CHE 384 Intermediate Synthetic and Spectroscopic Techniques  
Fall 2017

Lecture:  Tuesday 8:30 – 9:23 am, Frey Hall 112

Workshops: Tuesdays (L11 & 12)  9:30 am - 12:30 pm, to be decided

Labs: Thursdays L11 & 12)  8:30 am - 12:30 pm, Lab A

Instructors: Prof. Kathlyn Parker  
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Coordinator: Dr. Rong Chen  
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Email: rong.chen@stonybrook.edu

Office Hours: Prof. Parker – Mondays 4-5 pm, Wednesdays 12-1 pm, Chemistry 703.  
Dr. Chen – Mondays 3-4 pm, Wednesdays 10-11 am, Chemistry 523 or 344.

Office hours of the teaching assistants will be posted early in the semester. We urge you to use these scheduled times to discuss the techniques and experiments with any CHE 384 staff member. See Dr. Chen for questions regarding the course organization.

COURSE DESCRIPTION

Application of fundamental laboratory techniques to organic and inorganic problems including multistep syntheses and structural and mechanistic determinations. Lectures cover material pertaining to the experimental work, with an emphasis on spectroscopy. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: CHE 383 or CHE 327 Corequisites: CHE 322 or CHE 332

SBC: ESI

3 credits

LEARNING OUTCOMES/COURSE OBJECTIVES:

At the end of the course, the students should be able to:

- Perform multi-step organic and inorganic syntheses.
- Acquire and interpret spectroscopic data in order to characterize organic and organometallic compounds.
- Apply technical tools and chemistry knowledge to solving problems in organic and inorganic synthesis.
- Clearly present scientific findings by collecting the most pertinent data, drawing appropriate inferences from the data, organizing the data and analyses effectively, and writing and speaking in a confident voice using correct grammar and punctuation.
REQUIRED BOOKS AND SUPPLIES


- The CHE 384 Spring 2017 Lab Manual. This manual guides you to teach yourself concepts and techniques as you do the experiments. It has important introductory material about grading and course policies. Your success in CHE 384 will depend on how well you understand the course goals which are reflected in this material.

- A bound notebook whose pages are pre-numbered and duplicated. You will probably need 75-100 pages. Your notebook may be one that was used in another course, but not for a previous offering of CHE 384. Because your notebook is your own record, do not be referencing a previous notebook while you are in the lab – such an action must be considered academic dishonesty.

  Note: Alternatively, a bundle of an Electronic Laboratory Notebook (ELN) and the electronic version of CHE 384 Lab Manual Spring 2017 edition can be purchased from LabArchives. More details can be found on Blackboard under “Course Information”.

- Safety goggles that are in compliance with the latest Z87.1 Standard for Occupational and Educational Eye and Face Protection established by ANSI. These may be obtained at the bookstore; be sure you purchase chemical splash goggles and not a less effective kind of eye protection.

- Heavy-duty gloves. Lab Safety Supply Neoprene Gloves are recommended as they resist a broad range of organic and inorganic chemicals. Playtex Living Gloves are also satisfactory and probably the cheapest available. They can be found at a hardware or grocery store, or the university bookstore.

- Combination padlock. This will be used to lock your lab drawer.

RECOMMENDED BOOKS


GRADING (TENTATIVE)

You will be graded relative to other students, present and past. In this way, we may be sure our goals for a particular assignment are realistic. The total possible points obtained in this course are 500.

1. Experiments and reports (170 points)

   All the experiments are graded. Before the lab there are quizzes on Blackboard. After the experiment is completed, the experimental products and results are submitted with accompanying forms contained in the Lab Manual.

   If you are in a situation where you must make a decision between greater purity vs. greater yield, you should be aware that we grade both but purity will count more. A special case is getting a refill from the stockroom: A zero yield grade will be assigned.

   No product grade will be dropped. Instead, the value of your lowest grade will be adjusted upward at the end of the course. With our algorithm, you can achieve your highest total by trying for your best product in each experiment.
2. Notebook quizzes (120 points)

There will be one quiz regarding your notebook record. In Chapter 2 of the Lab Manual, there is a detailed description of what belongs in your notebook and how it will be collected and graded. Read it over carefully and review it several times early in this semester.

3. Theory exams (160 points)

There will be two full period exams on theory and practice, including both spectroscopy and synthesis. These exams will encompass material from the lectures as well as from the lab.

4. Interesting Unknown Analysis and Oral Presentation (40 points)

5. Technique (up to 10 points) added to borderline cases

You should endeavor to prepare thoroughly, work independently, show concern for safety, show consideration for others, and in general develop a worker-supervisor relationship of a professional nature.

PLANNING YOUR USE OF LAB TIME

Each period, allow enough time at the end to clean your glassware, which can then dry over the week. Since for most experiments the glassware has to be both clean and dry, pre-cleaning is by far the most efficient way for you to prepare. See cleaning and drying techniques at the beginning of the Lab Manual.

BLACKBOARD

The Blackboard supported web site should be checked on a regular basis. Reading and homework assignments, course announcements, lecture notes and various other course materials can be found there. Old examinations will be posted selectively, but you should realize that they may have been written by different faculty. This Blackboard supported web site can be found at: http://blackboard.stonybrook.edu/, where you can also view your grades and communicate with classmates or CHE 384 staff. The most recent class notice and/or announcement will be emailed through Blackboard. In order to receive the most recent email notice and/or announcement, you must check your University email account.

STOCKROOM POLICIES

You will check-in glassware and equipment, which you will keep in two assigned drawers. You will be required to bring in your own locks for these drawers, and it is your responsibility to lock your drawers each time after you complete the experiment.

At the end of the semester, the drawers and their contents should be clean and in the condition you received them (other than consumables such as litmus paper). Failing to check-out before the course ends will result in a fee, including the cost of: 1) the examination of the drawers by lab staff, and 2) the replacement of damaged equipment, if any. Any locks remained on the drawers will be removed by the stockroom.

Equipment you borrow should be returned to the stockroom as soon as practical during the same lab period. Keep in mind that the stockroom closes fifteen minutes before the scheduled end of the lab period.
DISABILITY SUPPORT SERVICES (DSS) STATEMENT
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following website:  http://www.stonybrook.edu/ehs/fire/disabilities.

ACADEMIC INTEGRITY STATEMENT
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

CRITICAL INCIDENT MANAGEMENT
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Workshop</th>
<th>Lab</th>
<th>Due dates</th>
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<tbody>
<tr>
<td>Aug. 28-Sep. 1</td>
<td>Introduction and safety.</td>
<td>Extended lecture: TLC study of bromine-catalyzed isomerization of dimethyl maleate to dimethyl fumarate.</td>
<td>Check in: Thursday (8/31) morning – 9 am</td>
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<td>Sep. 4-8</td>
<td>Labor Day observed. No lecture. No workshop.</td>
<td>TLC experiment (on Blackboard).</td>
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<td>At the end of the period, carbon copies of all pages on which you have written in the current lab period are due, even if you haven’t finished the experiment.</td>
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<td>Sep. 11-15</td>
<td>Ester Synthesis</td>
<td>TBA</td>
<td>Ester Experiment, Part A: synthesis (on Blackboard) *Blackboard demo folder: separatory funnel</td>
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<td>Sep. 18-22</td>
<td>IR review, Chromatography and GC; NMR overview.</td>
<td>Practice the solid IR technique</td>
<td>Ester Experiment, Parts B-D: purification, IR and GC</td>
<td>TLC result form due</td>
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<td>Sep. 25-29</td>
<td>$^1$H-NMR and $^{13}$C-NMR.</td>
<td>NMR Data Processing - Mnova</td>
<td>Interesting Unknown – purify the compound; find mp (or bp); take IR.</td>
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<td>Oct. 2-6</td>
<td>Diels-Alder and addition reactions.</td>
<td>Spectral analysis workshops</td>
<td>Synthesis including a Diels-Alder reaction. Work in pairs from now on.</td>
<td>Ester result form due</td>
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<td>Oct. 9-13</td>
<td><strong>Theory Quiz #1 on the TLC and Ester experiments (including IR, GC, $^1$H-NMR).</strong></td>
<td>Spectral analysis workshops</td>
<td>Finish the Diels-Alder experiment and mp, IR analyses.</td>
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<td>Oct. 16-20</td>
<td>Ferrocene synthesis, NMR review (including $^{13}$C-NMR)</td>
<td>Spectral analysis workshops</td>
<td>Ferrocene experiment Parts A-E</td>
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<td>2. Thoroughly clean the experiment apparatus for next week’s Grignard experiment so that it will air-dry over the week.</td>
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<td>Oct. 30-Nov. 3</td>
<td>Grignard reaction and mass spectrometry</td>
<td>Spectral analysis workshops</td>
<td>Synthesis of triphenylmethanol using a Grignard reaction.</td>
<td>Diels-Alder results due</td>
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<td>Nov. 6-10</td>
<td>Advanced Spectral Analysis</td>
<td>Spectral analysis workshops</td>
<td>Finish the Grignard experiment – MP, IR, and TLC.</td>
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<tr>
<td>Nov. 13-17</td>
<td>Inorganic Chemistry and the synthesis of (tetraphenylporphyrinato)copper(II).</td>
<td>Spectral analysis workshops</td>
<td>Synthesis of (tetraphenylporphyrinato)copper(II) experiment Parts A-C.</td>
<td>Ferrocene results and report due</td>
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<td>Nov. 20-24</td>
<td>Oral presentations</td>
<td>Spectral analysis workshops</td>
<td>Thanksgiving Break. No Lab.</td>
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<td>Nov. 27-Dec. 1</td>
<td>Oral presentations Take-home Notebook Quiz on all experiments is posted on Blackboard after the experiment is completed.</td>
<td>Oral presentations</td>
<td>Synthesis of (tetraphenylporphyrinato)copper(II) experiment Parts D&amp;E</td>
<td>Grignard results and report due</td>
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<tr>
<td>Dec. 4-8</td>
<td>Theory Quiz #2 on the Diels-Alder, ferrocene, Grignard, and Porphyrin experiments (including all the spectroscopies)</td>
<td>No workshops</td>
<td>Check out</td>
<td>Porphyrin report due. Notebook Quiz due. Unknown report form due</td>
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