

## General Information

Instructors: Stephen Corlett (aka, Dr. Corlett or most commonly, Prof. Corlett)  
Office: A 276 (which is inside room A 277, the Organic Lab)  
Phone: 510-464-3279 (from on campus, ext. 3279)  
E-mail: [scorlett@peralta.edu](mailto:scorlett@peralta.edu)  
My Website: <https://laney.edu/corlett/>

## Course Materials

Lecture: **Required**

Klein, **Organic Chemistry**, 3<sup>rd</sup> edition, Wiley, 2017  
*e-text with loose-leaf text – comes with Solutions Manual and Student Study Guide*  
(ISBN: 9781119447719) ~\$180. The special website below will get a discount from the publisher: <https://www.wiley.com/WileyCDA/Section/id-830294.html>

E-mail account – You must have an account to receive class information. By default, the school assigns one to you when you register – it's of the form:  
xxxx@cc.peralta.edu - you'll need this one to access Canvas.

Organic Chemistry Model Set such as:  
Maruzen set number 1013A  
<http://www.maruzen.info/hgs/catalog>

or

Molymod. Organic (student) Set. MMS-008  
<http://molymod.com/sets.html>

(Optional) Klein, **Organic Chemistry as a Second Language: Second Semester Topics**, 4<sup>th</sup> edition, Wiley, 2019 (ISBN: 9781119110651) or any prior edition

Laboratory: **Required**

Pavia, et al., **A Microscale Approach to Organic Laboratory Techniques**, 5<sup>th</sup> edition, Brooks/Cole, 2013 (ISBN: 9781133106524) - look for used copies, since it is an older text. (should cost ~\$30-\$100)

Field, et al., **Organic Structure from Spectra**, 5<sup>th</sup> edition, Wiley, 2013  
(ISBN: 9781118325490)

Bound Laboratory Notebook with **carbonless** copy and sequentially numbered pages  
(an example is Hayden-McNeil version with ISBN 9781930882744)

**Spartan Student (v 7 or v8)** - molecular modeling program (details will be provided in class for how to purchase for \$25)

Scientific Calculator – only non-programmable calculators allowed during exams!

## Meeting Times

Lecture:	Monday & Wednesday in A 273	1:00 pm – 2:15 pm
Laboratory:	Monday & Wednesday in A 277	9:00 am – 11:50 am
Office Hours:	Mon, Wed, & Thu in A277	12:00 noon – 1:00 pm*
	Tues in A277	2:30 pm – 3:30 pm

(\*Note that on certain days office hours will be at 2:30-3:30 pm – the official list will be posted outside my office)

## Overview

Chem 12B is a continuation of Chem 12A. Where the first semester of Organic chemistry is focused on the theory of the combination of the elements, carbon, hydrogen, oxygen, nitrogen, phosphorus, sulfur, a couple of halogens, and a few metals, the second semester is focused on observing patterns of reactivity associated with the most common *functional groups*.

Synopsis of topics: Reactions and properties of conjugated systems, alcohols, ethers, thiols, sulfides, aromatic compounds, aldehydes, ketones, amines, carboxylic acids and carboxylic acid derivatives. Other topics include: nucleophilic additions,  $\beta$ -dicarbonyl compounds, pericyclic/sigmatropic reactions, carbohydrates, lipids, amino acids, proteins, nucleotides, and heterocyclic compounds.

**Prerequisites**            Chemistry 12A (with a grade of C or better, strictly enforced)

## Keys to being successful in this class:

- Attend each lecture and laboratory!
- Read the assigned passages from the textbook, handout, or on-line resources.
- Complete the assigned homework.
- Ask questions when you don't understand something – always.
- Come to lab prepared to do lab and to participate.
- Work respectfully and honestly with your instructor and other students in the class, both in lecture and laboratory.

Organic chemistry is a notoriously challenging course. Topics are usually more abstract than in general chemistry, so the approach to learning them is frequently different. This is a hands-on course - through visualization, explanation, use of computer and physical models you will approach the subject, literally from many angles. The importance of organic chemistry to surrounding world cannot be overstated - the principles govern the chemistry of chemical compounds and processes related to living systems (e.g., amino acids, metabolism) as well as new synthetic materials (plastics to nanowires). The overall goal of this course is to gain a working understanding of the basic language of organic chemistry and in the end to have the tools to work through problems and solutions to chemistry questions - and not to be intimidated by a topic that appears to be out of reach. There is a connection for everyone in organic chemistry!

## Time Commitment and Dedication

This class requires significant class work! Generally, each hour of lecture will require at least two hours of study outside the classroom. With 6 hours of laboratory per week you can expect 1-2 hours of preparation and completion of work outside the classroom. That's about *10 hours a week outside the classroom for just this class*. You must be sure to set aside time for this in your academic schedule - to do the reading

assignments, to work through the assigned homework problems, to prepare for laboratory (prelabs), and to complete experimental write-ups (reports).

Doing homework problems is an essential component of learning organic chemistry and will be part of your out-of-class work. It is a time-honored way to gain practice in applying the principles of organic chemistry and to gain experience in solving simple, then complex chemical problems. It must become part of your weekly routine to work on homework problems, if you plan to succeed in organic chemistry.

### **Learning Objective and Goals (what you should be able to do by the end of this class.)**

The following is a list of the student learning objectives (SLO's) and the ultimate goals for this Organic Chemistry class.

1. **Nomenclature** - Apply naming rules (nomenclature) to name or draw the structures for organic molecules and, where appropriate, indicate stereochemistry.
2. **Bonding** - Describe the overall structure and properties of organic molecules using the principles of chemical bonding, atomic hybridization, and orbital theory.
3. **Mechanisms** - Apply thermodynamic and kinetic principles to characterize organic chemical reactions and mechanisms.
4. **Spectroscopy** - Use common spectroscopic techniques (NMR, IR, UV/Vis, MS) to determine the molecular structure of organic compounds and also to correlate with chemical reactivity.
5. **Lab Safety** - Operate in the laboratory using routine acceptable safe laboratory practices to handle chemicals, glassware, and common laboratory equipment. (Apply the precautionary principle when handling hazardous materials, especially those of unknown toxicity.)
6. **Notebook** - Record laboratory results and data correctly in a scientific notebook and report and interpret results using appropriate notational and descriptive content in standard scientific format.
7. **Synthesis** - Devise synthetic approaches to relatively simple organic compounds using the concepts of multi-step synthesis, which includes retro-synthetic analysis.

### **Institutional Learning Outcomes (what you should get from any class at Laney)**

The following outcomes (ILOs) are what we expect all students at Laney College to receive in any course:

1. **Communication** - Students will effectively express and exchange ideas through various modes of communication.
2. **Critical Thinking and Problem Solving** - Students will be able to think critically and solve problems by identifying relevant information, evaluating alternatives, synthesizing findings and implementing effective solutions.
3. **Career Technical Skills** - Students will demonstrate technical skills in keeping with the demands of their field of study.
4. **Global Awareness, Ethics and Civic Responsibility** - Students will be prepared to practice community engagement that addresses one or more of the following: environmental responsibility, social justice and cultural diversity.
5. **Personal and Professional Development** - Students will develop their knowledge, skills and abilities for personal and/or professional growth, health and well-being.

## Grading Policy

Your grade will be based on the following:

### Exams (60%)

There will be 3 midterm exams: combined, these exams will be worth **45%** of your grade. The final exam will be the American Chemical Society (ACS) Organic Chemistry Exam and is worth **15%** of your grade. Note, none of the midterm exam scores can be dropped.

### Quizzes (10%)

During lecture, there will usually be a brief quiz *after* completing each chapter, except on exam weeks (and all will be announced). Combined they will be worth 10% of your grade. You can drop the lowest quiz score, if it improves your grade.

### Laboratory (20%)

Your lab grade will be based on completed lab reports, quiz scores, your participation and demonstrated laboratory technique, and the laboratory final exam - this exam is worth 10% of your overall lab (see the **Laboratory Syllabus** for more detail). The laboratory exam at the end of the semester will cover basic skills and techniques learned from the laboratory and will include a spectroscopy final. You can drop the lowest laboratory report score, if it improves your grade. The comprehensive reports cannot be dropped. **Note: You must pass the lab portion of the class (65% or better) to receive a passing grade for the entire course. You cannot pass the class without passing the lab!**

### Homework (10%)

A variety of homework will be assigned throughout the term – some graded, some not, some extra credit. Selections of homework problems from the Klein chapters will be assigned each week, spot checked for accuracy and returned to you. Other assignments will include handouts and worksheets that will be graded and returned to you. Each assigned chapter set is worth 25 points, and most worksheets are worth 10 points. You should be able to work through all of the “in-text” Klein exercises for each assigned chapter. These problems are quite helpful to do as you are reading the text and should be your “o-chem understanding meter” to gauge how well you are getting the material. The in-text problems will not be graded or recorded, so no need to turn them in. On occasion, there will be extra credit homework assignments. They will count toward homework credit, only.

The answers to all Klein homework problems are available from the solutions manual. The solutions manual is essential for checking the accuracy of your work - all answers come with complete and extensive explanations. (*Hint: the solutions guide is an excellent study guide and many of the exam and quiz problems will come directly from the assignments in the textbook.*)

Total scores		Approximate Grading Scheme (Note, I do not grade on a curve)
Midterm Exams	45%	A: 100-90%
Final Exam	15%	B: 89-78%
Quizzes	10%	C: 77-65%
Homework	10%	D: 64-50%
Laboratory	20%	F: below 50%
Total	100%	

## Course Policies

### Attendance in Lecture

The attendance policy is simple: **attendance is mandatory**. This policy is detailed in the Laney College Catalog 2019-2020, p. 23 (see the entire catalog here: [Laney 2019-2020 College Catalog](#)) and is the basis of my attendance policy for both lecture and laboratory. The most important citation is below:

"Attendance is expected at every meeting of all courses in which students are enrolled."

Attendance is mandatory in both lecture and laboratory. **If you miss more than two weeks' worth of classes (4 lectures) you will be dropped from the class.** If you miss a lecture for any reason, you risk missing out on vital discussions and explanations of the topics of Organic Chemistry. Good attendance also means being on time. Lectures and exams will always start promptly at the beginning of the class, so be on time. If you miss class or come in late, it is *your* responsibility to find out what you missed. Therefore, it is a good idea to exchange contact information with a few people in the class so that you can get this information if you need it - if it isn't already posted on-line at the class website.

### Attendance in Laboratory

Attendance in laboratory is also mandatory and is twice a week. You must satisfactorily complete each assigned laboratory experiment to receive a passing grade in the laboratory and hence the whole course! If you miss an experiment for any legitimate reason (illness, death in the family, or other emergency) then it is your responsibility to make satisfactory arrangements with the instructor to make it up. There will be no make-up experiments for unexcused absences in the laboratory. Be on time! You must be present at laboratory right when it starts, since that is when nearly all lab demonstrations or special instructions are given.

### Emergencies

Only in the event of an emergency (illness, death in the family, or other valid situation) will you be allowed to make up a missed exam or laboratory for credit and only if you notify me **before, during or immediately after** you miss the event. Phone calls or messages, e-mails, and direct contact are all valid methods to notify me of an emergency. Some form of evidence may be required from you regarding why you missed the event - the instructor reserves the right to determine the conditions for make-up work. If you miss an exam on its scheduled day, you will be allowed to take a make-up within one week of the original exam. **If you miss two or more of the scheduled exams you will be dropped from the course.** No make-ups are possible for quizzes.

### Academic Integrity – Your work is your own work

**When It's OK to Work Together.** In this class there are numerous occasions where you will work together with other students, during both lecture and laboratory. You will be encouraged to work together to solve problems in class, in laboratory, and also perhaps in a study group outside of class – this type of interaction provides an excellent environment to learn the material and most students that do this benefit from the experience of collaborative learning. In the laboratory you will usually (not always) work with at least one partner (sometimes 2). Reasons for this are clear: working together can be a learning experience on its own;

we economize on reagents and time; some experiments need more than two hands; and it cuts down on equipment wear and tear.

**When It's Not OK to Work Together.** When it's time to show me that you have acquired new problem-solving skills or techniques on an exam or quiz, you are on your own! Giving or receiving help to or from other students during an exam or a quiz is simply not allowed or acceptable and is called cheating! All involved are equally culpable (responsible) and liable and therefore risk expulsion, not only just from the class, but possibly also from the college. Just glancing over at someone's quiz or exam briefly, constitutes cheating. Behavior of this sort in any class is dishonest and ultimately harms yourself and your educational potential – getting caught cheating can be a serious event that can follow you forever, academically. When working with partners in the laboratory you are 100% responsible for your own pre-laboratory preparation (prelabs) and the final analysis of your results (e.g., conclusion, charts and graphs, reports and answers to the assigned questions).

**Just to Be Very Clear,** if you are caught cheating on an exam or a quiz, or you are cited for plagiarism (see definition below) you are guaranteed a zero (0) grade on that assignment, and depending on the severity of the incident the Vice President of Student Services and Vice President of Instruction may receive notifications of the incident. Depending on the severity of the incident, you could also be expelled from the Peralta college district (see the complete Student Code of Conduct, pp. 105-112 of the Laney College Catalog, 2015-2017). It can get really messy from here, so best practice is not to cheat on anything.

**Plagiarism** (copying someone else's work without acknowledgement) is a serious academic offense and is also considered cheating and carries the same consequences outlined above.

### **Electronic Devices (things that go “beep”)**

It is imperative that cell phones be turned off during lecture and laboratory. Laboratory use of cell phones is prohibited, since it constitutes an explosion hazard (due to static charge) as well as a serious distraction to potentially hazardous laboratory activities! If disruptions to the class or laboratory occur because of your electronic device, you could be dropped from the class. The use of electronic musical devices during lecture, and especially in laboratory, is never allowed.

However, the use of any type of audio *recording* device in lecture or laboratory is allowed but *requires prior approval of the instructor*. (no video allowed!)

Only approved scientific calculators can be used during exams. The use of language translators, cell phones, PDA's, or pocket computers is prohibited during exams.

### **Important Dates**

Last day to add classes w/o permission #	1/25/20
Last day to add classes w/ permission # in person	1/31/20
Last day to drop for full refund	2/1/20
Last day to drop without a "W"	2/1/20
Last day to drop with a "W"	4/24/20
Final for this class	5/20/20

## Course Information

Nearly all details regarding required items and policies for this course are found in this syllabus. An overview of the topics and chapters, scheduled laboratory experiments, and tentative dates for the midterm exams are shown in the **Lecture and Laboratory Calendar**. More details on topics to be covered in the lecture, reading assignments, homework assignments, assigned exam dates, laboratory details, and any other vital data, are provided in **Agendas**, which will be handed out periodically throughout the semester and cover approximately two weeks at a time. Most information that is handed out during lecture is available on-line at my school website and in Canvas. The only password-protected area of the website is the **Notes** page. The password will be made available in class.

<https://laney.edu/corlett/>

Follow the link on the left for Chemistry 12B.

Canvas and the entire suite of Microsoft Office 365 applications are available in your student portal:

<https://web.peralata.edu/portal/>

## Non-Discrimination Clause

Laney College does not discriminate on the basis of age, race, religion, color, gender identity, gender expression, sexual orientation, ancestry, citizenship, national origin, military or veteran status, disability, marital status, pregnancy, medical condition, and immigration status.

## Laboratory Overview

**First Semester** (as a reminder) – Organic chemistry laboratory introduces you to the observable properties of organic compounds and, in this semester, is designed to teach you the basic skills required to work safely with organic compounds in a chemistry laboratory. It is when you learn the techniques of purification and characterization of organic compounds, how to use glassware to perform chemical reactions, and how to interpret the data from the most common means to characterize and identify organic compounds, infrared spectroscopy (IR) and mass spectrometry (MS), and nuclear magnetic resonance spectroscopy (NMR).

**Second Semester** – Organic chemistry laboratory, in the second semester, will give you more experience in the art and means of performing organic chemistry in the laboratory! You will gain practice in most of the techniques that you learned in the first semester, plus learn more routine operations. You will purify organic compounds and will routinely use spectroscopic techniques (IR, NMR, GC/MS) for analysis. Since organic chemistry is a laboratory intensive science, organic chemistry laboratory is a significant component of the class. ***You must pass the lab portion of the class to receive a passing grade for the course!*** (This means at a minimum, you need a lab grade of 65%)

## Safety

At all times you should operate safely in the laboratory! To do this, follow the guidelines described in Pavia (Technique 1 – Laboratory Safety) and the **Laboratory Rules and Safety Procedures** handout, which is discussed during the laboratory check-in and safety discussion. You will be quizzed on this information. At nearly all times that you are in the laboratory you will be required to wear approved safety goggles (which

may not be the same safety glasses that you used in earlier chemistry classes). Goggles are provided for you, however if you have your own set of laboratory goggles, they must meet the approval of the instructor, before you can use them in the organic chemistry laboratory. Note that your clothing in laboratory is also a safety device. How you dress for the laboratory is important, which will be discussed during the safety lecture. In general, consider coming to lab dressed as though you were about to paint a house!

Organic Chemistry Laboratory is serious business! To work safely in the laboratory, you will need to be distraction-free when you are in the laboratory. You are expected to only do laboratory related tasks during the laboratory sessions. Things that are NOT allowed during lab time are loitering, reading the newspaper, listening to music, working on other classes, socializing, rough-housing, or clowning around. Not surprisingly, the most common mistakes in laboratory are caused by lack of attention and focus on the experiment under study.

## The Notebook

You will use a laboratory notebook throughout the semester to record just about everything that you do in the lab. The notebook should be a **carbonless** copy notebook with sequentially numbered pages, where the copy page can be easily removed - you will always turn in the copies of your laboratory entries. **Since the notebook is a requirement for the course, you will always need to bring it to laboratory.** You could lose points from your experiment if you do not bring your notebook to laboratory! You will need to have the notebook ready for use by the second week of classes. You can use a "used" notebook from another class as long as it meets the requirements above and that you have ample room left for experiments.

You should maintain an **Index of Experiments** in your notebook. Each entry should contain the complete name of the experiment and the beginning page number. (This may be helpful for you when you use the notebook during the laboratory "prelab" quizzes.)

Each experiment will require the following:

### 1. The Prelab

The **Prelab** assignment for each experiment should be completed before the beginning of the laboratory period for which the lab begins. For nearly all experiments there will be a prelab quiz at the beginning of the lab. Depending on the experiment, all or most of the following sections described below will need to appear in your notebook **before the start of lab.**

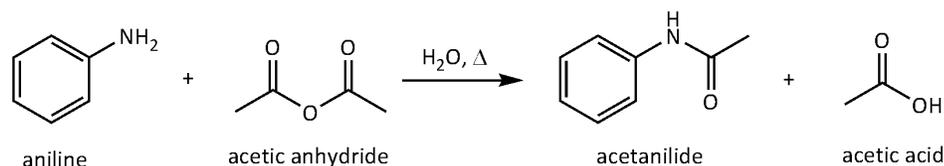
**Title** – A short descriptive title for the experiment (not just "Experiment 3," but "Simple and Fractional Distillation of Methanol and Water Mixtures.")

**Name** – Your name should always appear **on the top of each page** that you fill in and complete.

**Date** – Every page needs to indicate the date that information was entered, whether it's the day you prepared the prelab or the day you did something in the laboratory.

**Purpose** – A brief description of the goals of the experiment (state the obvious: "To separate a mixture of methanol and water using distillation." or "To prepare aspirin from salicylic acid and then to purify it by recrystallization ")

**Chemical Equations and/or Chemical Structure** – For experiments involving the conversion of one compound to another compound, a chemical equation should be clearly shown in your notebook. Any other type of experiment requires at least the chemical structure of the compound(s) under study. The equation should clearly show all reactants, the stoichiometry of the reaction, all products, and should indicate the reaction conditions (solvents, temperature, etc.). For example,



**Brief Outline** – When you come to lab to perform an experiment you should be prepared to start the procedure immediately (without thumbing through the laboratory textbook). In order to be prepared, a brief outline of the procedure plus any modification discussed in class, including any diagrams of the apparatus that you expect to use, should appear in your notebook.

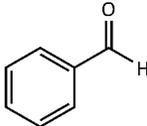
**Table of Reagents and Physical Properties** – If your experiment involves a chemical transformation, then a reagents table is required. If not, then a table of the physical properties for the reagents or compounds under study is required. Examples of both items are shown below. Note that it contains lots of information about the reactants: name of the compound, molecular formula, molecular weight, amount needed for the experiment, melting point (or boiling point), density (for liquids) or molarity (for stock solutions), moles of all reactants used, and equivalents of each reactant used (this row is useful for finding the limiting reagent\*). The final entry of the table should be for the expected product (shown in the far right column, below); you should calculate your *theoretical yield* in grams from the theoretical number of moles of product (shown in bold below), even if your product is a liquid.

#### An Example Reagent Table

	Reagents		Solvents	Products
Name	2-bromobutane	sodium iodide	acetone	2-iodobutane
Formula	C <sub>4</sub> H <sub>9</sub> Br	NaI		C <sub>4</sub> H <sub>9</sub> I
MW (g/mol)	137.03	149.89		184.02
Amount	2.0 mL	3.0 g	50 mL	<b>3.3 g (theory)</b>
Properties	bp 91°C		bp 56°C	bp 119-120°C <i>n<sub>D</sub></i> = 1.4991
Density (or M)	<i>d</i> = 1.255 g/mL			<i>d</i> = 1.598 g/mL
Moles	0.018	0.020		0.018 (theory)
Equivalents*	1.0 (limiting)	1.1		1.0 (theory)

(\*This row is designed to keep track of the limiting reagent, which in this case is 2-bromobutane. It shows to you and the reader that the theoretical number of moles of product is determined by the limiting reagent and is calculated by knowing the actual moles of reagent used compared to the stoichiometry of the reaction, which in this example is 1:1. Note that the other reagent is present with 1.1 equivalents of material, which is 0.1 equivalents excess, or 10% more than the theoretical amount needed. Finally, note that there is never a need to calculate moles or equivalents of solvents

### An Example Table of Physical Properties

Compound Structure	Properties
	benzaldehyde $C_7H_6O$ MW = 106.12 g/mol bp = 178-179°C $d = 1.045$ g/mL flash point = 64°C

## 2. Observations, Data, and Analysis

The information that appears in this section should be written directly into the notebook on the day of lab, during the experiment. Never put data *temporarily* on other paper and then copy it to the notebook: this is a poor practice, which is highly susceptible to errors. All supporting data, such as printouts or charts, must be turned in with your laboratory report. This material is part of your experiment. If you have a lab partner, then one of you needs to turn in the original and the other turns in a copy of this information.

Make frequent notes of your observations about what is going on during your experiment and record them in your notebook. This is part of the evidence that you performed the experiment. Record any physical properties measured for your product. This includes data such as mp, bp, crude mass, final purified mass, percent yield, and appearance (color, type of crystals, etc.).

Any analysis of your data (calculations, conversions, interpreted data from graphs, etc.) should appear in your notebook. The data itself (print outs, spectra, chromatograms, etc.) should be included at the end of your report. Note, there is no "pasting" of data directly into the notebook (since you are turning in the copy page from the notebook) – just turn in with rest of the report

## 3. Partial and Full Reports

Where you frequently used a template in the first semester class, in CHEM 12B the final analysis of your experiment will be completed as a *Partial* or *Full* report. This will be indicated in each experimental handout. Any analysis you perform or data (such as chromatograms, or spectra) you obtain on the compounds under study or products isolated should be recorded in the notebook - we will discuss formats for this during lab. Some analysis may require a computer – don't worry, you will learn how to do this when the time comes! Finally, answer all assigned questions from the experimental handout for each experiment on separate pages or in the *Template* as instructed in the handout. This section should be typed and completed according to the format listed on the **Laboratory Report Format and Check-List** handout

## 4. Signatures

The instructor will sign your laboratory notebook often. At the end of a completed experiment, you and the instructor will sign the bottom of the last page of the experiment.

## Laboratory Grading Policy

Your laboratory grade will be based on the following:

Item	Points
Exercises/Tasks/Handouts	100
Prelab Quizzes	100
Partial Reports (7)	500
Full Reports (3)	150
Laboratory Practical	100
Spectroscopy Exam	50
<b>Total Points</b>	<b>1000</b>

(\*tentative number of experiments – the actual number could vary)

To be clear, in laboratory, you must satisfactorily complete all laboratory work and your combined lab score must be **65%** of the total to receive a passing grade in the whole class.