Day	Date	Topic	Reading	Suggested Problems	
<b>1</b>	M	02.01	<b>Spectroscopy I:</b> syllabus + intro to spectroscopy	<b>14:</b> 01		
	W	02.03	<b>Spectroscopy II:</b> IR wavenumber, intensity, shape	<b>14:</b> 02–05	<b>14:</b> 01–11, 52	
	F	02.05	<b>Spectroscopy III:</b> IR spectrum + HDI/DOU	<b>14:</b> 06, 07, 16	<b>14:</b> 12–17, 29–37, 45, 48, 49, 51, 56	
Integrated and Challenge Problems: <b>14:</b> 61, 63, 65, 69, 71–73						
<b>2</b>	M	02.08	<b>Spectroscopy IV:</b> NMR spectrum, # of signals + topicity + chemical equivalence	<b>15:</b> 01–04	<b>15:</b> 1–7, 32, 35, 41, 45, 46, 50	
	W	02.10	<b>Spectroscopy V:</b> Chemical shifts: inductive and anisotropic effects; integration	<b>15:</b> 05–06	<b>15:</b> 8–14, 47, 51, 52	
	F	02.12	<b>Spectroscopy VI:</b> Multiplicity + <sup>1</sup> H NMR analysis + pattern recognition	<b>15:</b> 07–10	<b>15:</b> 15–25, 38, 42, 49, 53, 57, 58	
<b>3</b>	M	02.15	<b>Spectroscopy VII:</b> <sup>13</sup> C NMR + DEPT <sup>13</sup> C NMR and Combined IR + <sup>1</sup> H + <sup>13</sup> C NMR	<b>15:</b> 11–13	<b>15:</b> 26–31, 33, 34, 36, 37, 39, 40, 43, 44, 48, 54–56, 59–62	
	Integrated and Challenge Problems: <b>15:</b> 63–69, 71–78, 81					
	W	02.17	Review			
	<b>F</b>	<b>02.19</b>	<b>LECTURE EXAM 01</b>	<b>Weeks 1–3</b>		
<b>4</b>	M	02.22	<b>Conjugated Pi Bonds I:</b> Structure + stability + MOT + UV-Vis	<b>16:</b> 01–03, 11	<b>16:</b> 1–5, 27–28, 31–33, 41, 47–49, 59	

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W 02.24 **Conjugated Pi Bonds II:**  
Electrophilic addition + thermo vs. kinetic control **16:** 04–05 **16:** 6, 7, 9–11, 34–38

F 02.26 **Pericyclics I:** Intro to pericyclics + Diels-Alder **16:** 06–07 **16:** 13–18, 39, 40, 42–46, 57, 58

M 03.01 **Pericyclics II:** cycloaddition MO + electrocyclic reactions + sigmatropic rearrangement **16:** 08–10 **16:** 19–21, 23–26, 50–56

Integrated and Challenge Problems: **16:** 60, 61, 63–69, 74–78

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W 03.03 **Aromatics I:** Intro + structure + stability **17:** 01–05 **17:** 1, 3, 6–15, 24, 25, 30–41, 47

F 03.05 **Aromatics II:** Rxns @ benzylic position + reduction + spectroscopic considerations **17:** 06–08 **17:** 17, 18abcde, 20–23, 42–46

Integrated and Challenge Problems: **17:** 48, 49, 51–55, 57–61, 63, 67–71, 74

M 03.08 **Aromatics III:** Electrophilic aromatic halogenation + sulfonation + nitration + Friedel-Crafts alkylation + acylation **18:** 01–06 **18:** 1–10, 48–50, 58

W 03.10 **Aromatics IV:** Activating + deactivating groups **18:** 07–10 **18:** 11–17, 39–41, 43, 44, 60–62

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F 03.12 **Aromatics V:** Directing + blocking effects + synthetic strategies **18:** 11–12 **18:** 18–29, 38, 42, 45–47, 52–55, 63–65, 67abcdegh, 69–71

Integrated and Challenge Problems: **18:** 73, 74, 76–80, 83, 88–90, 93

M 03.15 Review

7 W 03.17 Review

**F 03.19 LECTURE EXAM 02 Weeks 4–7**

8 **SPRING BREAK (March 22 – 26)**

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	M	03.29	<b>Carbonyls I:</b> aldehydes/ketones preparation, nucleophilic addition reactions, and spectroscopy	<b>19:</b> 01–04, 13	<b>19:</b> 5, 6, 49
<b>9</b>	W	03.31	<b>Carbonyls II:</b> Oxygen nucleophiles (nucleophilic addition + hydrolysis)	<b>19:</b> 05, 07(start)	<b>19:</b> 7–13, 24, 55, 56, 58, 65, 68, 71, 72
	F	04.02	<b>Carbonyls III:</b> Nitrogen nucleophiles (nucleophilic addition + hydrolysis)	<b>19:</b> 06, 07(end)	<b>19:</b> 14, 15, 17–21, 23, 25, 59–63, 68, 70
	M	04.05	<b>Carbonyls IV:</b> Hydrogen and carbon nucleophiles	<b>19:</b> 09, 10	<b>19:</b> 10, 28–31, 34–38, 50–52
<b>10</b>	W	04.07	<b>Carbonyls V:</b> Tools for synthesis (sulfur nucleophiles, Wolff-Kishner reduction, cyanohydrin formation, and Baeyer-Villiger oxidation)	<b>19:</b> 08, 06(end), 10(mid), 11, 12	<b>19:</b> 22, 26, 27, 32, 33, 39, 40, 42, 53, 54, 57, 64, 66, 67, 69, 73
			<b>Integrated and Challenge Problems: 19: 74–80, 82–85, 88, 90–93</b>		
	F	04.09	<b>Carbonyls VI:</b> carboxylic acids acidity + preparation + reactions	<b>20:</b> 03–05	<b>20:</b> 4–7, 9–11, 35, 36, 43
	M	04.12	<b>Carbonyls VII:</b> introduction and reactivity of carboxylic acid derivatives	<b>20:</b> 06–07	<b>20:</b> 14, 15
<b>11</b>	W	04.14	<b>Carbonyls VIII:</b> preparation and reactions of acid chlorides and acid anhydrides	<b>20:</b> 08–09	<b>20:</b> 16–19, 44, 57, 61ad
	F	04.16	<b>Carbonyls IX:</b> preparation and reactions of esters	<b>20:</b> 10–11	<b>20:</b> 20–23, 45, 47, 52, 55, 58a, 61bce, 62, 63, 64a
	M	04.19	<b>Carbonyls X:</b> preparation and reactions of amides and nitriles	<b>20:</b> 12–13	<b>20:</b> 24–29, 46, 60
<b>12</b>	W	04.21	<b>Carbonyls XI:</b> synthesis and spectroscopy	<b>20:</b> 14–15	<b>20:</b> 30–34, 41, 42, 48–51, 53, 54, 56, 59, 69
			<b>Integrated and Challenge Problems: 20: 70–80, 82, 87–89</b>		
	F	04.23	<b>Carbonyls XII:</b> introduction to alpha carbon chemistry: enols + enolates	<b>21:</b> 01	<b>21:</b> 1–7, 47–56, 59, 60, 70
<b>13</b>	M	04.26	<b>Carbonyls XIII:</b> alpha halogenation + alkylation I	<b>21:</b> 02, 05(start)	<b>21:</b> 8–13, 29, 30, 65, 74ab

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Integrated and Challenge Problems: 21: 89, 95, 98, 101, 113

W 04.28 Review

**F 04.30 LECTURE EXAM 03 Weeks 9–13**

M 05.03 **Carbonyls XIV:** aldol 21: 03 21: 14–23, 57, 58, 61–64, 66, 71, 75, 81

**14** W 05.05 **Carbonyls XV:** Claisen + alkylation II 21: 04, 05(end) 21: 24–28, 31, 33, 67–69, 79, 80

F 05.07 **Carbonyls XVI:** Conjugate additions: Michael + Stork 21: 06 21: 35–39, 83, 84

M 05.10 **Carbonyls XVII:** Robinson annulation + synthesis strategies 21: 06–07 21: 40–43, 45, 72, 73, 76–78, 82, 85–88

Integrated and Challenge Problems: 21: 91–94, 96, 97, 99, 100, 103–108, 110, 114, 115

**15**

W 05.12 Review

F 05.14 Review + Exit

**16** **W 05.19 FINAL EXAM**  
**Section 03 (M/W/F 10–10:50am):**  
**10:45 am – 1:15 pm Cumulative**  
**Section 04 (M/W/F 11–11:50am):**  
**1:30 – 4:00 pm**