

# CHEM 203

## Introductory Organic Chemistry

### Fall 2013

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Office Hours:	M & F 11:15 – 12:05 AM W 1:25 – 2:15 PM & by appointment	M & W 1:25 – 2:15 PM T 12:15 – 1:30 PM & by appointment
Class Hours:	Monday & Wednesday 3:35 – 4:25 PM	123 OBS
Lab Hours:	Tuesday 8:00– 10:45 AM	107 OBS

#### Course Description:

This class will serve as the second course in the introductory organic sequence. The course consists of both a lecture and laboratory component. The lecture portion is made up of two parts; organic spectroscopy (IR, NMR, UV, MS) and introduction to biochemistry. The biochemistry part will focus on the chemistry of carbohydrates, enzymes, lipids, proteins, metabolism and nucleic acids. The lab portion will introduce basic organic chemistry laboratory skills and emphasizes the application of organic spectroscopy in organic structural analysis.

**Prerequisites:** CHEM 202.

#### Required Instructional Materials:

<b>Lecture text:</b>	Essential Organic Chemistry; Bruice, 2 <sup>nd</sup> edition
<b>Lab Text:</b>	Laboratory Techniques for Organic Chemistry; Lehman, 2 <sup>nd</sup> edition
<b>Lab Notebook:</b>	Bound carbonless carbon copy notebook (50 or 100 pages)
<b>Goggles:</b>	Any goggles or safety glasses with side-shields
<b>Combination Lock:</b>	Bring your own or purchase from the chemistry club during lab

#### Optional Instructional Materials:

<b>Study Guide:</b>	Study Guide & Solutions Manual, Bruice, 2 <sup>nd</sup> edition
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#### Attendance:

It is very important that you attend class. A grade of **W** is awarded to students who withdraw prior to the Late Drop Period (**November 15<sup>th</sup>**). Students are advised to discuss attendance irregularities or poor class performance with the instructors. Do not simply stop your attendance. This may result in an **F** for the course.

## LECTURE

### Problem Sets:

During the spectroscopy portion of the course, there will be two problems sets assigned. These assignments will require that you apply your knowledge of organic spectroscopy to solving structure problems. These assignments should be completed independently.

### Spectroscopy Puzzle:

As a final assessment for the spectroscopy section, students will be given an individualized final spectral problem to solve independently. Similar to the problem sets, students should complete this out of class assignment without outside influence. Any form of academic dishonesty will result in a zero for the assignment as well as further disciplinary action. (Please read the Academic Dishonesty section.)

### Case Study:

During the biochemistry portion of the course, there will be one case study assigned. A case study is a realistic situation and often involves a dilemma, conflict, or problem that must be solved. Details for this assignment will be provided during lecture.

### Exams:

There are three exams during the semester. Exams will be given during the regular class period as announced in class. Exams may include problems, short answer, multiple choice, true/false and some essay. Partial credit is given only if all necessary work is shown. Make-up exams will only be given for legitimate absences officially recognized by Penn State University. **No exceptions will be made.** It is the responsibility of the student to notify the instructor if an exam will be missed and arrange the make-up. There is no comprehensive final exam.

## LABORATORY

### Lab Notebook:

Your lab notebook must have at least 50 pages of carbonless duplicate paper. Three ring binders or loose-leaf paper are unacceptable. Begin your notebook by writing your name, section, desk number and combination on the inside front cover. Your notebook should be a daily log describing what you did everyday in lab. Each experiment should begin with a prelab and continue with your in-class observations and data. See the attached sheet "Tips for Keeping a Good Notebook" for a more detailed description of how to keep your notebook and what it should include.

### Prelab Reports:

You will be expected to have completed a prelab report in your lab notebook before beginning any experiment. For the contents of your prelab, see the attached sheet "Final Report Guidelines." I may or may not check the prelab report every week, but if I ask you for it and you don't have it, you will not be allowed to begin that lab until you complete it and you will also lose points from your final report. You are also responsible for prelab readings (Lehman), which will familiarize you with techniques and procedures you will be using in laboratory.

### Final reports:

Final reports will be due **one week** after the completion of the experiment. Unexcused late reports will be penalized **2 points** a day. Poorly written lab reports will be penalized regardless of the quality of your data.

### Lab Courtesy:

Failure to abide by safety rules will result in automatic deduction of courtesy points. Point deduction can also result from being chronically late, leaving early, disrupting or distracting other students. Courtesy points will also be, to some degree, be a judge of your preparedness for lab (i.e. do you know what you are doing when you come to lab) and how you use your time in lab (i.e. do you work efficiently.)

**Grades:**

Your overall grade will be based on both lecture (2/3) and lab (1/3). The breakdown is summarized below:

<b>Lecture</b>	Problem sets (2 x 25 pts)	50 pts
	Spectroscopy Puzzle	50 pts
	Case Study	25 pts
	<u>Exams (3 x 75 pts)</u>	<u>225 pts</u>
	Lecture total	350 pts
<b>Lab</b>	Lab courtesy	15 pts
	Lab notebook*	20 pts
	<u>Lab reports (7 x 20 pts)</u>	<u>140 pts</u>
	Lab total	175 pts
<b>Total</b>		<b>525 pts</b>

Letter grades will be assigned from a standard scale given below:

<u>Grade</u>	<u>Percentage</u>
A	94-100%
A-	90-93%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	70-76%
D	60-69%
F	0-59%

**Learning Resource Center:**

The Learning Resource Center promotes the academic success of Penn State Erie students through peer tutoring and study skills advising. Tutoring is free and available in most subject areas. Information can be found at [psbehrend.psu.edu/Academics/academic-services/lrc](http://psbehrend.psu.edu/Academics/academic-services/lrc).

**Note to students with disabilities:**

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for modifications or reasonable accommodations in this course, please contact the Disability Specialist in Room 1 Reed Union Building, 898-7101. Information can be found at [www.behrend.psu.edu/student/Educational%20Equities/DISABILITY.htm](http://www.behrend.psu.edu/student/Educational%20Equities/DISABILITY.htm).

**Academic Dishonesty:**

It is expected that each student will do his/her own work on all assignments including daily problems, homework, and exams. There are severe penalties for plagiarism and cheating. Proven cases of academic dishonesty will result in an **XF** for the course. For more information see the Academic Integrity & Academic Dishonesty (Senate Policy 49-20) at [www.psu.edu/ufs/policies/](http://www.psu.edu/ufs/policies/) or Behrend's Academic Integrity policy at [psbehrend.psu.edu/intranet/faculty-resources/academic-integrity](http://psbehrend.psu.edu/intranet/faculty-resources/academic-integrity).

## Tentative Lecture Schedule\*

<b>Date</b>	<b>Lecture</b>	<b>Suggested Problems</b>
8/26	Introduction	-
8/28	Ch. 14: UVVis Op. G, 41	-
9/2	<b>NO CLASS</b>	Drive safe!
9/4	Ch. 14: MS Op. G, 42	42, 47, 50
9/9	<b>NO CLASS</b>	-
9/11	Ch. 14: IR, Op. G, 39	41, 43, 44, 45, 46, 48, 49, 51
9/16 & 9/18	Ch. 14: NMR, Op. G, 40	54, 55, 56, 57, 59, 60, 63, 64
9/23 & 9/25	Solving Organic Structures	68
9/30	Spectroscopy Puzzle Practice	<b>Puzzle due 10/2</b>
10/2 – 10/9	Ch.15 – Carbohydrates	TBA
10/14 – 10/21	Ch. 16 – Amino acids, peptides, proteins	TBA
10/23 – 10/30	Ch. 17 – Enzymes/Vitamins	TBA
11/4 – 11/11	Ch. 18 – Metabolism	TBA
11/13 – 11/20	Ch. 19 – Lipids	TBA
11/25 – 11/27	<b>NO CLASS</b>	Happy Thanksgiving!
12/2 – 12/11	Ch. 20 – Nucleic Acids	TBA

*\*Schedule subject to change!*

## Tentative Lab Schedule\*

Date	LABORATORY**
8/27	Check In
9/3	Expt #2: Separating the Components of "Panacetin"
9/10	Expt #3: Identifying a Constituent of "Panacetin"
9/17	Expt #4: Synthesis of Salicylic Acid from Wintergreen Oil
9/24	Expt #4: continued
10/1	Expt #5: Preparation of Synthetic Banana oil
10/8	Expt #5: continued
10/15	Expt #9: Isolation of Lycopene from Tomato Paste
10/22	Expt #53: Structure of an Unknown D-Hexose
10/29	Expt #53: continued
11/5	Expt #54: Fatty Acid Content of Commercial Cooking oils
11/12	Expt #54: continued
11/19	No Class – Happy Thanksgiving!
11/26	Minilab #44: Isolation of trimyristin
12/3	Expt #33: Spectral Identification of Monoterpenes
12/10	Check Out

*\*Schedule subject to change!*

\*\* The specific experimental procedures will be given out as handouts and distributed in lecture or lab usually the week before that lab begins.

## Tips for Keeping a Good Notebook

1. Leave two pages at the front of your notebook for a title page and a table of contents.
2. The first entry in your notebook for each particular experiment must be a PreLab.
3. The PreLab should include the date, title, and a reference for each new experiment. The PreLab should also include any hazards, chemical or otherwise, and a drawing of any new or unfamiliar apparatus. It should also include the chemical equations for the reaction being done in that lab.
4. Include the date each time you continue the same experiment on a different day.
5. Always write in blue or black permanent ink.
6. It is helpful to have an appendix on the back pages of your notebook with common information. This may include boiling points, melting points, molecular weights, abbreviations, etc.
7. Always record weights, measurements, colors, smells, unusual events, spills, and any other observations.

For example:

- added 0.263 g of NaCl to 20 mL of distilled H<sub>2</sub>O
  - beaker became very warm and the water began to boil
  - smoke appeared to come from the beaker
  - after containing the smoking beaker in the hood, the NaCl container was examined
  - the container was not NaCl, it was Na (sodium metal)
  - disposed of hazardous Na/H<sub>2</sub>O with a slow addition isopropyl alcohol
  - started experiment again
8. Use as many standard abbreviations and chemical formulas as possible. It will help you practice for lecture and save you time in the lab.
  9. Record your data as it occurs. If you wait until the end of the class period you will not remember that actual steps you took. Very often it will deviate from the text, so the text is no longer a reliable source. You will need this detailed information for the procedure section of your final report. You do not have to write in complete sentences in your notebook.
  10. At the end of the class period, it is essential that you have me sign-off on your data. This insures academic honesty, but more importantly it helps me give time to provide each student information for the next class period.

# Final Reports Guidelines

## Prelab

- Title Page:** This should include your name, section number, date and title of the experiment (brief).
- Introduction:** The information should list goal(s) and/or objective(s) of experiment, type of reaction(s), and background information. (brief)
- Hazards:** Hazards and/or concerns associated with each laboratory should be listed in this section.

## Inlab

- Procedure:** The procedure is a detailed account of everything you accomplished during the lab. This portion of the report does not need to be in complete sentences but must contain enough information that a classmate could repeat your procedure exactly.

## Final Report

- Results:** All raw data should be included in this section, i.e. m.p., weights, spectra, etc. The information should be in a summary table or graph when appropriate. Include any simple analysis, e.g. IR table with peak assignments or other spectra analysis that may be relevant.
- Calculations:** Any calculations (detailed % yield, corrections, etc.) must be detailed here.
- Discussion:** The discussion section of your synthesis labs may include all or some of the following:
- (1) Discussion of the chemistry
    - discuss what type of reaction your are doing
    - include chemical equations for your reaction to show the transformation
    - discuss any potential stereoselectivity or regioselectivity in the reaction (if there is potential to form more than one product, why is this one formed?)
    - discuss any side reactions that occur or side products that could form
  - (2) Discussion of results
    - address the identity of your products based on spectral data (this should include and analysis of IR, NMR, etc as well as comparing your spectra to that of the any known compounds)
    - address the purity of your products based on melting point and/or spectral data (include literature values were applicable)
    - address the percent yield of your product(s)
    - briefly discuss any potential problems
- Conclusion:** Statement with final conclusion; state your final results. (brief)
- References:** Include source(s); text, handout, and/or reference books, spectra catalogs, etc.

## Other criteria for Final Reports

1. All reports must be completed in the carbonless duplicate notebook. The original will be turned in.
2. Use passive voice and past tense. Do not use the first or second person singular or plural.
3. The report should be concise.
4. Do not muddle procedure, results, calculations and discussion together. Each section should be complete before you start the next.
5. The data should dominate the report, being clearly tabulated for maximum visibility.
6. Literature values for physical constants should be reported and correctly referenced.
7. Do not write a detailed account of standard procedures, m.p. needs no further explanation.
8. Do not dispose of your products until your report is returned and graded.
9. An equation for every **reaction** that occurred during the experiment should be included.
10. All raw spectra and chromatograms should be included as a figure or appendix to your report with the operating conditions. Peak assignments should be tabulated in the results section. You may write directly on your spectra.