

**The Ohio State University**  
**Colleges of the Arts and Sciences Course Change Request**

Chemistry

Academic Unit

Organic Chem Laboratory

CHEM 254

Book 3 Listing (e.g., Portuguese)

Course Number

Summer      Autumn    X    Winter      Spring      Year 2008

Proposed effective date, choose one quarter and put an "X" after it; and fill in the year. See the OAA curriculum manual for deadlines.

**A. Course Offerings Bulletin Information.** Follow instructions in the OAA curriculum manual. Before you fill out the "Present Course" information, be sure to check the latest edition of the *Course Offerings Bulletin* and subsequent Circulating Forms. You may find that the changes you need have already been made or that additional changes are needed. If the course offered is less than quarter or term, please also complete the Flexibly Scheduled/OffCampus/Workshop Request form.

**COMPLETE ALL ITEMS THIS COLUMN**

**Present Course**

1. Book 3 Listing: Organic Chem Laboratory
2. Number: CHEM 254
3. Full Title: Organic Chemistry Laboratory
4. 18-Char. Transcript Title: ORGANIC CHEM LAB
5. Level and Credit Hours Undergraduate 03
6. Description: Introduction to the laboratory techniques of (25 words or less) organic chemistry, including synthesis, isolation, purification, and identification of organic compounds.
7. Qtrs. Offered : Au, Wi, Sp, Su
8. Distribution of Contact Time: (2 4-hr lab, 1 h cl) (e.g., 3 cl, 1 3-hr lab)
9. Prerequisite(s): 231 or 251
10. Exclusion: (Not open to....)
11. Repeatable to a maximum of \_\_\_\_\_ credits.
12. Off-Campus Field Experience:
13. Cross-listed with:
14. Is this a GEC course?
15. Grade option (circle): Ltr    S/U    P  
If P graded, what is the last course in the series?
16. Is an honors version of this course available? Yes
17. Other general course information: Safety glass must be worn in the lab.

**COMPLETE ONLY THOSE ITEMS THAT CHANGE**

**Changes Requested**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. Introduction to scientific writing, computational chemistry, laboratory techniques of organic chemistry, including synthesis, isolation, purification, and identification of organic compounds.
7. \_\_\_\_\_
8. (1 cl, 2 3 -hr lab)
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_

**B. General Information**

1. Do you want the prerequisites enforced electronically (see the OAA manual for what can be enforced)?  
Yes

2. Does this course currently satisfy any GEC requirement, if so indicate which category?  
No

3. What other units require this course? Have these changes been discussed with those units?  
BIO, ENG, MPS, PHR, AMP, SBS, EHE, CED, EXP, BUS, HUM, ASC, ART, AHR, GRD, NUR

4. Have these changes been discussed with academic units that might have a jurisdictional interest in the subject matter? Attach relevant letters.  
YES

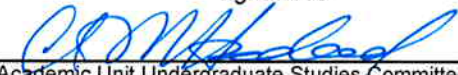
5. Is the request contingent upon other requests, if so, list the requests?  
CHEM 255

6. Purpose of the proposed change. (If the proposed change affects the content of the course, attach a revised syllabus and course objectives.)  
In order to improve the undergraduate organic chemistry laboratory curriculum and to accommodate the increasing number of students enrolled in these courses with our finite amount of laboratory space.

7. Describe any changes in library, equipment or other teaching aids needed as a result of the proposed change.

8. If the proposed change involves budgetary adjustments, describe the method of funding:

**Approval Process** The signatures or actions on the lines in ALL CAPS ( e.g. ACADEMIC UNIT) are required.

1.  CHRISTOPHER HADAD 10/15/07  
Academic Unit Undergraduate Studies Committee Chair Printed Name Date

2. Academic Unit Graduate Studies Committee Chair Printed Name Date

3.  CHRISTOPHER HADAD 10/15/07  
ACADEMIC UNIT CHAIR/DIRECTOR Printed Name Date

4. AFTER THE ACADEMIC UNIT CHAIR/DIRECTOR SIGNS THE REQUEST, FORWARD IT TO THE COLLEGES OF THE ARTS AND SCIENCES CURRICULUM OFFICE, 161 DENNEY HALL, 164 WEST 17TH AVENUE. THE ASC CURRICULUM OFFICE WILL FORWARD THE REQUEST TO THE APPROPRIATE COLLEGE CURRICULUM COMMITTEE.

5. COLLEGE CURRICULUM COMMITTEE Printed Name Date

6. ARTS AND SCIENCES EXECUTIVE DEAN Printed Name Date

7. Graduate School (if appropriate) Printed Name Date

8. University Honors Center (if appropriate) Printed Name Date

9. Office of International Affairs (study tours only) Printed Name Date

10. ACADEMIC AFFAIRS Printed Name Date

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**COMPLETE ALL ITEMS THIS COLUMN**

**Present Course**

1. Book 3 Listing: Organic Chem Laboratory II
2. Number: CHEM 255
3. Full Title: Organic Chemistry Laboratory II
4. 18-Char. Transcript Title: ORGANIC CHEM LAB II
5. Level and Credit Hours Undergraduate 03
6. Description: Introduction to the laboratory techniques of (25 words or less) organic chemistry, including synthesis, isolation, purification, and identification of organic compounds.
7. Qtrs. Offered : Au, Wi, Sp, Su
8. Distribution of Contact Time: (2 4-hr lab, 1 h cl) (e.g., 3 cl, 1 3-hr lab)
9. Prerequisite(s): 252 and 254
10. Exclusion: (Not open to....)
11. Repeatable to a maximum of \_\_\_\_\_ credits.
12. Off-Campus Field Experience:
13. Cross-listed with:
14. Is this a GEC course?
15. Grade option (circle): Ltr    S/U    P  
If P graded, what is the last course in the series?
16. Is an honors version of this course available? Yes
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**COMPLETE ONLY THOSE ITEMS THAT CHANGE**

**Changes Requested**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. Introduction to scientific writing, computational chemistry, laboratory techniques of organic chemistry, including synthesis, isolation, purification, and identification of organic compounds.
7. \_\_\_\_\_
8. (1 cl, 2 3 -hr lab)
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_

**B. General Information**

1. Do you want the prerequisites enforced electronically (see the OAA manual for what can be enforced)?  
Yes

2. Does this course currently satisfy any GEC requirement, if so indicate which category?  
No

3. What other units require this course? Have these changes been discussed with those units?  
BIO, ENG, MPS, PHR, AMP, SBS, EHE, CED, EXP, BUS, HUM, ASC, ART, AHR, GRD, NUR

4. Have these changes been discussed with academic units that might have a jurisdictional interest in the subject matter? Attach relevant letters.  
YES



5. Is the request contingent upon other requests, if so, list the requests?  
CHEM 254

6. Purpose of the proposed change. (If the proposed change affects the content of the course, attach a revised syllabus and course objectives.)  
In order to improve the undergraduate organic chemistry laboratory curriculum and to accommodate the increasing number of students enrolled in these courses with our finite amount of laboratory space.

7. Describe any changes in library, equipment or other teaching aids needed as a result of the proposed change.

8. If the proposed change involves budgetary adjustments, describe the method of funding:

**Approval Process** The signatures or actions on the lines in ALL CAPS ( e.g. ACADEMIC UNIT) are required.

<p>1.  Academic Unit Undergraduate Studies Committee Chair</p>	<p><i>CHRISTOPHER HADDAD</i> Printed Name</p>	<p>10/15/07 Date</p>
<p>2. Academic Unit Graduate Studies Committee Chair</p>	<p>Printed Name</p>	<p>Date</p>
<p>3.  ACADEMIC UNIT CHAIR/DIRECTOR</p>	<p><i>CHRISTOPHER HADDAD</i> Printed Name</p>	<p>10/15/07 Date</p>
<p>4. AFTER THE ACADEMIC UNIT CHAIR/DIRECTOR SIGNS THE REQUEST, FORWARD IT TO THE COLLEGES OF THE ARTS AND SCIENCES CURRICULUM OFFICE, 161 DENNEY HALL, 164 WEST 17TH AVENUE. THE ASC CURRICULUM OFFICE WILL FORWARD THE REQUEST TO THE APPROPRIATE COLLEGE CURRICULUM COMMITTEE.</p>		
<p>5. COLLEGE CURRICULUM COMMITTEE</p>	<p>Printed Name</p>	<p>Date</p>
<p>6. ARTS AND SCIENCES EXECUTIVE DEAN</p>	<p>Printed Name</p>	<p>Date</p>
<p>7. Graduate School (if appropriate)</p>	<p>Printed Name</p>	<p>Date</p>
<p>8. University Honors Center (if appropriate)</p>	<p>Printed Name</p>	<p>Date</p>
<p>9. Office of International Affairs (study tours only)</p>	<p>Printed Name</p>	<p>Date</p>
<p>10. ACADEMIC AFFAIRS</p>	<p>Printed Name</p>	<p>Date</p>

Current Syllabi CH 254 / CH 255

# Chemistry 254 – Spring 2007

## Organic Chemistry Lab



**Instructor:** Dr. Christopher Callam  
Office : 380 C Celeste Laboratory  
Telephone : 292-0679  
E-mail : ccallam@chemistry.ohio-state.edu

**Lecture:** 04752-A      Monday      4:30-5:18P      1000      McPherson Laboratory

### Office Hours:

Monday, Wednesday, Friday 12:30 pm - 1:18 pm. Wednesday and Friday, 2:30-4:00 pm. These are just my official office hours you are welcome to stop by at anytime. If I am not in my office I am in one of the labs on the 4<sup>th</sup> floor of Celeste, feel free to come talk to me. You may also make an appointment by e-mail and suggest times that are convenient to stop by my office.

### Course Objectives:

The main objective of this laboratory course is for everyone to gain an understanding of the fundamental techniques of organic chemistry and to use these techniques toward the synthesis of interesting organic compounds. The students will be exposed to the techniques of distillation, extraction, recrystallization, and chromatography. Students learn the basic spectroscopy and chromatography that chemists use to determine the structure of unknown compounds, including Infrared Spectroscopy (IR) and Gas Chromatography (GC). Students are also provided the opportunity to learn how to problem solve and have the opportunity to improve their science writing skills. The concept of learning revolves around active and independent thought, questions, and clear communication.

If you have any questions do not hesitate to ask.  
*My job is to teach you and to help you learn this material.*

### Textbook

ORGANIC CHEMISTRY LABORATORY I – Version 2 – Microscale – CH 254 by Christopher Callam  
ISBN 978-0-7575-4011-0

### Prerequisites:

Completion of Chemistry 251 or the Chemistry 231.

**Internet Pages:**

<https://carmen.osu.edu>

Answers to the suggested homework problems and your grades are available on this web pages. To view them, you will need the Adobe Acrobat reader installed on your computer. If you do not have it, you can download it for free from:

<http://www.adobe.com/products.acrobat.readstep.html>

All your grades for this course will be posted to Carmen on a regular basis. If you find an error in the grades that have been posted for you, please let your TA or Dr. Callam know immediately.

If you need help accessing materials from within the course page:

Contact me at [ccallam@chemistry.ohio-state.edu](mailto:ccallam@chemistry.ohio-state.edu)

**Laboratories:**

<b>Lab Section</b>	<b>Time</b>	<b>Location</b>
04753-4	T R 8:30 am-12:18 pm	410 CE
04754-0	T R 8:30 am-12:18 pm	420 CE
04758-1	T R 1:30 pm-5:18 pm	450 CE
04762-7	T R 5:30 pm-9:18 pm	420 CE
04763-2	T R 5:30 pm-9:18 pm	410 CE
04755-5	W F 8:30 am-12:18 pm	410 CE
04756-1	W F 8:30 am-12:18 pm	450 CE
04760-6	W F 1:30 pm-5:18 pm	450 CE
21419-2	W F 1:30 pm-5:18 pm	420 CE
21420-1	W F 1:30 pm-5:18 pm	460 CE

**Chemistry 254 Laboratory Experiments and Exams Schedule**

<b>Week Of</b>	<b>Tuesday, Wednesday Lab Experiment</b>	<b>Thursday, Friday Lab Experiment</b>
<b>Mar 26</b>	CHECK – IN	Recrystallization
<b>April 2</b>	Extraction: Caffeine	Extraction: Caffeine (continued)
<b>April 9</b>	Distillation and GC <b>QUIZ 1</b>	Distillation and GC (continued)
<b>April 16</b>	Dehydration of Alcohols	Dehydrohalogenation of Alkyl Halides
<b>April 23</b>	TLC	<b>MIDTERM EXAM 1 (CATCH-UP)</b>
<b>April 30</b>	Synthesis of Aspirin	Nitration of Veratrole
<b>May 7</b>	Benzil Quinoxaline <b>QUIZ 2</b>	Wittig Reaction
<b>May 14</b>	Isopentyl Acetate IR Unknow	Isopentyl Acetate (continued)
<b>May 21</b>	Triphenylmethanol	Triphenylmethanol (continued)
<b>May 28</b>	<b>MIDTERM EXAM 2 (CATCH-UP)</b>	CHECK - OUT

**LAST DAY TO TURN IN REPORTS IS June 1 – 4:00 pm**  
NO LATE LAB REPORTS WILL BE ACCEPTED



**Chemistry 254 Lecture and Reading Schedule**

<b>Date</b>	<b>Topics</b>	<b>Assigned Reading</b>
<b>Mar 26</b>	Course Overview Recrystallization	CH 1, 2, 3, 4, 5, 6
<b>April 2</b>	Extraction of Caffeine	CH 7
<b>April 9</b>	Distillation and GC	CH 8
<b>April 16</b>	Elimination Reactions ( $E_1/E_2$ )	CH 12, CH 13
<b>April 23</b>	Thin Layer Chromatography MIDTERM REVIEW	CH 9
<b>April 30</b>	Synthesis of Aspirin Nitration of Veratrole	CH 16 and 15
<b>May 7</b>	Benzimidazole Wittig Reaction	CH 18 and CH 23
<b>May 14</b>	Isopentyl Acetate IR Spectroscopy	CH 19
<b>May 21</b>	Triphenylmethanol	CH 20
<b>May 28</b>	Midterm II Review	—

\* Assigned reading from the text for each experiment should be read prior to the corresponding lecture.

### **Lecture and Reading Assignments**

I expect that you attend all lectures and come prepared ready to participate. The lecture will prepare you to do that week's experiments in the laboratory. We will go over important safety issues as well as talk about the theory and mechanism pertaining to that weeks series of experiments. The portions of the lecture that are covered via PowerPoint will be made available on Carmen prior to the lecture, the topics covered in these sections will be the experimental procedure details for the experiment. The reaction mechanisms and important principles will be discussed on the **blackboard**. It is imperative to your success that you take notes on the material covered in lecture.

### **Suggested Homework Problems**

Organic chemistry is best learned by working out problems; this means working the problem and then looking at the answer, not reading the questions and agreeing with the answer. I advise you to work as many problems as possible. All suggested study problems within the sections should be worked. I advise that you work out all of the practice problems from the textbook for each experiment performed. I will post the answers to these problems on the Carmen page at the end of each week. These homework assignments will not be graded or collected they are for your own benefit and should be worked out as practice and review. The type and level of difficulty on the quizzes and exams will reflect the homework assignments.

## Grading

The breakdown of points will be as follows:

13	Lab Reports	840	59.4%
2	Midterm Exam (2 X 200 PTS)	400	28.3%
1	Technique	50	3.5%
1	Lab Proficiency	75	5.3%
2	Quizzes (2 x 25 PTS)	50	3.5%
	Total	1415	100 %

**Grade Distribution** – The grading for the course will be as follows:

100-93% = A

92-90% = A-

89-87% = B+

86-83% = B

82-80% = B-

79-77% = C+

76-73% = C

72-70% = C-

69-67% = D+

66-60% = D

59-0% = E

### Quizzes

There will be two quizzes that are indicated on the course schedule. The quizzes will cover the topics listed below.. The quiz will be held during the first fifteen minutes of lab. There will be no make-up quizzes. You will need to bring a calculator for all quizzes.

#### **Quiz 1 – Recrystallization and Extraction : Caffeine**

#### **Quiz 2 – Aspirin and Nitration of Veratrole**

### Midterm Exams

*Two written midterm examinations will be given in the lab on the dates indicated in the above schedule. This examination will focus on the experiments and techniques you have performed. The exam will last for the first 90 minutes of the laboratory period. A study guide for the exam is provided in the back of this course packet. **The questions for the exams will be of similar difficulty to the homework and quiz problems. If there are no objections, there will not be a scheduled final examination during finals' week for this class. Please register objections by the end of the fourth week of class.***

### **Return and Re-grading of Exams**

Midterms will be returned in the first lab period meeting following the exam and your TA or myself will go over it with you at that time. **If you wish for your exam to be re-graded, you should give it to me or your TA before you leave the laboratory.** I will re-grade the exams personally. You must give all re-grades to your teaching assistant or me before you leave the class during which it is returned. **I will not accept re-grades that come to me any other way.**

### **Grading Consistency**

Given the number of assignments in this class, most of the grading is done by the TAs. We realize that every TA has a slightly different grading scale and we have taken steps to ensure that there is as much consistency as possible between sections. This is achieved as follows:

1. The TAs are given detailed instructions as how to grade reports. This includes the number of points to be assigned to each aspect of the report.
2. We monitor section averages throughout the course of the term. If a particular section is consistently below the average, we talk with the TA of that section to determine why their scores are below the average.
3. At the end of the term, we again look at section averages of all the reports for each TA. If the average of a section is significantly lower than the mean, we occasionally will add points to that section to bring it in line with the others. We do not, however, take points away from those sections with averages higher than the mean.

### **Lab Technique Evaluation**

This portion of your grade will be based upon how clean you keep your bench, your drawer, and the lab. **You are awarded this portion of your grade (50 points total) at the beginning of the course and, unless you lose it as explained below, it is yours to keep.**

Some of the penalties you could incur are:

- (a) not keeping your lab bench, glassware and drawer clean;
- (b) not being prepared for the lab;
- (c) how many times you had to repeat an experiment due to mistakes on your part;
- (d) repeated tardiness;
- (e) breakage of glassware or other equipment as explained elsewhere;
- (f) consistently falling behind schedule in completing the experiment;
- (g) unsafe practices (for example, not wearing safety goggles in the lab or inappropriate handling or disposing of dangerous chemicals).

Of course, if you are unsure about something, we encourage you to seek the assistance of your TA. At the same time, you need to make an effort to become as **independent** as possible, as this will make it easier to complete the experiments. It is important that you arrive to class on time as important announcements are usually given at the beginning of the lab period. *If you are more than 5 minutes late for lab you will receive a 5-point deduction from your technique grade for each occurrence.*

## Lab Proficiency Score

This score will be evaluated by your TA and instructor throughout the quarter. You will receive a grade based on your preparedness, efficiency and overall ability to perform the lab experiments to our expectations. You should not expect a perfect score, your score in this area of the lab will be compared to your section of lab only. Your score will be based on your TA's assessment of you for the entire quarter.

## General Rules and Guidelines

1. Attendance at all laboratory periods is mandatory. An unexcused lab absence will result in a **zero** for that experiment.

Students who have excused absences can make arrangements with the course instructor to complete the make up work.

**Students are not permitted to do make-up work in other sections.**

Please provide your professor with the documentation for absences due to illness or family emergency, and consult with him/her regarding due dates for work completed during catch-up periods.

2. Everyone is expected to keep their lockers and equipment clean and orderly. If you do not, deductions from your grade will result as follows:

A. Your teaching assistant will inspect your hood at the end of each class. A messy hood (glassware not put away, chemicals on the working surface, steam bath and aspirator not in working order, ring stands and their contents messy, rubber tubing not returned to boxes, etc.) will result in a warning the first time and a 5 pt deduction upon each occurrence thereafter.

B. Your teaching assistant will inspect the instrument room after each class. A messy instrument room (community equipment not returned to its proper place, chemicals left on surfaces, centrifuge not clean, balances dirty) will result in a warning the first time and a 5 pt deduction for every person in the class upon each occurrence.

3. **Attendance at the last laboratory period is mandatory.** At check-out your lockers are to be clean and contain precisely the contents on the locker list (nothing less and nothing more). This will be inspected by your instructor after check-out. **Non-compliance will result in a deduction of one letter grade for the course.**

4. The glassware and equipment you use in the laboratory are expensive. Therefore, it is expected that you will treat this equipment with care and respect and that you will keep it clean. Equipment breakage will be reflected in the "technique" portion of your grade. Loss or breakage of a kit item will result in a warning the first time, and a 5 pt deduction for each subsequent loss/breakage. There is no limit on the amount of points that can be deducted for this. If you lose all of your technique points due to excessive loss/breakage, any additional losses/breakages will result in 5 pts being deducted from your point total at the end of the course. If you lose or break your entire kit, you will automatically lose all 50 technique points.

5. *Repeating a lab experiment for a better yield.* If you wish to repeat an experiment to obtain a better yield you will be penalized 10 points for repeating the experiment. You may not repeat an experiment for a better yield if you have already handed in the report.

### **Experimental Reports**

A schedule for submitting reports is given below. It is important that reports be turned in on time such that evaluation of your progress can be monitored by your teaching assistant in a timely manner. Late reports will be penalized 10 pts per day late unless your instructor or TA is given an acceptable reason on or before the experiment due date. Report sheets for non-preparative experiments can be found in this course book. Reports for several “preparative” experiments will require independent writing on your part. These reports should consist of a heading, an equation that describes the experiment you performed, a reference, a narrative of the procedure you followed written according to the style accepted by American Chemical Society journals, and a brief discussion.

### **Report Deadlines:**

<u><b>Experiment:</b></u>	<u><b>Points:</b></u>	<u><b>Date Due for Grading:</b></u>
Recrystallization	40	April 5,6
Extraction: Caffeine (RS)	60	April 12,13
Distillation and GC (RS)	60	April 19,20
Dehydration of Alcohols (RS)	60	April 24, 25
Dehydrohalogenation of Alkyl Halides (RS)	60	April 26, 27
Thin Layer Chromatography (RS)	60	May 1, 2
Aspirin (R)	75	May 10, 11
Nitration of Veratrole (R)	75	May 10, 11
Benzil Quinoxaline (R)	75	May 17, 18
Wittig Reaction (R)	75	May 17, 18
Isopentyl Acetate (R)	75	May 24, 25
IR Unknown	50	May 31, June 1
Triphenylmethanol (R)	75	May 31, June 1

RS = Report Sheet

R = Report Written

### **Academic Misconduct**

Academic misconduct of any type will not be tolerated and will be dealt with severely, according to University guidelines. Students should not collaborate with others on their pre-labs and laboratory reports. We will refer all cases of suspected collaboration to the Committee On Academic Misconduct. Do your own work!

### **Disabilities**

If you have a university-documented disability, you should see me as soon as possible. If your disability requires that quizzes or examinations be taken outside regularly scheduled times, see the Office of Disability Services, Room 150 Pomerene Hall (292-3307)

**YOU ARE RESPONSIBLE FOR ALL CHANGES TO THIS SYLLABUS MADE IN CLASS WHETHER OR NOR YOU ARE IN ATTENDANCE.**

# Chemistry 255 – Spring 2007

## Organic Chemistry Lab



**Instructor:** Dr. Christopher Callam  
Office : 380 C Celeste Laboratory  
Telephone : 292-0679  
E-mail : ccallam@chemistry.ohio-state.edu

**Lecture:** Monday 5:30 pm - 6:18 pm 1000 McPherson

### Office Hours:

Monday, Wednesday, Friday 12:30 pm - 1:18 pm. Wednesday and Friday, 2:30-4:00 pm. These are just my official office hours you are welcome to stop by at anytime. If I am not in my office I am in one of the labs on the 4<sup>th</sup> floor of Celeste, feel free to come talk to me. You may also make an appointment by e-mail and suggest times that are convenient to stop by my office.

### Course Objectives:

The main objective of this laboratory course is for everyone to gain an understanding of the fundamental laboratory techniques of organic chemistry and to use these techniques toward the synthesis of interesting organic compounds. The students will be exposed to a wide variety of reactions such as Aldol, Diels-Alder, Electrophilic Aromatic Substitution, and Fisher Esterification. Students are also provided the opportunity to learn how to problem solve and have the opportunity to improve their science writing skills. The concept of learning revolves around active and independent thought, questions, and clear communication.

If you have any questions do not hesitate to ask.  
*My job is to teach you and to help you learn this material.*

### Prerequisites:

Completion of Chem 245 or 254; and Chem 252.

### Required Materials:

1. Organic Chemistry Laboratory II – Macroscale CH 255 (ISBN: # 978-0-7575-4010-3)
2. Hayden-McNeil Spiral Bound Lab Notebook; (ISBN: 1-930882-74-2, available at OSU Bookstore)

**Internet Pages:**

<https://carmen.osu.edu>

Answers to the suggested homework problems and your grades are available on this web pages. To view them, you will need the Adobe Acrobat reader installed on your computer. If you do not have it, you can download it for free from:

<http://www.adobe.com/products/acrobat/readstep.html>

All your grades for this course will be posted to Carmen on a regular basis. If you find an error in the grades that have been posted for you, please let your TA or Dr. Callam know immediately.

If you need help accessing materials from within the course page:

Contact me at [ccallam@chemistry.ohio-state.edu](mailto:ccallam@chemistry.ohio-state.edu)

**Laboratories:**

<b>Lab Section</b>	<b>Time</b>	<b>Location</b>
04766-9	T/R 8:30 a.m.-12:18 p.m.	CE 430
04767-4	T/R 8:30 a.m.-12:18 p.m.	CE 460
04768-0	T/R 8:30 a.m.-12:18 p.m.	CE 450
04769-5	T/R 8:30 a.m.-12:18 p.m.	CE 440
04770-4	W/F 8:30 a.m.-12:18 p.m.	CE 460
04771-0	W/F 8:30 a.m.-12:18 p.m.	CE 420
04773-1	T/R 1:30 p.m.-5:18 p.m.	CE 460
04774-6	T/R 1:30 p.m.-5:18 p.m.	CE 410
04775-1	T/R 1:30 p.m.-5:18 p.m.	CE 430
04776-7	T/R 1:30 p.m.-5:18 p.m.	CE 440
04778-8	W/F 1:30 p.m.-5:18 p.m.	CE 440
04779-3	W/F 1:30 p.m.-5:18 p.m.	CE 430
04784-4	T/R 5:30 p.m.-9:18 p.m.	CE 430
21141-1	T/R 5:30 p.m.-9:18 p.m.	CE 440
04783-9	T/R 5:30 p.m.-9:18 p.m.	CE 450



### Chemistry 255 Laboratory Experiments and Exams Schedule

Week Of	Tuesday / Wednesday Lab Experiment	Thursday / Friday Lab Experiment
<b>Mar 26</b>	CHECK IN	Reduction of Vanillin
<b>April 2</b>	Benzoin & Nitration of Methyl Benzoate	Benzoin & Nitration of Methyl Benzoate (continued)
<b>April 9</b>	Luminol <b>QUIZ 1</b>	Benzil Quinoxaline
<b>April 16</b>	Aldol Condensation	Synthesis of Tetraphenylnaphthalene
<b>April 23</b>	Catch - Up	<b>MIDTERM EXAM 1</b> (CATCH UP)
<b>April 30</b>	Column Chromatography NMR Project	Polymers Soaps
<b>May 7</b>	Sulfanilamide	Sulfanilamide
<b>May 14</b>	Benzocaine <b>QUIZ 2</b>	Benzocaine Synthesis Project
<b>May 21</b>	Synthesis Project	Synthesis Project
<b>May 28</b>	<b>MIDTERM EXAM 2</b> (Catch-Up)	CHECK - OUT

**LAST DAY TO TURN IN REPORTS IS June 1 - 4:00 p.m.**

**Chemistry 255 Lecture and Reading Schedule**

<b>Week Of</b>	<b>Topics Monday Lecture</b>	<b>Assigned Reading</b>
<b>Mar 26</b>	Course Overview Reduction of Vanillin	CH 1, CH 2, CH 3, CH 4, CH 5, CH 10
<b>April 2</b>	Benzoin and Nitration of Methyl Benzoate	,CH 12, CH 13
<b>April 9</b>	Luminol Benzil Quinoxaline	CH 19, CH 11
<b>April 16</b>	Aldol Condensations & Tetraphenyl Naphthalene	CH 14, CH 15
<b>April 23</b>	Midterm 1 Review	—
<b>April 30</b>	Column Chromatography NMR Project Polymers Soaps	CH 9, Handout, CH 17, CH 18
<b>May 7</b>	Sulfanilamide	CH 21
<b>May 14</b>	Benzocaine	CH 24
<b>May 21</b>	Synthesis Project	CH 23
<b>May 28</b>	Midterm 2 Review	—

**\* Course Packet materials and assigned reading from the text for each experiment should be read prior to the corresponding lecture.**

### **Lecture and Reading Assignments**

I expect that you attend all lectures and come prepared ready to participate. The lecture will prepare you to do that week's experiments in the laboratory. We will go over important safety issues as well as talk about the theory and mechanism pertaining to that weeks series of experiments. The portions of the lecture that are covered via PowerPoint will be made available on Carmen prior to the lecture, the topics covered in these sections will be the experimental procedure details for the experiment. The reaction mechanisms and important principles will be discussed on the **blackboard**. It is imperative to your success that you take notes on the material covered in lecture.

### **Suggested Homework Problems**

Organic chemistry is best learned by working out problems; this means working the problem and then looking at the answer, not reading the questions and agreeing with the answer. I advise you to work as many problems as possible. All suggested study problems within the sections should be worked. I advise that you work out all of the practice problems from the textbook for each experiment performed. I will post the answers to these problems on the Carmen page at the end of each week. These homework assignments will not be graded or collected they are for your own benefit and should be worked out as practice and review. The type and level of difficulty on the quizzes and exams will reflect the homework assignments.

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The breakdown of points will be as follows:

11	Lab Reports	925	57.5%
2	Midterm Exam (2 x 250 PTS)	500	31.0%
1	Lab Proficiency	75	4.7%
1	Lab Technique	50	3.1%
2	Quizzes (2 x 30 PTS)	60	3.7%
Total		1610	100 %

**Grade Distribution** – The grade distribution for the course will be as follows:

100-93% = A

92-90% = A-

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86-83% = B

82-80% = B-

79-77% = C+

76-73% = C

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69-67% = D+

66-60% = D

59-0% = E

### Quizzes

There will be two quizzes that are on the schedule above. The quizzes will be given at the beginning of lab. There will be no make-up quizzes.

**Quiz 1 Topic** – Reduction, Benzoin and Nitration of Methyl Benzoate

**Quiz 2 Topic** – Sulfanilamide, Polymers and Soaps

### Midterm Exams

*Two written midterm examinations will be given in the lab on the dates indicated in the above schedule. These examination will focus on the experiments and techniques you have performed. Each exam will last for the first 75 minutes of the laboratory period. A study guide for the exam is provided in the back of this course packet. **The questions for the exams will be of similar difficulty to the homework and quiz problems. If there are no objections, there will not be a scheduled final examination during finals' week for this class. Please register objections by the end of the fourth week of class.***

## Return and Re-grading of Exams

Midterms will be returned in the first lab period meeting following the exam and your TA or myself will go over it with you at that time. **If you wish for your exam to be re-graded, you should give it to me or your TA before you leave the laboratory.** I will re-grade the exams personally. You must give all re-grades to your teaching assistant or me before you leave the class during which it is returned. **I will not accept re-grades that come to me any other way.**

## Notebooks

You are required to keep a notebook for this class. You must use a duplicate-page spiral-bound notebook. Each experiment entry must begin on a new page in the notebook. There are two parts to the notebook entry: the pre-laboratory write-up (done before you come to the lab), and a narrative of the experimental procedure that you write as you perform the experiment in the lab.

**No credit will be given for pre-labs submitted late. Pre-labs are due at the beginning of the lab period.**

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Examples for both the notebook entry (pre-lab and narrative portions) and the preparative report write-up are shown in the lab manual.)

## Lab Technique Evaluation

This portion of your grade will be based upon your proficiency in the lab and how clean you keep your bench, your drawer, and the lab. **You are awarded this portion of your grade (50 points total) at the beginning of the course and, unless you lose it as explained below, it is yours to keep.**

Some of the penalties you could incur are:

- (a) not keeping your lab bench, glassware and drawer clean;
- (b) not being prepared for the lab;
- (c) how many times you had to repeat an experiment due to mistakes on your part;
- (d) repeated tardiness;
- (e) breakage of glassware or other equipment as explained elsewhere;
- (f) consistently falling behind schedule in completing the experiment;
- (g) unsafe practices (for example, not wearing safety goggles in the lab or inappropriate handling or disposing of dangerous chemicals).

Of course, if you are unsure about something, we encourage you to seek the assistance of your TA. At the same time, you need to make an effort to become as **independent** as possible, as this will make it easier to complete the experiments. It is important that you arrive to class on time as important announcements are usually given at the beginning of the lab period. *If you are more than 5 minutes late for lab you will receive a 5-point deduction from your technique grade for each occurrence.*

## Lab Proficiency Score

This score will be evaluated by your TA and instructor throughout the quarter. You will receive a grade based on your preparedness, efficiency and overall ability to perform the lab experiments to our expectations. You should not expect a perfect score, your score in this area of the lab will be compared to your section of lab only. Your score will be based on your TA's assessment of you for the entire quarter.

## Grading Consistency

Given the number of assignments in this class, most of the grading is done by the TAs. We realize that every TA has a slightly different grading scale and we have taken steps to ensure that there is as much consistency as possible between sections. This is achieved as follows:

1. The TA's are given detailed instructions as how to grade reports. This includes the number of points to be assigned to each aspect of the report.
2. We monitor section averages throughout the course of the term. If a particular section is consistently below the average, we talk with the TA of that section to determine why their scores are below the average.
3. At the end of the term, we again look at section averages of all the reports for each TA. If the average of a section is significantly lower than the mean, we occasionally will add points to that section to bring it in line with the others. We do not, however, take points away from those sections with averages higher than the mean.
4. If you have problems with the way things are being graded please bring them to my attention as soon as possible.

## General Rules and Guidelines

1. Attendance at all laboratory periods is mandatory. An unexcused lab absence will result in a zero for that experiment.

Students who have excused absences can make arrangements with the course instructor to complete the make up work.

**Students are not permitted to do make-up work in other sections.**

Please provide your professor with the documentation for absences due to illness or family emergency, and consult with him/her regarding due dates for work completed during catch-up periods.

2. Everyone is expected to keep their lockers and equipment clean and orderly. If you do not, deductions from your grade will result as follows:

A. Your teaching assistant will inspect your hood at the end of each class. A messy hood (glassware not put away, chemicals on the working surface, steam bath and aspirator not in working order, ring stands and their contents messy, rubber tubing not returned to boxes, etc.) will result in a warning the first time and a 5 pt deduction upon each occurrence thereafter.

B. Your teaching assistant will inspect the instrument room after each class. A messy instrument room (community equipment not returned to its proper place, chemicals left on surfaces, centrifuge not clean, balances dirty) will result in a warning the first time and a 5 pt deduction for every person in the class upon each occurrence.

3. **Attendance at the last laboratory period is mandatory.** At check-out your lockers are to be clean and contain precisely the contents on the locker list (nothing less and nothing more). This will be inspected by your instructor after check-out. **Non-compliance will result in a deduction of one letter grade for the course.**

4. The glassware and equipment you use in the laboratory are expensive. Therefore, it is expected that you will treat this equipment with care and respect and that you will keep it clean. Equipment breakage will be reflected in the "technique" portion of your grade. Loss or breakage of a kit item will result in a warning the first time, and a 5 pt deduction for each subsequent loss/breakage. There is no limit on the amount of points that can be deducted for this. If you lose all of your technique points due to excessive loss/breakage, any additional losses/breakages will result in 5 pts being deducted from your point total at the end of the course. If you lose or break your entire kit, you will automatically lose all 50 technique points.

5. *Repeating a lab experiment for a better yield.* If you wish to repeat an experiment to obtain a better yield you will be penalized 5 points for repeating the experiment. You may not repeat an experiment for a better yield if you have already handed in the report.

## Experimental Reports

A schedule for submitting reports is given below. It is important that reports be turned in on time such that evaluation of your progress can be monitored by your teaching assistant in a timely manner. Late reports will be penalized 10 pts per day late unless your instructor or TA is given an acceptable reason on or before the experiment due date. Report sheets for non-preparative experiments can be found in this course packet. Reports for several "preparative" experiments will require independent writing on your part. These reports should consist of a heading, an equation that describes the experiment you performed, a reference, a narrative of the procedure you followed written according to the style accepted by American Chemical Society journals, and a brief discussion. All "preparative" experiments calling for such reports (see course packet) should mimic this format. **Students should not collaborate with others on their pre-labs and laboratory reports. We will refer all cases of suspected collaboration to the Committee On Academic Misconduct. Do your own work!**

### Report Deadlines

<u>Experiment:</u>	<u>Points:</u>	<u>Date Due for Grading:</u>
Reduction of Vanillin (R)	75	April 5, 6
Benzoin (R)	75	April 12, 13
Nitration of Methyl Benzoate (R)	75	April 12, 13
Luminol (RS)	35	April 17, 18
Benzil Quinoxaline (R)	75	April 19, 20
Tetraphenylcyclopentadienone (R)	75	April 26, 27
Benzynes/Tetraphenylnaphthalene (R)	75	April 26, 27
Column Chromatography (RS)	40	May 8, 9
Soaps (RS)	50	May 10, 11
Polymers (RS)	50	May 10, 11
NMR Project (RS)	50	May 15, 16
Sulfanilamide (R)	75	May 15, 16
Benzocaine(R)	75	May 24, 25
Synthesis Project (R)	100	May 31, Jun 1

**Disabilities:** If you have a university-documented disability, you should see me as soon as possible. If your disability requires that quizzes or examinations be taken outside regularly scheduled times, see the Office of Disability Services, Room 150 Pomerene Hall (292-3307)

**NOTE: YOU ARE RESPONSIBLE FOR ALL CHANGES TO THIS SYLLABUS MADE IN CLASS WHETHER OR NOT YOU ARE IN ATTENDANCE.**



Revised Syllabi

CH 254 – No changes in course content

CH 255 – revised lab schedule

# Chemistry 255 – REVISED

## Organic Chemistry Lab



**Instructor:** Dr. Christopher Callam  
Office : 380 C Celeste Laboratory  
Telephone : 292-0679  
E-mail : ccallam@chemistry.ohio-state.edu

**Lecture:** Monday 5:30 pm - 6:18 pm 1000 McPherson

### Office Hours:

Monday, Wednesday, Friday 12:30 pm - 1:18 pm. Wednesday and Friday, 2:30-4:00 pm. These are just my official office hours you are welcome to stop by at anytime. If I am not in my office I am in one of the labs on the 4<sup>th</sup> floor of Celeste, feel free to come talk to me. You may also make an appointment by e-mail and suggest times that are convenient to stop by my office.

### Course Objectives:

The main objective of this laboratory course is for everyone to gain an understanding of the fundamental laboratory techniques of organic chemistry and to use these techniques toward the synthesis of interesting organic compounds. The students will be exposed to a wide variety of reactions such as Aldol, Diels-Alder, Electrophilic Aromatic Substitution, and Fisher Esterification. Students are also provided the opportunity to learn how to problem solve and have the opportunity to improve their science writing skills. The concept of learning revolves around active and independent thought, questions, and clear communication.

If you have any questions do not hesitate to ask.  
*My job is to teach you and to help you learn this material.*

### Prerequisites:

Completion of Chem 245 or 254; and Chem 252.

### Required Materials:

1. Organic Chemistry Laboratory II – Macroscale CH 255 (ISBN: # 978-0-7575-4010-3)
2. Hayden-McNeil Spiral Bound Lab Notebook; (ISBN: 1-930882-74-2, available at OSU Bookstore)

**Internet Pages:**

<https://carmen.osu.edu>

Answers to the suggested homework problems and your grades are available on this web pages. To view them, you will need the Adobe Acrobat reader installed on your computer. If you do not have it, you can download it for free from:

<http://www.adobe.com/products/acrobat/readstep.html>

All your grades for this course will be posted to Carmen on a regular basis. If you find an error in the grades that have been posted for you, please let your TA or Dr. Callam know immediately.

If you need help accessing materials from within the course page:

Contact me at [ccallam@chemistry.ohio-state.edu](mailto:ccallam@chemistry.ohio-state.edu)

**Laboratories:**

<b>Lab Section</b>	<b>Time</b>
T/R	8:30 a.m.-11:18 p.m.
W/F	8:30 a.m.-11:18 p.m.
T/R	11:30 a.m.-2:18 p.m.
W/F	11:30 a.m.-2:18 p.m.
T/R	2:30 p.m.-5:18 p.m.
W/F	2:30 p.m.-5:18 p.m.
T/R	5:30 p.m.-8:18 p.m.

### Chemistry 255 Laboratory Experiments and Exams Schedule

Week Of	Tuesday / Wednesday Lab Experiment	Thursday / Friday Lab Experiment
<b>Mar 26</b>	CHECK IN	Reduction of Vanillin
<b>April 2</b>	Benzoin & Nitration of Methyl Benzoate	Benzoin & Nitration of Methyl Benzoate (continued)
<b>April 9</b>	Luminol <b>QUIZ 1</b>	Benzil Quinoxaline
<b>April 16</b>	Aldol Condensation	Synthesis of Tetraphenyl-naphthalene
<b>April 23</b>	Synthesis of Tetraphenyl-naphthalene Catch - Up	<b>MIDTERM EXAM 1</b> (CATCH UP)
<b>April 30</b>	Column Chromatography NMR Project	Polymers Soaps
<b>May 7</b>	Sulfanilamide	Sulfanilamide
<b>May 14</b>	Benzocaine Synthesis Project <b>QUIZ 2</b>	Benzocaine Synthesis Project
<b>May 21</b>	Synthesis Project	Synthesis Project (Catch-Up)
<b>May 28</b>	<b>MIDTERM EXAM 2</b> (Catch-Up)	CHECK - OUT

**LAST DAY TO TURN IN REPORTS IS June 1 - 4:00 p.m.**

**Chemistry 255 Lecture and Reading Schedule**

<b>Week Of</b>	<b>Topics Monday Lecture</b>	<b>Assigned Reading</b>
<b>Mar 26</b>	Course Overview Reduction of Vanillin	CH 1, CH 2, CH 3, CH 4, CH 5, CH 10
<b>April 2</b>	Benzoin and Nitration of Methyl Benzoate	,CH 12, CH 13
<b>April 9</b>	Luminol Benzil Quinoxaline	CH 19, CH 11
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<b>April 23</b>	Midterm 1 Review	---
<b>April 30</b>	Column Chromatography NMR Project Polymers Soaps	CH 9, Handout, CH 17, CH 18
<b>May 7</b>	Sulfanilamide	CH 21
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**\* Course Packet materials and assigned reading from the text for each experiment should be read prior to the corresponding lecture.**

### **Lecture and Reading Assignments**

I expect that you attend all lectures and come prepared ready to participate. The lecture will prepare you to do that week's experiments in the laboratory. We will go over important safety issues as well as talk about the theory and mechanism pertaining to that week's series of experiments. The portions of the lecture that are covered via PowerPoint will be made available on Carmen prior to the lecture, the topics covered in these sections will be the experimental procedure details for the experiment. The reaction mechanisms and important principles will be discussed on the **blackboard**. It is imperative to your success that you take notes on the material covered in lecture.

### **Suggested Homework Problems**

Organic chemistry is best learned by working out problems; this means working the problem and then looking at the answer, not reading the questions and agreeing with the answer. I advise you to work as many problems as possible. All suggested study problems within the sections should be worked. I advise that you work out all of the practice problems from the textbook for each experiment performed. I will post the answers to these problems on the Carmen page at the end of each week. These homework assignments will not be graded or collected they are for your own benefit and should be worked out as practice and review. The type and level of difficulty on the quizzes and exams will reflect the homework assignments.

**Grading**

The breakdown of points will be as follows:

11	Lab Reports	925	57.5%
2	Midterm Exam (2 x 250 PTS)	500	31.0%
1	Lab Proficiency	75	4.7%
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82-80% = B-

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76-73% = C

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69-67% = D+

66-60% = D

59-0% = E

**Quizzes**

There will be two quizzes that are on the schedule above. The quizzes will be given at the beginning of lab. There will be no make-up quizzes.

**Quiz 1 Topic** – Reduction, Benzoin and Nitration of Methyl Benzoate

**Quiz 2 Topic** – Sulfanilamide, Polymers and Soaps

**Midterm Exams**

*Two written midterm examinations will be given in the lab on the dates indicated in the above schedule. These examination will focus on the experiments and techniques you have performed. Each exam will last for the first 75 minutes of the laboratory period. A study guide for the exam is provided in the back of this course packet. **The questions for the exams will be of similar difficulty to the homework and quiz problems. If there are no objections, there will not be a scheduled final examination during finals' week for this class. Please register objections by the end of the fourth week of class.***

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5. *Repeating a lab experiment for a better yield.* If you wish to repeat an experiment to obtain a better yield you will be penalized 5 points for repeating the experiment. You may not repeat an experiment for a better yield if you have already handed in the report.

## Experimental Reports

A schedule for submitting reports is given below. It is important that reports be turned in on time such that evaluation of your progress can be monitored by your teaching assistant in a timely manner. Late reports will be penalized 10 pts per day late unless your instructor or TA is given an acceptable reason on or before the experiment due date. Report sheets for non-preparative experiments can be found in this course packet. Reports for several "preparative" experiments will require independent writing on your part. These reports should consist of a heading, an equation that describes the experiment you performed, a reference, a narrative of the procedure you followed written according to the style accepted by American Chemical Society journals, and a brief discussion. All "preparative" experiments calling for such reports (see course packet) should mimic this format. **Students should not collaborate with others on their pre-labs and laboratory reports. We will refer all cases of suspected collaboration to the Committee On Academic Misconduct. Do your own work!**

### Report Deadlines

<u>Experiment:</u>	<u>Points:</u>	<u>Date Due for Grading:</u>
Reduction of Vanillin (R)	75	April 5, 6
Benzoin (R)	75	April 12, 13
Nitration of Methyl Benzoate (R)	75	April 12, 13
Luminol (RS)	35	April 17, 18
Benzil Quinoxaline (R)	75	April 19, 20
Tetraphenylcyclopentadienone (R)	75	April 26, 27
Benzynes/Tetraphenylanthracene (R)	75	April 26, 27
Column Chromatography (RS)	40	May 8, 9
Soaps (RS)	50	May 10, 11
Polymers (RS)	50	May 10, 11
NMR Project (RS)	50	May 15, 16
Sulfanilamide (R)	75	May 15, 16
Benzocaine(R)	75	May 24, 25
Synthesis Project (R)	100	May 31, Jun 1

**Disabilities:** If you have a university-documented disability, you should see me as soon as possible. If your disability requires that quizzes or examinations be taken outside regularly scheduled times, see the Office of Disability Services, Room 150 Pomerene Hall (292-3307)

**NOTE: YOU ARE RESPONSIBLE FOR ALL CHANGES TO THIS SYLLABUS MADE IN CLASS WHETHER OR NOT YOU ARE IN ATTENDANCE.**