

SYLLABUS

CHEM3451 Organic Chemistry-I Fall 2021

Department of Chemistry and Biochemistry | Angelo State University



1. Course Information

| | | |
|---------------|---|---|
| Course Name | : | CHEM 3451 Organic Chemistry I |
| Course Type | : | 4.000 Credit Hours Lecture and Lab |
| Pre-Requisite | : | "C or better" grade in CHEM1411 General Chemistry |
| Website | : | https://blackboard.angelo.edu |

2. Instructor Information

| | | |
|----------------|---|--|
| Instructor | : | Dr. Saravanan Ramasamy |
| Office | : | CAV 214A |
| Email | : | sramasamy@angelo.edu |
| Phone | : | 325-486-6627 |
| Office Hours | : | MTWRF 8:00 – 9:00 am |
| Student Tutors | : | Lily Ellzey (lzellzey@angelo.edu) and Christian Bell (cbell25@angelo.edu) |

3. Lecture Sections and Meetings

| Sections | Days | Time | Instructor | Location |
|----------|------|--------------------|--------------|----------|
| 010 | MWF | 9:00 am – 9:50 am | Dr. Ramasamy | CAV 200 |
| 020 | TR | 9:30 am – 10:45 am | Dr. Ramasamy | CAV 200 |

4. Lab Sections and Meetings

(See [LABORATORY SYLLABUS](#) on page#8)

5. Course Materials for the Lecture and Lab

| | |
|---------------------------------------|--|
| Textbook (Required) | Online WileyPLUS Access for Organic Chemistry 4 th Edition – by David Klein – Integrated on Blackboard. (Click to see Textbook Buying Options on the last page.) |
| Class Room Response System (Required) | TopHat subscription. (You will get an email invitation from me. Please wait for that.) |
| Model Kit (Required) | Molecular Visions Model Kit (ISBN-13: 978-0964883710 or ISBN-10: 0964883716) |
| Study Guide (Recommended) | You can rent (\$16) or purchase (\$48) the solution manual and study guide for the textbook (Organic Chemistry by Klein – 4 th edition). Here is the publisher's sales page. (ISBN: 978-1-119-65952-5) |
| Free Lab Manual | A pdf manual will be posted on Blackboard |
| No Lab Notebook | There is no lab notebook. You will type your lab reports, and submit on Blackboard. |
| Other Supplies (Required) | Approved lab goggles (from bookstore, or from chemistry lab), and nitrile gloves |

6. Course Description

The *CHEM 3451 Organic Chemistry-1* is the first of two organic chemistry course sequence (3451 and 3452). In this first course we discuss both the physical properties of organic compounds as well as the chemical reactions they undergo. The course covers the concepts of structure, bonding, molecular orbitals, hybridizations, resonance, acid-base, alkane, alkene, alkyne, alcohols, ethers, substitution reaction, addition reaction, elimination reactions, reagents, mechanisms, and nomenclature with an emphasis on biological applications. The overall objective is for the student to master the structural relationships to reactivity and shape, and the reactions of the principal classes of organic compounds.

7. Course Goals

The goals are to increase your skills in nomenclature, understanding structural properties, functional group transformation, and single-step synthesis. Mastering this course material will provide students with a foundation for understanding and applying the concepts of organic chemistry. This course increases the students' knowledge of the involvement of organic chemistry in everyday life, prepares the students for biochemistry and upper-level organic courses, and develops the critical thinking skill through course assignments. Specifically, a strong knowledge of organic chemistry will aid succeeding in standardized examinations for professional programs.

8. Evaluation

Your grade in this course will be determined by the assignments, quizzes, midterm exams, lab reports, and the final exam. The final letter grade for the course will be as follows. Grades will not be rounded up.

A = 90 - 100%, B = 80 - 89.9%, C = 70 - 79.9%, D = 60 - 69.9%, F = <60%.

Point distribution:

| | | |
|-----------------------------------|-------------|----------------|
| Assignments / Homework | | 200 pts |
| Quizzes (3 best out of 4 quizzes) | 3 x 50 pts | 150 pts |
| Midterm Exams | 3 x 100 pts | 300 pts |
| Final Exam | 1 x 150 pts | 150 pts |
| Laboratory | | 200 pts |
| TopHat (Bonus) | | 50 pts (bonus) |
| Total points | | 1000 |

The **online assignments** posted on the course website (*Blackboard or WileyPLUS*) can significantly contribute to your learning process. The prompt feedback of the system can have a positive impact on your learning and retention. Each online assignment may have a different format and a different number of attempts. It is recommended that students work through the practice problems in the textbook before attempting online assignments. It is highly recommended that you review the section of the text related to a question in the online assignment after you miss the first attempt on that question. Each student should work individually on the online assignments and give an earnest effort.

There will be a total of 4 **quizzes** (paper-based, ~30 min, 50 points each). Three highest scored quizzes will be counted out of the four quizzes. The quizzes will consist of free responses (short answers / mechanisms) or multiple-choice questions. These questions will be closely related to the practice problems on the textbook, and the laboratory problems. It's the student's responsibility to write the

answers legibly. The quizzes will be graded by the next week and can be picked up during the instructor's office hours. Grades will be posted on the Blackboard site. Students will have two-day time to inform the instructor of any error in grading.

There will be a total of 3 **midterm exams** (~50 min, 100 points each). The exams will consist of multiple-choice questions and free response (structures/reactions/mechanisms/spectroscopy, etc), but the instructor reserves the right to make changes in the format. The instructor also reserves the right to make different versions of an exam with different questions that cover the same course material and concepts. It is very important that each student shows up on time during exam days. Every effort will be made by the instructor to distribute the exam materials in a timely fashion. It is very important to write your name on your exam and to bubble in your name and Campus ID number on the answer sheet.

The **final exam** will be a comprehensive one (2 hours, 150 points). It is mandatory to take the final exam to pass this course. The exams will consist of multiple-choice questions and free response (structures/reactions/mechanisms/spectroscopy, etc), but the instructor reserves the right to make changes in the format. The instructor also reserves the right to make different versions of an exam with different questions that cover the same course material and concepts. You must bring your Campus ID card, and it is very important to write your name on your exam and to bubble in your name and ID number on the answer sheet.

There may be **TopHat** classroom quizzes during almost every lecture meeting. This classroom response system provides instant feedback to assess how well students are keeping up with the material. It also increases students' engagement to the lecture. You must bring your own device (laptop, tablet or smartphone) with TopHat app registered to the course. It's your responsibility to make sure that your device is in working condition and connected to the internet.

Make-up policy: No make-up for missed classroom participation will be offered. A grade of zero will be assigned to the missed class participation points. A make-up exam or quiz may be offered, if a student misses an exam or quiz for a university-excused absence (such as religious holiday, death in family, documented illness, jury duty, or for representing the university in sporting events) with a proper documentation of the absence. The student must communicate with the instructor before the starting of the regular exam or quiz in order to request a make-up.

Grade adjustment policy: There is no curve in this course. The instructor reserves the right to make linear adjustments to exam grades in cases if an exam question was found to be in error or unreasonably difficult. Adjustments will **not** be made to increase the average of the class or to hike the letter grade.

Incomplete Grade Policy: It is the policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#) for more information.

9. Learning Outcomes:

At the successful completion of the course, a student will be able to:

1. Illustrate the structure, bonding and stability of a molecule
2. Identify spatial arrangement (isomer/conformation) and evaluate their energy differences
3. Identify and assess strength of good leaving groups, good nucleophiles, electrophilic centers, bases, and acidic protons

4. Provide the major products of a chemical reaction with correct regio- and stereochemistry
5. Provide the reagents necessary to accomplish a given one-step transformation
6. Provide the mechanism of a given transformation and relate to a reaction coordinate energy diagram, comparing competing pathway utilizing thermodynamic and kinetic principles
7. Propose a plausible multi-step synthesis for a given transformation

Specific learning outcomes for each chapter will be listed at the beginning of each chapter.

10. What is expected of you to enjoy success in this course?

Like in any science course you can do much better in organic chemistry when you understand the reason behind the concepts. Participating in lecture, taking notes, reading the materials, and watching the videos are essential, but not enough to enjoy the success in this course. You must involve in active learning like practicing problems, drawing out structures, making 3D models, raising question while reading, addressing your questions with detailed answers, making connections to the key concepts, frequently reviewing the fundamentals, taking the time to reflect your learning, and making a framework of concepts in your mind. Especially, you should always be familiar with the factors that contribute to the stability or instability of electrons in a given environment. Chemical reactions can generally be seen as a flow of electrons to get stable structures. So, it's often required to draw out the non-bonded electron pairs, and you should keep a count of electrons. Clarity in your drawing leads to clarity in your thinking.

Key concepts and connection will be covered in the lecture, but you should read the textbook and practice the assigned problems before the next class meeting. Failure to stay current on reading and practicing assignments will greatly affect your ability to keep up during lecture and, therefore, will affect your grade in this course.

11. Course and University Policies

This is a face-to-face course with online components that students are expected to access in [Blackboard](#).

Please refer to this [Health and Safety web page](#) for updated information about campus guidelines as they relate to the COVID-19 pandemic.

Office Hours / Email Communication: Students can walk-in to the regular office hours. If you can't make it during those hours, please make an appointment by email. Students are expected to frequently check their Angelo State email account and the Blackboard course website announcements for important communication from the instructor. Use CHEM3451 in the subject line of your emails to enable proper filtering. The instructor will only answer e-mails that are sent from an ASU e-mail account. Any submitted e-mails to the instructor are expected to be written in a professional format and include your first and last name and course number and section/meeting time. The instructor will not respond to any messages that do not comply with such requirements. The instructor will respond to legitimate e-mails within 24-48 hours during the week and may not respond until after weekends or holidays if messages are received on any of such days. More general questions will be addressed in the following lecture.

Blackboard: Grades, information, handouts, homework assignments, and other course documents will be posted on Blackboard. <http://blackboard.angelo.edu> (or access Blackboard from RamPort).

Changes: The instructor reserves the right to change by addition and/or subtraction any and/or all materials contained in this syllabus. This includes, but is not limited to, course content, assignments, due dates, and portion(s) of the grade assigned to individual items within the course

Copyright: All handouts, videos, quizzes, exams and lecture material are ©2021 by Saravanan Ramasamy. Free (no cost) copying and distribution of these materials among Angelo State University students are allowed. Any other distribution, including distribution for a fee or sharing online are not allowed without my written consent. WileyPLUS materials are copyrighted by the publisher Wiley.

Policy on Academic Misconduct: All students are required to follow the policies and procedures presented in these documents: [Angelo State University Student Handbook](#) and [Angelo State University Catalog](#). By enrolling in this course, you agree to be bound by the university's [Statement of Academic Integrity](#). All students are expected to conform to college-level standards of ethics, academic integrity, and academic honesty. The penalty for ANY sort of dishonesty, cheating or plagiarism can range from a grade of zero on the assignment to an F in the course and disciplinary action as warranted in accordance with university guidelines.

Plagiarism is a serious topic covered in ASU's Academic Integrity policy in the Student Handbook page-96. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft. In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list. Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the [ASU Writing Center](#).

Student Absence for Observance of Religious Holy Days: A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 [Student Absence for Observance of Religious Holy Day](#) for more information.

Accommodations for Students with Disabilities: ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the [Student Disability Services website](#). The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

Behavior: All students are expected to follow proper classroom behavior and treat other students and the instructor with respect. If the instructor deems a student's actions or behavior disruptive to the class, the students will be asked to leave the class for that day.

Title IX at Angelo State University: Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: [Incident Reporting Form](#)ⁱ

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: michelle.miller@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit the [Title IX website](#).

Refer [ASU academic calendar](#) for important dates related to enrollment. To know more about the final exam schedule refer to [ASU Final exam schedule](#)

This syllabus, including grade evaluation and course schedule, is subject to modification on potentially short notice based on developing circumstances. A reasonable notice will be given for any changes made. Latest update: 08/18/2021

Syllabus CHEM 3451-Fall 2021

12. MWF Section - Tentative Lecture and Exam Schedule (Quizzes and Exams are at 5:30 pm in CAV200)

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---------------|---|--------------------------------|---|
| 23-Aug Chapter 1: A Review of General Chemistry | 24-Aug | 24-Aug Chapter 1: A Review of General Chemistry | 26-Aug | 27-Aug Chapter 1: A Review of General Chemistry |
| 30-Aug Chapter 2: Molecular Representations | 31-Aug | 1-Sep Chapter 2: Molecular Representations | 2-Sep Quiz-1 | 3-Sep Chapter 2: Molecular Representations |
| 6-Sep (Labor Day – No class) | 7-Sep | 8-Sep Chapter 3: Acids and Bases | 9-Sep | 10-Sep Chapter 3: Acids and Bases |
| 13-Sep Chapter 3: Acids and Bases | 14-Sep | 14-Sep Chapter 3: Acids and Bases | 16-Sep Exam-1 | 17-Sep Chapter 4: Alkanes and Cycloalkanes |
| 20-Sep Chapter 4: Alkanes and Cycloalkanes | 21-Sep | 22-Sep Chapter 4: Alkanes and Cycloalkanes | 23-Sep | 24-Sep Chapter 4: Alkanes and Cycloalkanes |
| 27-Sep Chapter 5: Stereoisomerism | 28-Sep | 29-Sep Chapter 5: Stereoisomerism | 30-Sep Quiz-2 | 1-Oct Chapter 5: Stereoisomerism |
| 4-Oct Chapter 6: Chemical Reactivity and Mechanisms | 5-Oct | 6-Oct Chapter 6: Chemical Reactivity and Mechanisms | 7-Oct | 8-Oct Chapter 7: Nucleophilic Substitution and Elimination |
| 11-Oct Chapter 7: Nucleophilic Substitution and Elimination | 12-Oct | 13-Oct Chapter 7: Nucleophilic Substitution and Elimination | 14-Oct Exam-2 | 15-Oct Chapter 7: Nucleophilic Substitution and Elimination |
| 18-Oct Chapter 8: Addition Reactions of Alkenes | 19-Oct | 20-Oct Chapter 8: Addition Reactions of Alkenes | 21-Oct | 22-Oct Chapter 8: Addition Reactions of Alkenes |
| 25-Oct Chapter 8: Addition Reactions of Alkenes | 26-Oct | 27-Oct Chapter 9: Alkynes | 28-Oct Quiz-3 | 29-Oct Chapter 9: Alkynes |
| 1-Nov Chapter 9: Alkynes | 2-Nov | 3-Nov Chapter-10 Radicals Reactions | 4-Nov | 5-Nov Chapter-10 Radicals Reactions |
| 8-Nov Chapter-10 Radicals Reactions | 9-Nov | 10-Nov Chapter-11 Synthesis | 11-Nov Exam-3 | 12-Nov Chapter-11 Synthesis |
| 15-Nov Chapter 12: Alcohols and Phenols | 16-Nov | 17-Nov Chapter 12: Alcohols and Phenols | 18-Nov Quiz-4 | 19-Nov Chapter 12: Alcohols and Phenols |
| 22-Nov Chapter 12: Alcohols and Phenols | 23-Nov | 24-Nov (Thanksgiving Break) | 25-Nov | 26-Nov (Thanksgiving Break) |
| 29-Nov (Review) | 30-Nov | 1-Dec (Review) | 2-Dec | 2-Dec (Review) |
| 6-Dec (No class) | 7-Dec | 8-Dec Final Exam (at 8:00-10:00 am in CAV200) | 9-Dec | 10-Dec |

13. TR Section - Tentative Lecture and Exam Schedule

| Monday | Tuesday | Wednesday | Thursday | Friday |
|--------|--|-----------|---|--------|
| 23-Aug | 24-Aug Chapter 1: A Review of General Chemistry | 24-Aug | 26-Aug Chapter 1: A Review of General Chemistry | 27-Aug |
| 30-Aug | 31-Aug Chapter 2: Molecular Representations | 1-Sep | 2-Sep Chapter 2: Molecular Representations Quiz-1 (at 5:30 pm in CAV200) | 3-Sep |
| 6-Sep | 7-Sep Chapter 3: Acids and Bases | 8-Sep | 9-Sep Chapter 3: Acids and Bases | 10-Sep |
| 13-Sep | 14-Sep Chapter 3: Acids and Bases | 14-Sep | 16-Sep Chapter 3: Acids and Bases Exam-1 (at 5:30 pm in CAV200) | 17-Sep |
| 20-Sep | 21-Sep Chapter 4: Alkanes and Cycloalkanes | 22-Sep | 23-Sep Chapter 4: Alkanes and Cycloalkanes | 24-Sep |
| 27-Sep | 28-Sep Chapter 5: Stereoisomerism | 29-Sep | 30-Sep Chapter 5: Stereoisomerism Quiz-2 (at 5:30 pm in CAV200) | 1-Oct |
| 4-Oct | 5-Oct Chapter 6: Chemical Reactivity and Mechanisms | 6-Oct | 7-Oct Chapter 6: Chemical Reactivity and Mechanisms | 8-Oct |
| 11-Oct | 12-Oct Chapter 7: Nucleophilic Substitution and Elimination | 13-Oct | 14-Oct Chapter 7: Nucleophilic Substitution and Elimination Exam-2 (at 5:30 pm in CAV200) | 15-Oct |
| 18-Oct | 19-Oct Chapter 8: Addition Reactions of Alkenes | 20-Oct | 21-Oct Chapter 8: Addition Reactions of Alkenes | 22-Oct |
| 25-Oct | 26-Oct Chapter 8: Addition Reactions of Alkenes | 27-Oct | 28-Oct Chapter 9: Alkynes Quiz-3 (at 5:30 pm in CAV200) | 29-Oct |
| 1-Nov | 2-Nov Chapter 9: Alkynes | 3-Nov | 4-Nov Chapter-10 Radicals Reactions | 5-Nov |
| 8-Nov | 9-Nov Chapter-10 Radicals Reactions | 10-Nov | 11-Nov Chapter-11 Synthesis Exam-3 (at 5:30 pm in CAV200) | 12-Nov |
| 15-Nov | 16-Nov Chapter 12: Alcohols and Phenols | 17-Nov | 18-Nov Chapter 12: Alcohols and Phenols Quiz-4 (at 5:30 pm in CAV200) | 19-Nov |
| 22-Nov | 23-Nov (Thanksgiving Break) | 24-Nov | 25-Nov (Thanksgiving Break) | 26-Nov |
| 29-Nov | 30-Nov (Review) | 1-Dec | 2-Dec (Review) | 2-Dec |
| 6-Dec | 7-Dec (No class) | 8-Dec | 9-Dec Final Exam (at 8:00-10:00 am in CAV200_ | 10-Dec |

LABORATORY SYLLABUS

CHEM3451 Organic Chemistry-I Fall 2021

Angelo State University | Department of Chemistry and Biochemistry

14. Lab Instructor Information

| | |
|---|--|
| Dr. Saravanan Ramasamy Office: CAV 214A sramasamy@angelo.edu | Mr. Kevin Boudreaux Office: CAV 207B Kevin.Boudreaux@angelo.edu |
|---|--|

15. Lab Sections and Meetings

| Sections | Day | Time | Instructor | Location |
|----------|-----|--------------------|---------------|---------------|
| 03Z | M | 2:00 pm – 4:50 pm | Dr. Ramasamy | CAV 219 / 233 |
| 04Z | T | 2:00 pm – 4:50 pm | Mr. Boudreaux | CAV 219 / 233 |
| 05Z | W | 11:00 am – 1:50 pm | Dr. Ramasamy | CAV 219 / 233 |
| 06Z | W | 2:00 pm – 4:50 pm | Mr. Boudreaux | CAV 219 / 233 |

16. Required Supplies to Purchase for lab

- [Proper Lab Attire](#) (Full-sleeve shirt, full-length pants, closed shoes)
- Lab Goggles (Required): Available from the ASU Bookstore or from the lab stockroom
- Nitrile gloves (Required)
- (Optional) A sharpie marker and laboratory coat

17. Lab Portion Description

This laboratory portion is designed to accompany *CHEM 3451 Organic Chemistry-1* course. Selected experiments are designed to illustrate the fundamental techniques used in organic chemistry, to develop familiarity with the properties of organic compounds, and to introduce analytical techniques including chromatography and spectroscopy.

By the end of this course, the student should be able to

- Carry out chemical reactions, work up, separate, purify and analyze the products. Manipulate synthetic apparatuses and glassware.
- Carry out mathematical procedures necessary in organic synthesis and analysis.
- Interpret analytical data (melting point, boiling point, thin layer chromatography, column chromatography, gas chromatography, infrared spectroscopy, NMR spectroscopy, mass spectrometry) to verify the product/composition of a reaction.
- Explain the procedures and concepts of basic organic laboratory, synthetic and analytical techniques.
- Communicate the outcome of an experiment to scientific audience.

18. Experiments and Grades

Out of the following 11 experiments, we count your 10 best scored experiments. Each lab experiment is worth 20 points. You must participate in the lab work and submit a complete lab report to get the lab points. Grading rubrics and benchmarks will be discussed during the lab introduction. The 10 labs x 20 pts = 200 pts from the laboratory portion will be added to your calculate your 3451 final score.

3451 course = 800 points from lecture + 200 points from laboratory.

| Week of | Experiment | Grade |
|---|---|----------------------|
| Aug-23 | Introduction and Melting Point | No points |
| Aug-30 | TLC and Model Kit Lab | Lab Report = 20 pts |
| Sep-6 | <i>(No Lab – Labor Day week)</i> | - |
| Sep-13 | Fractional Distillation | Lab Report = 20 pts |
| Sep-20 | Steam Distillation | Lab Report = 20 pts |
| Sep-27 | Recrystallization of Biphenyl and Acetanilide | Lab Report = 20 pts |
| Oct-4 | Isolation of Trymyristin | Lab Report = 20 pts |
| Oct-11 | Separation of Benzoic Acid and Naphthalene | Lab Report = 20 pts |
| Oct-18 | Column Chromatography | Lab Report = 20 pts |
| Oct-25 | Dehydration of Cyclohexanol (?) | Lab Report = 20 pts |
| Nov-1 | Limonene Extraction Using Supercritical CO ₂ | Lab Report = 20 pts |
| Nov-8 | IR Spectroscopy | Problem Set = 20 pts |
| Nov-15 | NMR Spectroscopy – Part 1 | Problem Set = 20 pts |
| (one lab will be dropped) Total points | | 200 pts |

Most of the experiments for this course are described in the lab manual, which will be posted on Blackboard. You are expected to read over each procedure before performing the experiment in lab. You will have to type the procedure in you lab notebook

There will be no separate exams for the laboratory portion of 3451.

19. Lab Report and Preparation for Lab

Lab reports should be typed and submitted online by the due date. A complete lab report includes prelab, observation and post-lab.

Prelab: Prelab for each experiment may take a couple of hours to prepare properly and it is important that you understand the intent and purpose of the experiment before attending the lab. You should use the template available on the Blackboard to type your prelab. Your procedure should be detailed enough to allow anyone to follow the instructions and complete the experiment. A printed copy of the prelab should be shown to the lab instructor at the beginning of a lab session. The following sections should be included in the prelab

- Date and experiment title
- Your name
- Purpose (aim) of the experiment
- Chemical equations and structures

- Physical data table
- Theoretical yield calculation (if applicable)
- Procedure

Observation: Thorough observation should be recorded (handwritten) on your notebook during the lab. Your instructor will sign you out only if you have a complete observation record.

Post-lab: You will have to type the post-lab and submit it in blackboard by the deadline posted for each lab. The following sections should be included in the post-lab.

- Results
- Conclusion
- Answers to the lab questions
- References
- Graphs, spectra (IR and NMR), and chromatography data (GC and TLC)

20. Attendance & Participation

Mandatory attendance is required to get a grade for the experiment. Preparation, efficient and appropriate use of time, attention to detail, staying on task, and a willingness to learn and participate are valuable qualities that will lead to a successful lab experience.

No make-up labs are given for CHEM 3451. Any lab which is missed for valid reasons will have its score substituted for the average on all the other labs for the term. In order to be eligible for this, the instructor must know beforehand that you will be absent.

Students will work in groups of two unless otherwise instructed. Both students should participate equally in the lab. Students will turn in individual lab reports that are reasonably different from their partner's work.

Standard Operational Procedures and Safety Rules In the Organic Chemistry Laboratory

The following rules are to be observed in this lab at all times. There is a signature sheet at the end of this syllabus that you are required to sign and turn in. Any student working in an unsafe manner may be dismissed from the laboratory by the instructor.

21. Mandatory Online Training: Lab Safety and Chemical Hygiene

It is a pre-requisite that you passed the online "Lab Safety and Chemical Hygiene" course in Blackboard, before going to your first lab. It is ASU's policy that a student should take this online training before allowed into a lab. You should have gotten email reminders for this during your first term in ASU. If you had passed this training course in the past, you don't need to take it again.

22. Laboratory Attire

Beginning on the first day of lab, everyone MUST have **approved goggles, long pants, long sleeve shirt, and closed-toed shoes** (no sandals, ballet slippers, etc). Tank tops, A-shirts, and anything that bears the midriff are also not allowed. Your clothing should not have excessive holes in it due to wear and tear or design (no excessively ripped jeans and the like). Anyone not wearing the appropriate attire will not be allowed into lab. Remember, the more skin you show the more places that chemicals can get on your skin and cause damage. Lab is also not a place that you want to wear nice clothing. We will be working with chemicals that can burn holes in, discolor, or damage clothing. Also, anyone with shoulder length hair should tie it back during lab. It is also recommended to have a spare pair of pants and a shirt in your backpack when you come to lab in case of a spill or accident in lab.

23. Safety in the Lab Environment

The student is responsible for reading the safety regulations given on this syllabus. All students must alert the lab instructor immediately in the event of any cuts, chemical spills, broken equipment, fires, etc.

Behavior: Do not eat, drink, smoke, or chew gum in the lab. Work only at your assigned desk. Do not perform experiments other than those which are scheduled for that day. No horseplay will be tolerated.

Fires: Most organic materials — including you, your hair, and your clothing — are flammable. Know the location of the safety showers, fire extinguishers, and fire blankets. The student is responsible for knowing the location of the safety equipment in the lab in which he or she is working. This includes the location of the safety shower, eye wash station, fire extinguishers and fire blankets.

Injuries: Blood is always a sure sign of bad laboratory technique. Check all glassware for cracks, sharp edges, or star cracks before using it. Any injury no matter how trivial should be reported to the lab instructor.

Floods: Be careful with drain hoses and leaky faucets.

Spills: Notify the lab instructor of any spills which occur during the lab. Minor spills can be cleaned by students, but do not try to clean up reagent or solvent spills yourself; some of these materials require special care in their disposal. Clean up any spills immediately.

Eye Safety: The wearing of contact lenses is not forbidden; however, note that it is not safe as volatile chemicals can react with the material that is used to make soft contact lenses and can be trapped

behind hard contact lenses. This can result in the lenses being fused to your eye or the chemicals being trapped behind the lens and staying in contact longer with your eye.

If you are pregnant (or become pregnant) contact the instructor immediately to make special accommodations.

24. Chemical Wastes

Most of the procedures contain a description of how to handle the wastes generated in these labs. Appropriately labeled waste bottles will be provided for most organic wastes. Concentrated acids should be neutralized with sodium bicarbonate, or some other appropriate weak base, before being disposed of in the sink; concentrated bases should be neutralized with glacial acetic acid (unless we need to unclog a drain somewhere!). Do not throw away broken glass or capillary tubes in the trash; dispose of them in the glass waste containers.

Throw away trash in the appropriate containers. Follow the directions of your instructor for discarding wastes from that day's work. These instructions must be followed carefully; disposing of chemical wastes in the wrong way may result in dangerous reactions (or at least a foul-smelling lab — or a foul-smelling chemist). Always ask if you're unsure. Broken glass should be discarded in the designated waste containers. NEVER throw glass away in the trash cans!

25. Chemical Stock

Do not move reagent bottles from their assigned place. Always recap reagent bottles. Some reagents decompose when exposed to the atmosphere for a period of time or they will evaporate and you may then begin breathing it in. Do not stick anything into the reagent bottles. If a spatula is provided for that purpose, be sure that the same spatula is used in the same bottle. If you pour out or weigh out too much of any reagent or solvent from the bottle, do **NOT** put the excess back in the bottle. This will risk introducing contaminants into the main supply of the reagent. Unused or excess reagents should be disposed of in the appropriate waste container. When an experiment calls for water, use deionized water provided in the wash bottles on the lab benches unless the directions specifically call for tap water. USE ONLY TAP WATER IN HOT WATER BATHS! Never add water to acid! Never add boiling chips or activated carbon to hot liquids!

26. Cleaning Up

Before a student can leave the lab at the end of the experiment, he or she must make sure that the bench area is clean, all electrical equipment has been unplugged, all faucets turned off, and no solids have been left in the sinks. Once these tasks have been accomplished a student must then have their lab instructor check their bench and initial one of the pages in their lab book for the current experiment. The common areas of the lab must be kept clean. This means that the hoods and balances should be free from solid or liquid waste and the solvent and reagent bottles should be capped. If the lab is not clean when the lab section is over there will be one "grace" lab. This means your lab section can leave the lab messy once. If the lab is left messy following a lab section more than once the entire section will have 10% removed from their grades for that particular lab report. If this happens more than once a 10% penalty will be applied each and every time and harsher measures may also be applied if the messiness continues. If it can be determined who left the lab messy only those people will have their lab report grades impacted. If not then the entire section will be penalized. No points will be deducted for broken glassware as long as it is cleaned up and reported to your instructor.

27. Microkit Return Policy

Plastic kits containing the microscale glassware will be checked out at the beginning of the lab period. These kits must be returned with ALL of the glassware clean and dry. As part of the checkout procedure outlined above you will return your microkits only after your instructor has checked your area and the microkits for cleanliness and initialed your notebook.

28. Other Operational Procedure

- Students should disassemble and return common equipment to the TA, drawer, or cabinet at the end of the lab period.
- Students should complete all lab work and clean up by at least ten minutes before the end of lab. Students should be out of the lab on time to allow for the next class to be prepared.
- It is a good idea that students wash their hands before leaving the lab. Even if gloves were used, residual chemicals may still be present on the skin.
- Students should wash glassware, clean the workspace area.
- Students should take care to not contaminate chemicals, standards, solutions, or solvents by using the same pipette or spatula in different containers without cleaning and drying the item thoroughly first.
- Students should not sit or lean on the counters as there may be chemical residue remaining which may damage the skin or clothing.
- Students should not leave the lab while wearing gloves or lab coats.
- Fume hoods are used when a procedure may produce smoke or strong odors. Keep the fume hoods clean! Do not leave weighing paper lying around in the hood after you're finished with it.
- Keep the balances clean. Immediately clean up any chemicals which are spilled on the balances, or around the balance area. Do not leave stray pieces of paper or glassware around the balances.
- Equipment: Bunsen burners, ring stands, clamps and O-rings, and buret clamps are available on the side shelves. At the end of the laboratory period, clean the desk space and return burners, clamps, and ring stands to their assigned spaces.
- Glassware: Hot glass looks exactly like cold glass. Check all glassware for cracks, sharp edges, or star cracks before using it. (I know I said this already, but it bears repeating.)

29. Dead Week Lab Clean-Up

There is no lab performed in the dead week, but your lab instructor may require you to clean the lab items during.

This syllabus is subject to change at any point throughout the term. Reasonable notice will be given for any changes made. Latest update: 08/18/2021

30. Acknowledgement

I hereby acknowledge that I have passed the online Blackboard course “Lab Safety and Chemical Hygiene”. I also acknowledge that I have read the “Standard Operational Procedures and Safety Rules in the Organic Chemistry Laboratory” given in the CHEM 3451 laboratory syllabus. I fully understand the risks involved in chemical laboratories, and that I must use precautions.

| | |
|-----------|--|
| Name | |
| Signature | |
| Date | |

(Your instructor will provide this page on the first day of lab. Turn in this signature page on the first day of your lab.)

31. Textbook Buying Options

We would use the online textbook “Organic Chemistry 4th Edition by David Klein” for the two-semester organic chemistry-1 and 2 courses. WileyPLUS is the online platform of the textbook, that contains an E-text, assignments, guided practice problems, a few animations, and videos.

Two places from where you can buy the WileyPLUS access code + Online textbook

- You can buy the two-semester access code (with online textbook) from ASU Bookstore for \$161 (Organic Chemistry, Edition: 4th, Author: Klein, WileyPLUS Next Gen 2 Semester Access Codes) (ISBN: 9781119761068)
- Or you can simply purchase the same using a credit card from Blackboard > Organic Chemistry course > [WileyPLUS Course Resources](#). This may be cheaper than ASU Bookstore, and gives you a few additional options to choose (like downloadable offline e-textbook, or physical copy). Also, this will automatically register you without an access code.

[Do not buy or register your textbook directly on WileyPLUS.com]

Then as mentioned in the first page of this syllabus, you can rent (\$16) or purchase (\$48) the “solution manual and study guide” (recommended material) for the textbook (Organic Chemistry by Klein – 4th edition). [Here is the publisher’s sales page](#). (ISBN: 978-1-119-65952-5)
