

# NEW YORK UNIVERSITY

Department of Chemistry

Summer 2016

## CHEM-UA 225 ORGANIC CHEMISTRY I LABORATORY

Course Instructor: Prof. John Henssler  
Office: Silver 1001S  
Email: See section II

Section Instructors	e-mail address
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Laboratory Operations Manager:

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Stockroom Staff:

Manuel (Noel) Mendoza

Roland Mendoza

### Office Hours:

Instructor office hours are posted on the NYU Classes website. You may attend all instructors' office hours (majors and non-majors sections), *not* only the instructor of your laboratory section.

Also, the University Learning Center (ULC) offers free peer tutoring - one-to-one as well as group sessions - to students in chemistry.

### Course Materials:

Required Textbook: *Experimental Organic Chemistry: A Miniscale and Microscale Approach, 6<sup>th</sup> Edition*, John C. Gilbert, Stephen F. Martin, Cengage Learning, 2014 (referred to hereafter as G&M)\*

Required Notebook: *Student Lab Notebook, Organic Chemistry, 100 Carbonless Duplicate Sets*, Hayden McNeil\*

Suggested Marker: Fine point permanent marker (for labeling samples)

Required Laboratory Equipment (commonly referred to Personal Protective Equipment, or PPE): Laboratory safety goggles\*, 12 disposable laboratory coats\*\*, 1 box of disposable gloves\*\*

\* *May be purchased at NYU bookstore*

\*\**May be purchased at the stockroom, located in the organic teaching laboratory*

## **I. Course Description**

This course is intended to introduce you to major concepts and techniques in organic chemistry through laboratory experiments. The Organic Chemistry I Laboratory course will provide training in the techniques of the organic chemistry laboratory, such as carrying out chemical reactions and purification of chemical mixtures. Purification methods such as recrystallization, extraction, distillation, and chromatography will be utilized. Chemical identification and purity will be determined by analyzing data from methods such as chemical tests, thin-layer chromatography (TLC), gas chromatography (GC), mass spectrometry (MS), nuclear magnetic resonance (NMR) spectroscopy, and infrared (IR) spectroscopy. Expanding your knowledge base and critical thinking skills will help you to prepare for a wide array of potential future challenges, including upper level courses, medical school, and independent research.

## **II. Contacts and Interactions**

### ***II-i. Email Communications for Specialized Inquiries***

You will have the opportunity to interact with the section instructor and course instructor of record in person on a regular basis in the laboratory; use these opportunities to get answers to your questions when possible. If you must email, your primary contact is your laboratory section instructor. All inquiries regarding grading, policies, absences, and any other issue should begin by contacting your section instructor and they will answer your e-mail within a 48-hour period.

**ALL email correspondences for this course MUST begin with a list of the following:**

- 1) Your Name**
- 2) Section #**
- 3) Lab Section Instructor**

Also, include the word “**organic**” (not “orgo,” not “chem lab,” etc) somewhere in your subject line. Additional descriptive words in the subject line may be included, but the specific word “organic” will be used to retrieve potentially buried course emails.

The course instructor of record (Professor Henssler, henssler@nyu.edu) should only be contacted via email *after* you have email verification that your section instructor has ruled on the matter. Students wishing to meet with the course instructor must provide information regarding prior discussions with their section instructor and explain why the section instructor’s ruling is unsatisfactory. When contacting the course instructor via email, you **MUST** include (1) **ALL** of the identification information described above **AND** (2) the correspondence(s) with your section instructor. If all or parts of this are missing, the course instructor may not answer your e-mail.

### ***II-ii. NYU Classes Communications***

General inquiries on topics such as laboratory rules, procedures, experimental details for a specific laboratory experiment should be posted on the “Forum” section of NYU Classes. Postings will be addressed by an instructor and will be visible to all students. You are required to monitor to “Forum” as well as the “Announcements” section of NYU Classes laboratory site.

### ***II-iii. Instructor Office Hours***

As mentioned above, instructor office hours are posted on the NYU Classes website. You may attend all instructors' office hours (Majors and non-majors instructors), *not* only the instructor of your laboratory section. *Also use extra laboratory time to ask questions and discuss course materials with the instructors.* Also, the ULC offers free peer tutoring.

### ***II-iv. General Comments on Contacts and Interactions***

Office hours, meetings with instructors, and e-mail/NYU Classes communications are limited to the workweek. No correspondence of any type should be expected from any instructor on weekends and university holidays. If you follow the instructions above but do not receive an instructor response to your inquiry via email or NYU Classes within what you consider to be a reasonable amount of time, please resend the email including the original message.

## **III. Safety**

The safety of you and your peers is our highest priority. For the laboratory to be a safe environment, all of the occupants must be aware of procedures, policies, and hazards associated with each experiment. Students should be familiar with of the location and operating procedures for all laboratory exits and safety related equipment (e.g. safety shower, eye-wash, fire blankets, fire extinguishers, emergency phones). Other chemistry faculty might visit the laboratory without notice and are allowed to enforce laboratory safety rules at any time.

### ***III-i. Experiment Preparation and Prompt Arrival***

To operate safely in the laboratory you must be prepared. Students must arrive at the laboratory thoroughly prepared for the experiment, including a properly prepared laboratory notebook. Students that are unprepared for a laboratory experiment are a safety risk and will be removed from the laboratory, receiving a "0" for that experiment. The laboratory lecture is an integral part of the preparation for an experiment at which time safety instructions might be explained to you. Therefore, students who are 1-20 minutes late more than once may not be allowed to carry out the experiment (and will be subject to grade deductions for each tardy event). Students arriving to laboratory more than 20 minutes late or during/after the laboratory lecture will not be admitted, receiving a "0" for that experiment. Students who do not pay attention to laboratory lectures may be asked to leave, causing them to earn a "0" for that day's experiment.

### ***III-ii. REQUIRED Personal Protective Equipment (PPE)***

- 1) **Safety goggles** must be properly worn at all times by all occupants of the laboratory, even if you are not working with chemicals, otherwise you will be removed from the laboratory and not permitted to complete the experiment. Goggles can be purchased from the NYU bookstore.
- 2) **Protective gloves** must be worn at all times in the laboratory. You may purchase a box of 100 disposable nitrile gloves from the stockroom in the organic teaching laboratory and/or a pair of rubber gloves from the bookstore. We recommend purchasing both the nitrile gloves (for everyday lab use) and the rubber gloves (when needed). Nitrile gloves, while more comfortable to wear, will not protect you well against halogenated solvents such as dichloromethane. Latex-based gloves are NOT allowed. While wearing gloves, do not touch areas that are commonly touched without gloves (e.g. door knobs, staplers).
- 3) **Laboratory coats** must be worn at all times in the laboratory. You may purchase a set of 12 lab coats from the stockroom in the organic teaching laboratory.

The three PPE items listed above (safety goggles, protective gloves, and laboratory coats) are for LABORATORY USE ONLY. Do NOT wear these items outside of the laboratory even if you think they are clean.

- 4) **Clothing that covers your legs** must be worn at all times in the laboratory.
- 5) **Closed shoes** (no part of your foot or ankle is exposed) must be worn at all times in the laboratory.

### ***III-iii. Basic Laboratory Rules***

- 1) No food, gum, or drinks are allowed in the laboratory.
- 2) No cell phone usage is allowed in the laboratory.
- 3) No personal items such as coats, backpacks, etc. are allowed in the laboratory at any time. Please plan accordingly. Note that general lockers are available on the 4<sup>th</sup> floor of Silver to store your personal belongings BEFORE you enter the laboratory. These lockers are on a 5-hour timer, i.e. they will open automatically after 5 hours. A limited number of non-electronic lockers (for use with personal locks) are available on the 4<sup>th</sup> and 5<sup>th</sup> floors of Silver. Personal items left in these lockers for more than 5 hours will be donated to charities.
- 4) It is the student's responsibility to ensure that a full set of communal glassware (a set is located below each half of each hood) is present and clean at the end of every laboratory session (if there are any issues with this glassware upon arrival in the lab, the section instructor must be informed immediately). Broken communal glassware may be replaced for free at the stockroom.
- 5) As a matter of safety, students in the morning sessions must exit the laboratory by 1:40pm and students in the afternoon sessions must exit the laboratory by 6:40pm. A penalty of 1 point/minute will be assessed for violation of this safety measure.

### ***III-iv. Chemical/Glassware Handling and Spills***

- 1) Treat all chemicals with caution.
- 2) Waste must be disposed in appropriate waste bottles. When in doubt, ask where to dispose of chemicals. NO chemicals may be disposed of down any drain. Note that there are (a) trash cans for paper and lab coat disposal, (b) barrels with lids for gloves and glass waste disposal, (c) containers in the waste hoods for solid chemical waste disposal, and (d) labeled bottles for specific liquid waste disposal.
- 3) Read the Fire/Injury Instructions located on the columns in the laboratory.
- 4) Alert the instructor if there is a spill. Never leave any spill or trash (contaminated or not) at a balance, in your hood, or any other place in the lab.
- 5) If you accidentally over-dispense a chemical, dispose of it in the proper waste container. NEVER return chemicals to the bulk container.
- 6) Do not transport an uncapped flask out of the fume hood.
- 7) Do not raise the fume hood sash above the recommended level (half way up).
- 8) Never use glassware or laboratory equipment if it appears to be broken. Report all broken communal items to your instructor and replace all broken personal items immediately.

### ***III-v. Illness, Injury, and Physical Conditions [medical/health considerations]***

If you are not feeling well or are injured while in the laboratory, inform the instructor immediately. The course of action will be dependent on the nature of the event. We recommend that, at the very least, any student who experiences illness or injury during a laboratory session is seen by NYU Health Services.

If you are experiencing any physical condition that could affect your ability to function safely in the laboratory (i.e., pregnancy, medical conditions), inform the course instructor immediately.

*If a student violates any of these requirements, they will lose all technique/safety points for that day and may be asked to leave, causing them to earn a "0" on the experiment.*

## IV. Grading and Requirements

You will receive a single grade for the combined organic chemistry lecture and laboratory courses. The laboratory portion contributes to 25% of the overall organic chemistry course grade.

There are 9 laboratory sessions during which experimentation will take place in the laboratory, plus a final practical exam laboratory sessions. Your final grade will be based on your (1) highest n-1 quiz grades, (2) 8 of 9 highest weekly combined notebook/results + technique/safety + report/post lab assignment grades, and (4) written and practical final exam grades. You must complete at least 75% of the experiments and associated work (7 of the 9 laboratory experiments) as well as both portions of the final exam in order to be eligible to receive a passing grade for the course. For logistical reasons, it is NOT possible to offer make-up laboratory sessions. Therefore, **there will be NO makeup laboratory sessions for any reason**. If you miss a laboratory session, for any reason, you will receive a score of “0” for all graded work associated with that experiment (but remember, only 8 of 9 highest weekly combined experiment scores count toward the final grade).

Pre-lab quiz	20%
Notebook/Results	5%
Safety/Technique	10%
Laboratory Reports/Postlab Assignments	30%
Final Exam (Practical and Written)	35%

If you do not take the midterm or final practical (in-lab experiment) exams, they will be graded as “0” points unless you provide a valid notice. The notice must be submitted to the course instructor of record (not to the section instructor) within 3 days of the missed exam. For students that have a valid excuse for missing a practical exam, ONE make up exam will be offered. There will be NO make-up exam for written final laboratory exam.

### ***IV-i. Prelab Quiz***

As a way of preparing for each experiment, you should arrive at the laboratory prepared to take a quiz each week. Quizzes will take place in the laboratory, for a specified amount of time, typically at the beginning of the session. If you arrive late to the laboratory session while a quiz is being taken, you may take the quiz but you must stop at the same time as everyone else. If you arrive after the quiz has been taken, you may not take the quiz, and you will receive a score of “0” for that quiz. No resources may be used during the quiz. *Anyone caught in possession of any type of resource that may potentially aid them or others in taking a quiz* (e.g. handouts, any electronic device that is visible to an instructor, calculators, notebooks, etc.) *will receive a “0” for all graded components of the experiment and will be required to leave the laboratory. Cheating is a direct violation of NYU’s policies and will be dealt with accordingly (See Syllabus section “V. Academic Honesty”).* Quiz content will be based on the assigned reading/handouts for the upcoming experiment (i.e. the experiment that you will be performing that day) unless otherwise announced by the course instructor. The quiz will cover information related to the experiment, including but not limited to theory, background, and experimental procedure. A typical quiz will have 3-6 multiple-choice, multiple answer, or short answer questions. Note that (1) you may not have a quiz for every experiment, and (2) not all quizzes will be the same, even for the same experiment. If you miss a quiz, for any reason, you will receive a score of “0” (but remember, your quiz grade will be determined by the average of your highest n-2 quiz grades, where “n” is the total number of quizzes offered to your section).

#### ***IV-ii. Notebook/Results (5 points per experiment)***

All students should see the Notebook Guidelines document that is posted on the NYU Classes website. A laboratory notebook (*Student Lab Notebook, Organic Chemistry, 100 Carbonless Duplicate Sets*, Hayden McNeil) can be purchased from the NYU bookstore. Please note that a student who does not use the assigned notebook with carbonless duplicate pages will receive a “0” for the notebook part of the grade. Your notebook is a tool to help you prepare for the experiment and to record your observations during the lab period. If the laboratory notebook has not been prepared prior to arrival at laboratory, the student will be removed from the laboratory as a safety risk. Your notebook will serve as your only source of information in conducting the experiment. **You may not bring the textbook, handouts, or any other source of information into the laboratory unless approved by the course instructor.** Instructors may check notebooks at any time. At the end of the laboratory session, you must give your section instructor the carbon copy of your entry; notebook carbon copies will not be accepted after the student leaves the laboratory.

In some cases, your experimental results (e.g. product purity, percent yield) will contribute to this portion of the grade.

#### ***IV-iii. Safety/Technique (10 points per experiment)***

Incidents that reduce the level of your safety or the safety of those around you will lower your score (e.g. see section “III. Safety”). Severe penalties will be incurred for senseless negligence, which has no place in a chemical laboratory. For example, leaving any type of chemical or waste in personal or common areas, or failure to leave your common glassware clean and organized condition is unacceptable. If communal areas are broadly abused, the instructors may apply a penalty to all students in the lab; encourage your peers to clean up after themselves.

You will be assessed for your technique during each laboratory period. Improper use of laboratory equipment, materials, or chemicals (including over dispensing) will lead to point deductions. During the laboratory lecture (the first 10-20 minutes), important laboratory related information will be distributed. You are expected to pay attention and take notes during the laboratory lecture. All materials discussed during the laboratory lecture should be familiar to you after the lab lecture, i.e. if you do not know the contents of the lab lecture, you will receive a grade of “0” for the technique part for the experiment. Your instructor will evaluate your understanding of the experiment and laboratory safety every laboratory period. Your answers to questions will be part of your technique grade. If the instructor views you as unprepared to undertake the laboratory experiment for the week, they will remove you from the laboratory and you will receive “0” points for the experiment.

You will not be allowed to leave the laboratory until all personal and communal work areas/glassware are in satisfactory condition. If a balance or piece of glassware is dirty/broken/missing/etc. upon your arrival, inform an instructor immediately. They will help to rectify the situation and penalize the person who left the item in poor condition. However, doing nothing to resolve the situation is unacceptable. Ultimately you are responsible for leaving the space in good condition when you leave the laboratory and failure to do so will result in point deductions. Your section instructor will often check that your laboratory locker is locked at the end of each lab period. If you leave the lab with your locker door ajar/unlocked, you will lose points. This is for your own protection.

Note that average performance in the laboratory with regards to technique/safety will earn a score of 7/10. Your Safety/Technique and Notebook/Results grade will be listed on the grading

sheet handed back with your lab report or written on your lab report each week. These scores may only be disputed for one week after they are returned. Do not approach your instructor at the end of the term requesting a re-grade of materials that were returned more than one week prior.

#### ***IV-iv. Laboratory Reports/Postlab Assignments***

##### General Information.

All students should see the 'Notes on Laboratory Reports' and the 'Report Template' document that are posted on the NYU Classes website. For each experiment either a Report or Postlab Assignment will be assigned. Both Reports and Postlab Assignments must be fully electronic (NO hand written text/drawings). All chemical structures and TLC plate images must be generated using the ChemDraw program (available for download via the library website).

##### Due Dates and Submission Requirements.

Reports and Postlab Assignments are due at the beginning of the laboratory session one week after the experiment is performed. **Reports/Postlab Assignments must be submitted 1) as a hard copy to your section instructor, AND 2) uploaded to NYU Classes as a PDF file (using "Turnitin").** Make sure your PDF file has been uploaded before the laboratory session starts when the report is due, otherwise the report will be late. Late reports will incur a 25% point deduction if turned in late, but within 24 hours after of the assignment due date/time. Assignment submission beyond 24 hours after the original deadline will result in a score of "0."

If you are absent from any laboratory session for any reason, the previous week's assignment is still due one week after the experiment was performed. However, in this case the assignment will be counted as on time if you submit the assignment electronically via Turnitin AND email your section instructor to notify them of your report submission to Turnitin. You should make arrangements with your section instructor to give them the hard copy as soon as possible (do NOT simply "drop it off" at the laboratory or chemistry office without informing your section instructor). Any assignments that are submitted to the Chemistry office help desk (Silver 1001) MUST have a cover sheet that includes ONLY (1) your name, (2) the course number, (3) your section number, and (4) most importantly your SECTION INSTRUCTOR'S FULL NAME.

##### Turnitin.

When you successfully submit your report to 'Turnitin' (via the link on NYU Classes, under the assignment tab) you will immediately receive a confirmation email receipt. It is your responsibility to make sure you receive and save this confirmation. If you do not receive an email confirmation indicating successful upload of the assignment to Turnitin, email a copy of your report to your **section instructor** prior to the time the assignment is due, otherwise the assignment may be counted as late. It is not required but sometimes helpful if your file names are descriptive, such as 'Last Name-First Name-Exp Number' (e.g. Curie-Marie-Exp 1).

Turnitin will only accept PDF and word documents. Make sure that your file name contains one of these three extensions: .docx, .doc, .pdf. Do not submit files from Pages.

If you must resubmit a document to Turnitin, 1) you will have to gain permission from your instructor, and 2) you may need to remove the prior submission in order to upload the new one.

#### ***IV-v. Regrade for Any Evaluation Component***

**For re-grading of any type of course assessment, you must submit a Regrade Form within one week after the graded work is available to you.** The Regrade Form on the Laboratory NYU Classes website should be used. Do NOT make any marks on assignment/quiz/exam/report (any marks directly invalidate any materials for re-grading). Note that we will occasionally copy student work in order to minimize the temptation to falsify claims. *Cheating is a direct violation*

of NYU's policies and will be dealt with accordingly (See section "V. Academic Honesty"). **You must include a detailed written statement addressing why something should be re-graded, i.e. a statement such as 're-grade question 2' is not acceptable.** Tell us why you think your answer/report/performance deserves more points. While instructors can provide insight into errors made on a laboratory work, instructors are strictly forbidden to make any grade changes during a personal encounter. Regrades are strictly done by the written request process to ensure objectivity. **Regrade requests should first be submitted to your laboratory section instructor for consideration.** Cases that cannot be resolved between the student and the section instructor, with both parties approval, should be transferred to the laboratory course instructor of record for review. In this case a detailed description of why a resolution between the student and the section instructor was not satisfactory must be included with the regrade form.

## V. **Academic Honesty**

All students are required to comply with the NYU Academic Integrity policies and the Honor Code, which can be found at:

<http://cas.nyu.edu/page/academicintegrity>

<http://cas.nyu.edu/page/honorcode>

It is expected that all students are aware of their responsibilities not to cheat. 'Teamwork' is NOT allowed during the prelab quizzes, writing of reports/postlab assignments, or exams. Work in the lab is to be carried out independently, unless otherwise instructed by the course instructor of record. No one in the laboratory course has a laboratory partner. Therefore, you should NEVER use another student's results as if they are your own; this is considered cheating. Each student must carry out his/her own experiment. You may be directed to share data during selected collaborative projects but this will be at the explicit instruction of the course instructor of record and all sources of data must be cited. ANY unauthorized data sharing will be penalized, at minimum, by a score of "0" for all graded components of the experiment. *Cheating off of another person's work is unethical, unacceptable, and is a direct violation of NYU's policies, and will be dealt with accordingly. Falsifying work (for example before turning it in for a re-grade) is cheating and will be reported.* Note that we will occasionally copy student work in order to minimize the temptation to falsify claims. **A major problem in the organic laboratory course is plagiarism. Plagiarism is to use someone else's ideas, words, or figures as your own.** That means that you cannot use current or old reports, data, figures (such as ChemDraw figures), etc. from your textbook, friend, labmate, roommate, the internet, commercial report-writing websites, or anyone other than yourself. Submission of any previous semester course materials or any material/resources available through the internet is NOT allowed for this course. Even taking a single phrase from another source is plagiarism and will be viewed as such. We are fully aware that old reports are available on the web. You are NOT allowed to collaborate on the laboratory reports with anyone inside or outside of the course. This includes (but is not limited to) that you cannot exchange ChemDraw figures, Excel figures, etc. The transfer of any file between any two parties, and subsequent submission of its contents, in full or in part, for a grade is considered plagiarism. Make sure you are NOT using these prohibited resources but instead hand in a laboratory report that is solely based on your data, thoughts, and writing.

As discussed in section "IV-iv. Laboratory Reports/Postlab Assignments," all students are required to upload each laboratory report to Turnitin as a PDF file. Note that Turnitin will automatically scan each report for overlap with any other report ever submitted to Turnitin as well as resources on the web (Turnitin scans not only for overlap in writing but also figures, tables and schemes), i.e. we WILL recognize if you cheated or plagiarized.

***If we recognize that you plagiarized anywhere in your coursework there will be a penalty that is non-negotiable.*** The *first time* you hand in a plagiarized work, you (1) will receive a “0” for ALL grades related to the experiment for which the report containing plagiarism was handed in (these grades WILL be counted as scores that determine your final grade), (2) will be reported to the Dean’s office, and (3) may receive a “0” for the entire laboratory part of your organic course grade. If you hand in a plagiarized work for the *second time*, you (1) will receive a “0” for the entire laboratory part of your organic course grade, (2) will not be allowed to continue with the organic laboratory for the rest of the semester, and (3) will be reported to the Dean’s office in another letter. That is a “0” for the WHOLE semester not just for the one laboratory session. Note that if Turnitin recognizes that students worked together on laboratory reports or used the same internet source, etc., (i.e. it recognizes an overlap between two or more laboratory reports, or recognizes that a laboratory report is copied from the internet or an old laboratory report, in part or in whole) it alerts us to which laboratory reports have notable overlap. ***Each student*** whose laboratory report is flagged will be penalized ***INDEPENDENTLY***, regardless of whether you are actually the student that copied the laboratory work or the student that allowed access to his/her laboratory work (both offenses are considered cheating).

Note that penalties for plagiarism are NOT contingent upon when the student is caught for plagiarism. For example, if a student commits plagiarism on Experiments 2 and 3, and is caught at the end of the semester, the full penalty for multiple cases of plagiarism, as described above, will be applied.

Any student who violates the “academic honesty” clause will be reported to the Dean’s office, no exceptions, and a recommendation will be made to the dean’s office that the violation result in a permanent note in the student’s record.

## **VI. Additional Miscellaneous Notes**

- 1) Experiments are correlated to the lecture concepts when possible. You are responsible for all relevant theory covered in lecture.
- 2) In an effort to correlate the lecture and laboratory topics, experiments will be announced the week before each experiment. This will allow for our ability to adjust the experiment order to best match the variable pace of the lectures. That being said, the laboratory can be a great place to introduce certain new concepts. Therefore, you should not be surprised if you find yourself learning “lecture-type” concepts for the first time in the laboratory setting.
- 3) Each section in G&M ends with a set of exercises; it is in your best interest to work on these problems. Certain exercises may be announced for you to address formally in your written report/postlab assignment.
- 4) **For each experiment, check the NYU Classes laboratory website for additional handouts. In case of conflict, instructions on the handouts supersede those written in the textbook.**
- 5) Student who are approved by the Moses Center for special accommodations and would like to utilize them must make arrangements with the Moses Center in accordance with their policies.
- 6) As science, technology, and pedagogy are constantly evolving, the instructor of record reserves the right to modify the syllabus or experiment schedule in an effort to offer NYU students the highest quality laboratory experience possible.

## Schedule

<u>Date</u>	<u>Laboratory Experiment</u>
5/23	Check-in, Safety, Syllabus, Introduction to Basic Laboratory Techniques, Recrystallization of Acetanilide (Melting Point (MP) Analysis)
5/25	Conformational Analysis, Molecular Modeling, Electronic Resources One-Base
6/1	Extraction (Thin-Layer Chromatography (TLC) Analysis)
6/6	Isolation of the Components of an Analgesic Powder
6/8	Analysis of the Components of an Analgesic Powder, and Column Chromatography (d)
6/13	Preparation of (2-bromoethyl)benzene from 2-phenylethanol (GC-MS Analysis)
6/15	Dihydroxylation of Cyclohexene by Two Methods (TLC Analysis), and Distillation (d)
6/17	Lecture on Nuclear Magnetic Resonance Spectroscopy
6/20	Spectroscopy (NMR and IR Spectroscopies, GC-FID and GC-MS)
6/22	Dehydrobromination of Meso-Stilbene Dibromide (TLC and Chemical Test Analysis)
<b>6/27</b>	<b><i>Laboratory Practical Final Exam and Check-out</i></b>
<b>6/28</b>	<b><i>Laboratory Written Final Exam (Time and location TBA)</i></b>