

**Widener University**  
**Fall 2014**  
Chemistry 257  
Organic Chemistry I Laboratory  
**Lecture (KLC 1):** W 12:00 pm – 12:50 pm (All sections)  
**Labs (KB 438):**  
Th 8:00 am – 10:50 am (Sec. A)  
Th 11:00 am – 1:50 pm (Sec. B)  
Th 2:00 pm – 4:50 pm (Sec. C)  
W 2:00 pm – 4:50 pm (Sec. D)  
W 7:00 pm – 7:50 pm (Sec. F)

Coordinator:

Dr. Loyd D. Bastin  
Office: Kirkbride 469A  
Office Hours: TBA  
M 8-9am, Tu 3-4pm, Th 4-5pm, F 8-9am & 2-3pm  
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E-mail: lbastin@widener.edu

Section A & C:

Dr. Irina Knyazeva  
Office: Kirkbride 440 and 466C  
Office Hours: M 9-10am, T 9-10am, F 9-10am, F  
11am-noon & by appointment  
Phone: (610) 499 – 4023  
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Section B:

Dr. Shara Compton  
Office: Kirkbride 466A  
Office Hours: M 1-3pm, T 2-3pm, W 10-11am,  
Th 2-3pm  
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Section D:

Dr. Krishna Bhat  
Office: Kirkbride 571  
Office Hours: M 1-3pm, T 11am-2pm, F 1-2pm  
Phone: (610) 499 – 4005  
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Section F:

Dr. Molly O'Connor  
Office: Kirkbride 562D  
Office Hours: W 5-7pm  
Phone: (610) 499 – 1080  
E-mail: maoconnor@mail.widener.edu

Website: [http://www.science.widener.edu/~bastin/Widener/Chem\\_257.html](http://www.science.widener.edu/~bastin/Widener/Chem_257.html)

*“UNLESS someone like you cares a whole awful lot nothing is going to get better. It’s NOT.”  
“I am the Lorax. I speak for the trees.” (Dr. Seuss’ The Lorax)*

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**Required Textbooks  
and Materials**

*Chemistry 257/258: A Greener Organic Chemistry Laboratory*, 4<sup>th</sup> edition by L. Bastin and K. Bhat, pdf file available in Shared Files of CampusCruiser  
*Green Organic Chemistry: Strategies, Tools, and Laboratory Experiments*, K.M. Doxsee and J.E. Hutchison, Thomson: Brooks/ColeCengage, 2004. ISBN: 0-534-38851-5. Can be purchased used on amazon.com.  
*The Organic Chem Lab Survival Manual: A Student’s Guide to Techniques*, 7<sup>th</sup> edition, J.W. Zubrick, John Wiley & Sons, 2012. ISBN-13: 9781118083390. Can be purchased used on amazon.com.  
Laboratory Notebook by Jones and Bartlett. Must be a bound notebook with carbon copies and page numbers throughout. A very good version can be purchased at the Widener bookstore. ISBN: 0-558-96530-X.

**Course Description**

This laboratory course provides experience in basic techniques for the preparation, isolation, purification, interconversion, and determination of physical properties of the common classes of organic compounds. The students are also introduced to synthetic design and Green Chemistry. Prerequisites: CHEM 147 and 148. Corequisite: CHEM 255. 3 hours laboratory. 1 semester hour.

## Course Goals

Students will: 1) be familiar with the basic techniques of isolation and purification of organic compounds; 2) be able to determine the physical properties (mp, bp, refractive index, IR) of the common classes of organic compounds; 3) be able to take an experimental procedure from the literature and reproduce the experiment; 4) be able to obtain and interpret IR spectra ; 5) understand the principles of Green Chemistry; 6) design a synthetic scheme using classical organic reactions and green chemistry reactions; 7) work safely in the laboratory; 8) use chemicals without harming the environment; 9) recognize how chemistry relates to other disciplines and to societal issues.

## Readings

The purpose of the readings is to prepare you for the laboratories. You **MUST** read the appropriate experiment and associated background readings **before** the appropriate lecture and laboratory class (as outlined later). This includes the appropriate techniques mentioned in each experiment. Few people will understand an experiment on the first reading, so schedule your time accordingly.

## Attendance

Attendance at EVERY class meeting is crucial in a laboratory course. You **MUST** attend the Wednesday lectures or you will NOT be allowed to perform the experiment that is covered during the missed lecture and will receive a 0 for that lab. If you have an acceptable reason for missing the Wednesday lectures, you can arrange a time to meet with Professor Bastin to discuss the information you missed. **This will only be done in extenuating circumstances.**

Absences from lab for any reason must be discussed with Professor Bastin or your instructor in advance of the lab being missed (except for unexpected illness, in which case a note must be brought from your physician or the health center). You must contact Professor Bastin or your instructor within 24 hours after missing a lab in order to submit a proper excuse for an absence. Absence from lab is **HIGHLY** discouraged and you will automatically fail the course if you miss 3 lab periods. **There are NO make-up labs.**

## Grading

|                                  |         |
|----------------------------------|---------|
| Lab Notebook (6 at 50 pts each)  | 300 pts |
| Synthesis Final Report           | 100 pts |
| Laboratory Technique/Preparation | 100 pts |
| Final Exam                       | 100 pts |
| Total                            | 600 pts |

## Lab Notebooks

Each experiment entry in the laboratory notebook consists of a pre-lab due at the beginning of the lab period, in-lab observations due at the end of the lab period, and a post-lab write-up due at the beginning of the first lab period following the completion of the experiment. All portions should be written in your lab notebook and carbon copies placed in the file folder located in the laboratory. The pre-lab will be checked at the beginning of the lab period for that experiment. You will not be allowed to begin the experiment until the pre-lab is completed. See the Chemistry 257/258 Laboratory Manual for additional details. **Late notebook pages will be penalized 10% per day.**

## Synthesis Final Report

The Synthesis laboratory final report will be a short typewritten paper. You will find instructions for the format of this report on the Chemistry 257 Website. The report will be submitted via the instructions provided by your instructor. **Late reports will be penalized 10% per day.**

## Laboratory Technique/Preparation

This will be judged on a number of items, including the following: pre-lab portion of the notebook, familiarity with the experiment, familiarity with the technique, how well you assemble your equipment, speed, neatness, economy, purity and amount of product, and concern for safety.

## Final Exam

The final exam will cover the background and theory (reactions, mechanisms, etc.) of each experiment in addition to testing your understanding of the experiments you have performed. You are expected to understand the purpose of each chemical used in an experiment.

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Academic Fraud</b>          | The Science Division and the Chemistry Department strictly enforce the University's policy on cheating and other forms of academic fraud. Cheating on an exam or laboratory report will result in automatic failure of the course. See the student handbook for details.                                                                                                                                                                                                                                                                                                                   |
| <b>Electronic Devices</b>      | Use of electronic devices for non-class activities is not allowed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Class Cancellation</b>      | If a lecture or lab section is cancelled for any reason, you will be notified via Widener email.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Grievance Procedure</b>     | Please refer to the student handbook, the science office, or Professor Bastin if you have a problem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Student Health</b>          | The laboratory experiments conducted in this course are designed with safety in mind. However, some students may have medical conditions that may increase sensitivity to the chemicals used in the laboratory. This is especially true for students who may be pregnant. If you have any medical condition that may increase your risk, you should speak with your physician and the course instructor so that arrangements can be made to ensure your safety.                                                                                                                            |
| <b>Syllabus Modification</b>   | I reserve the right to change/modify the syllabus throughout the semester if needed. All changes will be announced in class and you are responsible for those changes whether you are present or absent during those class times.                                                                                                                                                                                                                                                                                                                                                          |
| <b>Learning Accommodations</b> | In accordance with the Americans with Disabilities Act, any student has the right to request reasonable accommodation of a disability. Accommodations can be requested through Academic Support Services, Disabilities Services (520 E. 14 <sup>th</sup> St., 610-499-1266). Disabilities Services is the office that authorizes all accommodations on campus. Please note that you will need to present documentation of your disability to Disabilities Services. It is important to make this request as soon as possible so that we will have time to make any necessary arrangements. |

## Lab Schedule

| <u>Week</u>                      | <u>Class</u> | <u>Lecture Topic/Experiment</u>                                                                          | <u>Readings</u>                                                 | <u>Notebook Pages Due</u> |
|----------------------------------|--------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------|
| <b>1</b><br>8/27<br>&<br>8/28    | Lecture      | Introduction<br>Lab Notebooks<br>Intro to Exp. 1                                                         | Bastin: Pages 6-10                                              |                           |
|                                  | Lab          | Check-in & Safety Exercise                                                                               | Bastin: Pages 2-5<br>Zubrick: Chapter 3                         |                           |
| <b>2</b><br>9/3<br>&<br>9/4      | Lecture      | Recrystallization<br>Melting Points<br>Intro to Exp. 2                                                   | Zubrick: Chapter 13<br>Zubrick: Chapter 12                      |                           |
|                                  | Lab          | Exp. 1: Solventless Aldol (reaction)                                                                     | Bastin: Pages 11-13                                             | Week 4                    |
| <b>3</b><br>9/10<br>&<br>9/11    | Lecture      | Extraction<br>Intro to Green Chemistry                                                                   | Zubrick: Chapter 15<br>Doxsee: Chapter 1-3                      |                           |
|                                  | Lab          | Exp. 1: Solventless Aldol (melting points)<br>Exp. 2: Acid-Base Extraction (isolation)                   | Bastin: Pages 14-16<br>Zubrick: Chapter 10                      | Week 6                    |
| <b>4</b><br>9/17<br>&<br>9/18    | Lecture      | Green Chemistry                                                                                          | Doxsee: Chapters 4-6, 10                                        |                           |
|                                  | Lab          | Exp. 2: Acid-Base Extraction (recrystallization)                                                         |                                                                 |                           |
| <b>5</b><br>9/24<br>&<br>9/25    | Lecture      | Distillation                                                                                             | Zubrick: Chapter 20                                             |                           |
|                                  | Lab          | Exp. 2: Acid-Base Extraction (melting points)<br>Exp. 3: Biosynthesis of Ethanol (setup<br>fermentation) | Bastin: Pages 17-19                                             |                           |
| <b>6</b><br>10/1<br>&<br>10/2    | Lecture      | Chromatography                                                                                           | Zubrick: Chapters 27 & 29                                       |                           |
|                                  | Lab          | Exp. 3: Biosynthesis of Ethanol                                                                          | Bastin: Pages 17-19<br>Zubrick: Chapter 19<br>Doxsee: Chapter 9 | Week 9                    |
| <b>7</b><br>10/8<br>&<br>10/9    | Lecture      | Infrared (IR) Spectroscopy<br>TLC                                                                        | Zubrick: Chapter 34<br>Zubrick: Chapter 28                      |                           |
|                                  | Lab          | Exp. 3: Biosynthesis of Ethanol (cont)                                                                   |                                                                 |                           |
| <b>8</b><br>10/15<br>&<br>10/16  | Lecture      | Intro to Exp. 4                                                                                          | Doxsee: Chapter 8<br>Bastin: Pages 27-29                        |                           |
|                                  | Lab          | Exp. 4: Friedel-Crafts Acetylation (reaction)                                                            | Bastin: Pages 20-24<br>Doxsee: Chapter 7                        | Week 13                   |
| <b>9</b><br>10/22<br>&<br>10/23  | Lecture      | Intro to Exp. 5                                                                                          |                                                                 |                           |
|                                  | Lab          | Exp. 4: Friedel-Crafts Acetylation (column)                                                              |                                                                 |                           |
| <b>10</b><br>10/29<br>&<br>10/30 | Lecture      | Synthesis Introduction                                                                                   |                                                                 |                           |
|                                  | Lab          | Exp. 5: Spearmint Oil (Column)                                                                           | Bastin: Pages 25-26                                             | Week 11                   |
| <b>11</b><br>11/5<br>&<br>11/6   | Lecture      | Synthesis Details                                                                                        |                                                                 |                           |
|                                  | Lab          | Exp. 4: Friedel-Crafts Acetylation (melting<br>points)<br>Exp. 5: Spearmint Oil (Rotovap & IR)           | Bastin: Pages 27-29                                             | Week 14                   |
| <b>12</b><br>11/12<br>&<br>11/13 | Lecture      | Synthesis Details                                                                                        |                                                                 |                           |
|                                  | Lab          | Exp. 6: Synthesis (Part 1 of 2)                                                                          |                                                                 | 12/8 by<br>5pm            |
| <b>13</b><br>11/19<br>&<br>11/20 | Lecture      | Synthesis Report                                                                                         |                                                                 |                           |
|                                  | Lab          | Exp. 6: Synthesis (Part 2 of 2)                                                                          |                                                                 |                           |

|                                    |         |                                                                                     |  |  |
|------------------------------------|---------|-------------------------------------------------------------------------------------|--|--|
| <b>14</b><br>11/26<br>&<br>11/27   | Lecture | NO CLASS: Thanksgiving Break                                                        |  |  |
|                                    | Lab     | NO CLASS: Thanksgiving Break                                                        |  |  |
| <b>15</b><br>12/3<br>&<br>12/4     | Lecture | Lab exam outline                                                                    |  |  |
|                                    | Lab     | Exp. 6: Synthesis (Characterization)<br>Checkout                                    |  |  |
| <b>16</b><br>Final<br>Exam<br>Week |         | <b>Final Exam</b><br>Wednesday, December 10<br>10:15 am – 12:15 am<br>Location: TBA |  |  |