

Syllabus for Chemistry 12B

Spring Semester 2015

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Units: 5 semester hours

Class Meetings: Lecture: Tu, Th 11:00-12:15 in BCC 015.
Laboratory: Tu, Th 1:30-4:20 PM in BCC 514.

Office Hours: M-Th 10:00-11:00* AM BCC 541 or 514. Or by appointment.

Texts/Materials:

- Organic Chemistry, by David Klein, 2nd edition. (Note that the Study Guide is not strictly essential, but many students find it helpful; consider getting together with someone else in the class to share a copy.)
- A Small Scale Approach to Organic Laboratory Techniques, third or fourth Edition, by D. L. Pavia, G. M. Lampman, G. S. Kriz and R. G. Engel.
- Laboratory notebook: One with sequentially numbered pages. Carbon copy is not desired.
- Molecular models (not strictly necessary, but very helpful).
- Calculator – not mandatory if you can do addition and multiplication without one.
- Safety goggles (available at the bookstore, or in any hardware store).

Course Objectives: Students who complete this course will be prepared to: Extend fundamental concepts of chemical bonding, structure and reactivity to develop a deeper understanding of organic chemistry, including applications to polyfunctional molecules and biomolecules; demonstrate improved facility in solving organic chemical problems and interpreting chemical behavior, based on fundamental principles, knowledge of specific compound types, standard reference sources, and reasoning by analogy; apply relatively advanced lab skills, chemical synthesis and instrumental analysis abilities, appropriate judgment and safe work habits in the use and study of organic compounds and reaction; evaluate and use a variety of organic chemical reference materials and software, including spectral databases, spectroscopic simulation and molecular modeling software, and journal resources; further develop the ability to maintain a laboratory notebook and write formal laboratory reports describing and interpreting the results obtained in the laboratory.

Course Content and Format: Chemistry 12B is the second semester of a two-semester course in organic chemistry; successful completion of Chemistry 12A or its equivalent is a course prerequisite. In this second semester, we will utilize fundamental concepts of structure, properties, and reactivity of the compounds of carbon, to build an overview of the scope and concepts of organic chemistry. This allows later applications both to understanding many common substances, and to the chemistry of living systems. Although there are millions of known organic compounds, most chemical behavior can be predicted and explained according to readily recognizable "functional groups" which determine the compound type. Fortunately many generalizations are possible. This semester we will discuss alcohols, ethers, sulfur compounds, aldehydes, ketones, carboxylic acids and derivatives, aromatic compounds, amines, and basic biomolecules; oxidations, reductions, aromatic substitution reactions, carbonyl reactions, organometallic reactions; and physical and spectroscopic properties of organic compounds. The lab exercises are intended to reinforce the lecture topics, and to provide direct experience with the properties, preparation, and safe handling of organic compounds. Since laboratory skills have their own logic, and because labs address a series of individual topics, the labs may not always follow the specific order of the lectures. See attached lecture schedule for details. The morning session will predominantly be lecture material based on the chapters covered in the text. There will usually be a powerpoint presentation with quite a bit of work on the board. The afternoon session will be comprised of working in the lab, lab demos, some lab lecture, and workshops based on lecture and lab material.

Ground rules: Silence your cell phones. If you must take a call, please step out of class. Please don't text in class.

Questions and class participation are important and encouraged. Remember, the only dumb question is the un-asked question.

Evaluation: Grades will be based on a combination of quizzes, exams, and laboratory scores:

Quizzes: There will be quizzes throughout the semester and will account for 20% of your grade.

Quizzes count approximately 20 points each.

Midterm exams: There will be three regular midterm exams and one standardized ACS exam during the term; each of these exams will count 10% of your final grade. The ACS exam will may be used additionally to replace one of the midterm exam scores if doing so will improve your grade. The ACS exam score may not be replaced. Exams are tentatively scheduled for February 12, March 12, April 30, and May 14 (ACS).

Laboratory reports and notebooks: Formal lab reports (see the separate handout regarding format) will be due at the beginning of lab the week after the lab is performed; notebooks will be collected approximately twice during the semester and will count toward your lab score total. Labs will count 20% of your grade.

Final exam: The final will account 20% of your final score; it is tentatively set for Tuesday, May 19 from 1:30 – 4:20 PM, and will be comprehensive, covering topics from the entire semester.

Grading will be awarded according to the following percentage ranges (out of approximately 850 points): A = <90%; B = 80-89%; C = 70-79%; D = 60-69%; F = below 60%.

The Lab and lecture components of this course are combined. You will not receive a passing grade without completion of both Lab and Lecture sections. Failure to complete the lab portion of the course will result in a failing grade – see attendance guidelines below!

Makeup exams or quizzes are possible only in cases of illness or other emergency absences, and then only if it is possible to take the makeup before the exam or quiz is returned or the exam appears on the website. **Repetitious absence (the equivalent of two weeks of class/lab time) from lectures and/or labs, or repeated disregard of lab safety rules, will result in being dropped from the course.** No labs may be dropped or made up. Pagers and cell phones must be turned *off* during lectures and during the introductory parts of lab periods (go discreetly into the hall for any later calls during lab; any such calls must be kept to an absolute minimum, and only in ways that do not compromise your lab work), to avoid distracting the rest of the class. Use of phones or messaging devices during an exam or a quiz will result in a zero on that exam or quiz. Since your undistracted attention is critical to your performance in this demanding course, and also is necessary for safe lab work, use of ipods and other personal music systems will not be permitted in lecture or lab. It is also expected that students will consistently adhere to the highest standards of integrity in this course as a condition of passing and of continuing enrollment (please refer to the BCC Student Code of Conduct, and the Academic Honesty Policy in the current BCC catalog).

Course content: See attached lecture schedule.

Laboratory Exercises: See attached lab schedule.

Some additional comments: It is utterly essential that you keep up with the assigned work for this course. This means, in particular, that you will need to schedule your week so that you devote substantial study time (two hours or more) to organic chemistry on at least four or five days each week. *College work is your job here at BCC, and requires your highest priority!* Homework that may be assigned at times is intended to be representative of the course material, but is by no means sufficient to assure mastery. *The plain fact is that those students who perform best in organic chemistry courses (as in all demanding courses) are those students who truly devote themselves to learning the subject, methodically trying each and every exercise while working through the text.* The use of molecular models is strongly advised as an aid to visualizing structures. **Learning organic chemistry is like learning a new language: the individual parts are not particularly difficult, but there is no substitute for time, effort, and motivation.**

Taking responsibility for your own performance in this course will be your most important step toward doing well in organic chemistry!

DSPS Statement - Students who require special accommodations due to disabilities should submit documentation from DSPS regarding your prescribed accommodations for this course. If you need such documentation, please contact the Programs and Services for Students with Disabilities (DSPS) office. The DSPS office is available to facilitate the reasonable accommodations process and is located in Room 261. The DSPS staff can be reached by telephone at (510) 981-2812 or (510) 981-2813.

The student is also welcome to contact the instructor, preferably in writing, to begin the accommodations process. (This should be done within the first two weeks of class.) Should a disabling condition arise during the course of the semester, please let the instructor know for appropriate planning, if any, for needed accommodations.

Student Learning Outcome (SLO):

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.

Attendance: Attendance in lecture and lab classes is essential for success in the class. Please make every effort to attend classes, lectures and workshops.

Stay informed: Please check the course MOODLE site, <http://eperalta.org/spring2015/>, regularly for important documents and course updates

Disclaimer: Due to unforeseen circumstances, the contents of this syllabus, lecture and lab schedules are subject to change. Any changes required will be announced in class and via email to the registered students in the class.

*Office hours may need to be changed once in a while. Any changes will be announced in class and posted on the moodle site.

Chemistry 12B Tentative Lab Schedule

Spring 2015

<u>Week</u>	<u>Dates</u>	<u>Lab Exercise</u>	<u>Reference</u>
1	Jan 20-22	Check-in/Safety/Introduction Review of lab techniques and equipment	pg. 546-586; handout
2	Jan 27-29	Borneol→camphor→isoborneol	Lecture Expt. 31
3	Feb 3-5	Borneol→camphor→isoborneol Spectroscopy Review	Expt. 31 Klein 15, 16
4	Feb 10-12	Grignard reaction demo / review Exam 1	--
5	Feb 17-19	Grignard Reaction	Expt. 33
6	Feb 24-26	Diels-Alder reaction	Expt. 49
7	Mar 3-5	Preparation of Methyl Orange	handout
8	Mar 10-12	Unknown determination Lecture Exam 2	55D Appendix 1 --
9	Mar 17-19	Unknown determination	
10	Mar 24-26	Soaps and Detergents	handout
-----SPRING BREAK-----			
11	April 7-9	Crossed aldol lab (multi-step)	handout
12	April 14-16	Finish aldol lab	handout
13	April 21-23	Spectroscopy workshop DEET	Expt. 45 --
14	April 28-30	GC-MS analysis of volatile compounds Exam 3	Handout
15	May 5-7	Synthesis workshop	
16	May 12-14	Check-out / ACS exam workshop Exam 4(ACS)	--

Chapter references are to **D. L. Pavia, G. M. Lampman, G. S. Kriz and R. G. Engel, "A Microscale Approach to Organic Laboratory Techniques", 5th Edition (Brooks/Cole, 2013)**

The instructor reserves the right to change this schedule with advanced notice.

Chemistry 12B Tentative Lecture Schedule

Spring 2015

<u>Week</u>	<u>Dates</u>	<u>Lecture Topic</u>	<u>Chapter</u>
1	Jan. 20-22	Review of 12A Synthesis	1-11, 15, 16
2	Jan. 27-29	Synthesis Alcohols	12 13
3	Feb. 3-5	Ethers, Epoxides	13,14
4	Feb. 10-12	Thiols, Sulfides Exam 1: 2/12 (Chapters 12-14)	14
5	Feb. 17-19	Pi Systems	17
6	Feb. 24-26	Aromaticity	18
7	Mar. 3-5	Aromatic reactions	19
8	Mar. 10-12	Aldehydes / Ketones Exam 2: 3/12 (Chapters 17-19)	20
9	Mar. 17-19	Carboxylic acid	21
10	Mar. 24-26	Carboxylic Acids/Enolates	21, 22
-----SPRING BREAK-----			
11	April 7-9	Enolates / aldol	22
12	April 14-16	Amines	24
13	April 21-23	Sugars Carbohydrates	25
14	April 28-30	Review / Catch up Exam 3: 4/130 (Chapters 20-25)	
15	May 5-7	Amino Acids /Proteins	26
16	May 12-14	Lipids / polymers ACS Exam: 5/14	27, 28

The final exam is tentatively scheduled for 4/19 from 1:30-4:20 PM

This schedule is a guideline only. Some changes to this schedule may be necessary as the class progresses.