

# Chemistry 203: Organic Chemistry Lab & Lecture

## Spring 2011

**Lecture Times:** Sections 1 & 2: Tues/Thurs 8:00 – 8:55 am

**Lab Times:** Section 1: Tuesday, 9:05 am – 1:10 pm

Section 2: Thursday, 9:05 am – 1:10 pm

**Lecture Location:** 117 Osmond

**Lab Location:** 205/215 Whitmore Lab

### Faculty in charge:

*Dr. Jackie Bortiatynski*

Office: 211D Whitmore

Phone: 865-2772

Email: [jackie@chem.psu.edu](mailto:jackie@chem.psu.edu)

Office Hours: Tuesday 9:30 – 11:30 am or by appointment

*Dr. Sheryl Rummel*, Director of Instrumentation

Office: 211B Whitmore Lab

Phone: 867-2658

E-mail: [sad270@psu.edu](mailto:sad270@psu.edu)

### Course Website: ANGEL

I will communicate with you through Angel. All class materials will also be posted on Angel. The lectures **will not** be posted before they are given in class. Suggested readings and practice problems will be posted prior to lectures.

### Required Materials:

1. **"Lab Guide for Chemistry 203 & Chemistry 213B, A Life Science Experience in the Organic Chemistry Laboratory"** Minard, Masters, Halmi, Williamson & Bortiatynski, most recent Edition published by Hayden McNeil. Make sure you have this lab guide, do not purchase the **Chemistry 213 Lab Guide!**
2. **Organic Chemistry Laboratory Notebook** - 8.5" x 11" white quadrille sheets with 120 tear-out and carbonless carbon pages, published by Hayden McNeil.
3. **Eye Protection** - *Eye Protection is required at all times in the Organic Laboratory! See Information on Eye Protection in Chapter 2*
4. **Organic Lab Equipment Kit** of expendable items including 2 NMR tubes, 15 TLC plates, 12 vials, etc. This kit is available at the Penn State Bookstore.
5. **Combination or key lock**
6. **"Fundamentals of Organic Chemistry, 6<sup>th</sup> or 7<sup>th</sup> edition" McMurry & Solutions Guide**

If you wear shorts or a top that exposes your midriff, you must purchase and wear a plastic lab apron to protect your midriff and legs. You **CANNOT** wear open-toe shoes in the lab!

**Course Objective: In Lab:** To reinforce the organic chemistry concepts covered in Chem 202, to learn and master fundamental organic chemistry laboratory techniques, to perform synthetic reactions, work-ups, and purifications, to learn how to operate instrumentation and analyze spectral data, and to write original lab reports in a professional manner. **In Lecture:** To discuss laboratory topics, spectroscopy, reactions/mechanisms, and special topics.

**Policy on Absences:** It is extremely important that you attend all lab and lecture sessions. Late homework will not be excepted, and I will only grant permission to take make up quizzes and make up missed lab work if the instructional team (your TA and the instructor) are notified within 24 hours of your illness by email or phone. Email correspondence is preferred but I realize that this may not always be possible. We have labs running 4 days a week so we can not make up labs whenever it is convenient for your schedule. I understand that illness hits at the worst time and family emergencies can not be avoided. I also understand that you may have conferences or interviews scheduled during the semester and the times for these events are out of your control. Please see me early in the semester if you know you have a professional event that will conflict with lab and we will work out schedule for you to make up your work.

**Assignments/Grading:**

Each student has the ability to acquire a total of 1885 points for the semester. The breakdown is as follows:

<u>Activities</u>	<u>Total Points Towards Final Grade</u>
Lecture Problems, 10 problem sets/10 pts each	110 pts
Class Participation: Group Problems, 10 problems, 10 points each	100 pts
3 In Class Quizzes, 100 pts each	300 pts
<i>Orientation Activities</i>	100 pts
5 Technique Experiments: 5 PreLabs-Notebook Pages	425 pts
1 Formal Final Report (Two submissions), Chapter, 7 (TLC)	100 pts
2 Synthetic Experiments: 2 PreLabs-Notebook Pages/75 pts each	150 pts
2 Final Reports/125 pts each	250 pts
Spectral Unknown Exercise, 1 Worksheet	100 pts
5 Technique Quizzes, 50 pts each	250 pts
<b>Total</b>	<b>1885 pts</b>

**NOTE: The Lab Guide is updated once a year. Occasionally changes in assignments may occur from one semester to the next. Refer to your syllabus for the most up to date version of assignment point distributions.**

**Lecture Assignments and Grading:**

- You will be given 12 lecture problems but you only need to complete 10 of them. Lecture Problem #1 Part #1 and Part #2 is **mandatory** for you to complete. After completing Lecture Problem #1 Part 1 and 2, I will only count the 9 highest lecture problem scores of the remaining problems toward your final grade. Each assignment is worth 10 points and will consist of one to three questions. The lecture problems are due at the start of class and will be given back the next week in lab. I will review the answer to the lecture problems in class before they are turned back in lab. A lecture problem will not be accepted after its due date, because I will only count the highest 9 out of the remaining 11 problems. The lecture problems are designed to ensure that you keep up with the lecture material.
- Class Participation/Group Problems: You will be asked to engage in at least 10 group problems in lecture during the course of the semester. These problems are designed to assist you in the understanding of the course material. I will ask you to work in groups of 4-6 to answer a problem in class. The problem will be given toward the end of class and you will work with your group to come up with an answer. Your work will be written on the problem sheet that is handed out in class and all group members present will receive credit for the problem. I will not announce when we will be having group questions.
- You will have 3 in class Quizzes that are worth 100 each. These quizzes will focus on both lab and lecture materials. If you miss either **in class** Quiz #6 or #7, due to illness or family emergency, then you can take a make up the missed quiz on Thursday, April 21<sup>st</sup> as long as you made the appropriate notification to the instructional team on the day of the missed quiz. The make up quiz will contain cumulative information from the beginning of the semester through the material on the Quiz #7. Make up quizzes will only be given to students who have legitimate reasons for missing lecture or lab and must be approved by Dr. B. Your graded quizzes will be given back in lab, and they cannot be taken out of lab.

**Lab Check-In and Orientation Activities:** You will check into lab during your first lab period. This process will allow you to make sure all your glassware and supplies are present in your lab drawer. You are required to bring all required lab materials with you every lab period including this first meeting. After checking in you will familiarize yourself with how the common lab supplies and resources are organized, how to use the melting point apparatus, and calibrate your thermometer. These exercises will enable you to begin lab promptly the next period giving you more time to complete the bench work.

### Lab Assignments/Grading:

- **Policy on Tardiness:** You will have a 4-hour lab period once a week. There is another lab session scheduled 15 minutes after your lab period ends. This means that you must be efficient with your time and you must be out of the lab on time. It is almost impossible to complete the lab if you show up late. My advice to everyone is to be on time. If you miss the lab quiz due to tardiness you can not make it up. If you come in while the quiz is being given, you will not receive any extra time to complete the quiz. Any assignments due at the beginning of the lab period will receive a 5 point deduction for being late.
- The assignments to be completed by each student are listed in the table above and on the course schedule.
- You are not allowed at any time to work unsupervised in the laboratory.
- There will be five (5) techniques experiments requiring prelabs and notebook pages, one (1) spectral unknown experiment, and two (2) synthetic experiments.
- Each technique and synthetic experiment will have one PreLab/Notebook Pages assignment.
- The Prelab assignment will be checked in class for completeness at the beginning of the lab and signed by the TA. If the Prelab assignment is incomplete you will not be allowed to start the experiment until it is finished and you will receive a point deduction for not having it completed on time.
- Note the Chapter 4 PreLab/Notebook assignment is worth half the normal weighting since this is the first assignment of this type that you will submit for a grade.
- A Formal Final Report will be submitted for Chapter 7. The Chapter 7 final report will be submitted twice for grading. You can earn back 50% of the points you missed in the first submission, if you make the appropriate corrections suggested by your TA. This report is worth a total of 100 points and does not carry the full weight of the remaining Formal Final Reports (worth 125 points).
- Each synthetic experiment will have a PreLab/Notebook assignment, and a Final Report.
- Grade sheets for PreLabs and Final Reports can be downloaded from ANGEL; attach them to the front of the assignments. Please follow the rubric on the grade sheets; **if you are missing sections on that are designated on the grade sheet you will loose points!**
- Graded work will remain in the laboratory for your review but will not leave the lab. Please be sure to note TA comments to ensure improvement on subsequent reports. If you would like more time with you graded assignments ask you TA to bring them to office hours.
- You will have five (5) laboratory quizzes throughout the semester (see schedule for dates); each is worth 50 points. The Quizzes will consist of several questions that will test your preparedness for the experiment you are starting that day.
- If you miss a lab technique quiz given in lab due to sickness or a family emergency, or preapproved absence then you must make it up the next lab period.
- You will submit a spectral unknown report form found on Angel.

### Calculation of Final Grades:

- For the lab portion of the course, sections will be normalized in order to compensate for variations in TA grading. Your TA should provide the class with averages for each report and quiz; use this average as a reference point to gauge your progress. *Your TA should also hand back your reports no later than one week after the due date.* If this is not being done, please see Dr. Bortiatynski as soon as possible.
- The average final grade per section is typically in the B range. If the average for your section falls in the B range, traditional grade lines will then be used to assign final grades (for example, 92-100 is an A; 91-90 is an A-; 87-89 is a B+; 83-86 is a B; 80-82 is a B-, etc). If your sections' average is low (in the C range), then the average may be curved up.

**Please Note:** Your time spent in lab does not include time to analyze the compounds you synthesize or isolate throughout the semester. You will need to devote some additional time for analysis in our Instrument Room (206 Whitmore). There are several very important Instrument Room policies (posted on ANGEL) implemented by our Director of Undergraduate Instrumentation, Dr. Sheryl Rummel. To help

make this room run in an educational and efficient manner, please familiarize yourself with these policies. You will also be required to complete an Instrument Room Worksheet as part of your orientation activities.

**Registrar Dates:**

**Course Schedule of Assignments:** Attached to Syllabus.

Start Date: January 11<sup>th</sup>

End Date: April 28<sup>th</sup>

Add Period: January 10 - 8:00 a.m. (ET) January 20

Drop Period: January 10 - 19

Late Drop: January 20<sup>th</sup> - April 2<sup>nd</sup>

Spring Break Recess: March 6<sup>th</sup> - 12<sup>th</sup>

**Academic Integrity:** Academic dishonesty includes, but is not limited to, the following situations:

- Giving the electronic file of your final report to another current student or future student via e-mail, flash drive, CD, etc.
- Using someone else's data, not citing other student's data or fabricating data.
- Using phrases or sentences directly or **paraphrasing** from the lab guide or any other source (book, journal, or website) and not referencing that source or not using quotes.
- Using phrases or sentences directly from the lab guide or any other source (book, journal, or website), referencing that source, but not using quotes.
- **Using more than one sentence** directly from or paraphrasing from the lab guide or any other source (book, journal, or website) even if you reference it and use quotes. **You are required to have all your written work in your own words!**

If you are found to be involved with academic dishonesty on a final report, you will be given a zero for that report. The second offense will involve receiving an F or an XF for the course. Please see Chapter 1, Section 1.5 for a detailed discussion on academic dishonesty.

**All University and Eberly College of Science policies regarding academic integrity/academic dishonesty apply to this course and to the students enrolled in this course. Refer to the following URL for further details on the academic integrity policies of the Eberly College of Science:**

<http://www.science.psu.edu/academic/Integrity/index.html>, <http://www.sa.psu.edu/ja/conduct.shtml>

**The Code of Mutual Respect and Cooperation:**

The Eberly College of Science Code of Mutual Respect and Cooperation pertains to all members of the College community; faculty, staff, and students. <http://www.science.psu.edu/climate/code-of-mutual-respect-and-cooperation-1>

The Code of Mutual Respect and Cooperation was developed to embody the values that we hope our faculty, staff, and students possess, consistent with the aspirational goals expressed in the Penn State Principles. The University is strongly committed to freedom of expression, and consequently, the Code does not constitute University or College policy, and is not intended to interfere in any way with an individual's academic or personal freedoms. We hope, however, that individuals will voluntarily endorse the 12 principles set forth in the Code, thereby helping us make the Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

The 12 Principles of the Code are:

1. Treat everyone equally and with respect
2. Be courteous
3. Be ready to communicate
4. Encourage others and share your expertise with them
5. Give and accept constructive criticism
6. Be receptive to change
7. Be a team player
8. Get involved

9. Have a positive attitude
10. Be honest and accept responsibility
11. Recognize other people's priorities
12. Strive to do your best

**Procedure to obtain a Letter of Recommendation:**

Letters of recommendation are composed by your TA and Dr. Bortiatynski. It is recommended that you only seek a letter of recommendation if your current course grade is A- or better. Your TA will supply Dr. Bortiatynski with a personal statement that reflects your performance and your professional attitude as it pertains to the Code of Mutual Respect and Cooperation. When requesting a letter or recommendation please follow this procedure or your letter will not be written:

1. Inform your TA of your intent to request a letter of recommendation and ask him/her to please draft a personal statement for you.
2. You must fill out the Request Letter of Recommendation Form posted on Angel and bring it to Dr. Bortiatynski's Office where you will log into the Request for Recommendation Book, providing the following information: date of request, name, TA name, course taken, semester taken, destination of letter, date letter is due.
3. Follow up with your TA to make sure the personal statement has been sent to Dr. Bortiatynski. When the letter is complete you will receive an email from Dr. Bortiatynski letting you know the letter has been sent to the recipient. Please allow at least 1 month lead time for me to compose the letter. Approximately 40 requests for letters are received each semester and it is impossible to write all the letters in one or two weeks.

**Email Correspondence with Dr. Bortiatynski:**

I will try to check email at least twice a day. I will check it by no later than 9 a.m. and again before leaving the office in the afternoon. I will not answer email from home in the evenings, and we will not answer email on the weekends. If you send email after 5 pm on a weekday, we will try to answer it first thing the following morning. Please make sure you include the name of your TA, your lab section, and the name of the experiment or specific procedure in all correspondence. Numerous emails are received without such information and it delays the response time.

**Clean up and Check out:**

You are required to assist in lab clean up and check out at the end of the semester. If you cannot attend the last day of lab then you must make other arrangements with Dr. Bortiatynski at least one week in advance. Remember your lab final will also take place on the last day of lab. If a student fails to check out of their lab locker, they will lose 100 points toward their final grade.

**Academic Success:**

The Eberly College of Science is committed to the academic success of students enrolled in the College's courses and undergraduate programs. When in need of help, students can utilize various College and University-wide resources for learning assistance. <http://www.science.psu.edu/advising/success/>.

Chem 203 Spring 2011 Lecture and Lab Schedule LP = Lecture Problem; LG :

	Week Day	Date	Lecture Topics	Lecture Activity	Reading Homework	Lab Activity	Lab Work Due
1	Tues.	11-Jan	Overview of Course		LG: CH 1 - 3, M: CH 1	CHECK-IN	Bring Goggles and Combination Lock
2	Thur.	13-Jan	Isolation Purification Techniques/Physical Properties of Organic Compounds		LG: CH 4	CHECK-IN	Bring Goggles and Combination Lock
3	Tues.	18-Jan	Isolation Purification Techniques/Physical Properties of Organic Compounds	<b>Lecture Problem #1 Review Worksheet Part 1</b>	LG: CH 5/ M: CH 6 (Stereochemistry), CH 10.3, CH 12.3	<b>Quiz 1 &amp; LG Ch 4:</b> Recrystallization and Melting Point Determination	Ch 4 Prelab/Check
4	Thur.	20-Jan	Isolation Purification Techniques/Introduction to Spectroscopy		LG: CH 5, M: 13.2	<b>Quiz 1 &amp; LG Ch 4:</b> Recrystallization and Melting Point Determination	Ch 4 Prelab/Check
5	Tues.	25-Jan	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>Lecture Problem #1 Review Worksheet Part 2</b>	LG: CH 13, M:13.2	<b>Quiz 2 &amp; LG Ch 5: Extraction (Procedure 1)</b>	Ch 5 Prelab/Check Signup for NMR & IR Time
6	Thur.	27-Jan	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG: CH 15, M: 10.6, 13.7-13.13	<b>Quiz 2 &amp; LG Ch 5: Extraction (Procedure 1)</b>	Ch 5 Prelab/Check Signup for NMR & IR Time
7	Tues.	1-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>LP 2 Due</b>	LG: CH 15; M:13.7-13.13	Extraction ( <b>Procedure 2</b> )	Chapter 4 Prelab/Notebook ; Sign up for NMR & IR Time
8	Thur.	3-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG: CH 6, CH 18 (Gas Chromatography); M: 8.4, 13.1	Extraction ( <b>Procedure 2</b> )	Chapter 4 Prelab/Notebook ; Sign up for NMR & IR Time
9	Tues.	8-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>LP 3 Due</b>	LG: CH 16; M:13.3-13.4	<b>Quiz 3 &amp; LG Ch 6</b> Distillation ( <b>Procedures 1 &amp; 2</b> )	Ch 6 Prelab/Check

10	Thur.	10-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG: CH 15; M:13.7-13.13	<b>Quiz 3 &amp; LG Ch 6</b> Distillation <b>(Procedures 1 &amp; 2)</b>	Ch 6 Prelab/Check
11	Tues.	15-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>LP 4 Due</b>	LG: CH 7, 17, M:13.1	Distillation <b>(Procedure 3)</b>	Ch 5 Prelab/Notebook
12	Thur.	17-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG: CH 17	Distillation <b>(Procedure 3)</b>	Ch 5 Prelab/Notebook
13	Tues.	22-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>LP 5 Due</b>	LG: 9, 14 M: 13.5-6	<b>Quiz 4 &amp; LG Ch 7:</b> Thin Layer Chromatography	Ch 7 Prelab/Check;
14	Thur.	24-Feb	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG: CH 7	<b>Quiz 4 &amp; LG Ch 7:</b> Thin Layer Chromatography	Ch 7 Prelab Check
15	Tues.	1-Mar	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms	<b>LP 6 Due</b>	LG: CH 7	Ch 7: Thin Layer Chromatography Chapter 12 worksheet Progress Check	Chapter 6 Prelab/Notebook Pages
	<b>Week Day</b>	<b>Date</b>	<b>Lecture/Lab Topics</b>	<b>Lecture Activity</b>	<b>Reading Assignments</b>	<b>Lab Activity</b>	<b>Lab Work Due</b>
16	Thur.	3-Mar	Integrated Spectroscopy Problems			Ch 7: Thin Layer Chromatography Chapter 12 worksheet Progress Check	Chapter 6 Prelab/Notebook Pages
17	Tues.	15-Mar	Isolation Purification Techniques/Introduction to Spectroscopy and Reaction Mechanisms		LG CH 9	Quiz 5 & LG Ch 9: Column Chromatography	Ch 9 Prelab/Check;
18	Thur.	17-Mar	<b>Integrated Spectroscopy Problems and Review for Quiz 6</b>	<b>LP 7 Due</b>	LG: CH 12	Quiz 5 & LG Ch 9: Column Chromatography	Ch 9 Prelab/Check;
19	Tues.	22-Mar	Quiz 6	<b>Quiz 6 on Ch 10 &amp; NMR, IR</b>		Finish up Ch 9	Spectral Unknown Worksheet Due
20	Thur.	24-Mar	Synthetic Strategies	LP 8 Due	M: CH 9	Finish up Ch 9	Spectral Unknown Worksheet Due

21	Tues.	29-Mar	Organic Reaction Mechanisms	<b>LP 9 Due</b>		Two Synthetic Experiments	Chapter 7 Prelab/Notebook Pages and Formal Final Report Synthetic Ex #1 Prelab
22	Thur.	31-Mar	Organic Reaction Mechanisms		M: CH 10	Two Synthetic Experiments	Chapter 7 Prelab/Notebook Pages and Formal Final Report Synthetic Ex #1 Prelab
23	Tues.	5-Apr	Organic Reactions	<b>LP 10 Due</b>		Two Synthetic Experiments	Ch 9 Prelab/Notebook Due
24	Thur.	7-Apr	Organic Reactions		M: CH 11	Two Synthetic Experiments	Ch 9 Prelab/Notebook
25	Tues.	12-Apr	Organic Reactions	<b>LP 11 Due</b>		Two Synthetic Experiments	Synthetic Ex # 2 Prelab
26	Thur.	14-Apr	<b>Quiz 7</b>	<b>Quiz 7</b> UV/Vis, Polarimetry, Refractive Index, & Integrated Spectral Problems		Two Synthetic Experiments	Synthetic Ex # 2 Prelab
27	Tues.	19-Apr	Properties of Organic Compounds	<b>LP 12 Due</b>		Two Synthetic Experiments	Synthetic Ex #1 Final Report
28	Thur.	21-Apr	Properties of Organic Compounds	<b>Make Up Quiz</b>		Two Synthetic Experiments	Synthetic Ex #1 Final Report
29	Tues.	26-Apr	Properties of Organic Compounds			LAB CLEAN-UP AND CHECK-OUT	Synthetic Ex #2 Final Report
30	Thur.	28-Apr	<b>Quiz 8</b>	<b>Quiz 8</b> on Reactions/Special Topics/Lab Applications		LAB CLEAN-UP AND CHECK-OUT	Synthetic Ex #2 Final Report