Course Goals: The primary goals of this course are (1) to provide you with hands-on experience with organic reactions & materials that have practical “real world” applications, (2) to improve your laboratory skills through experimentation, observation, data collection, and the critical evaluation of experimental outcomes, and (3) to improve your science writing skills by describing the experimental purpose & outcomes in a writing style that is consistent in form and tone with common chemistry journals. Previous completion of and/or concurrent enrollment in CHEM 116 is a pre-requisite for this course.

Recitation: Monday, 4:15 - 5:05 pm, 103 Reiss.

Laboratory Sections: All laboratory sections are held in 405 White-Gravenor.

Section 2: Tu 12:15 pm - 4:05 pm  
Section 3: Tu 4:15 pm - 8:05 pm  
Section 4: W 1:15 pm - 5:05 pm  
Section 5: W 5:15 pm - 9:05 pm  
Section 6: Th 7:40 am -12:05 pm  
Section 7: Th 12:15 pm - 4:05 pm  
Section 8: Th 4:15 pm - 8:05 pm  
Section 9: F 2:15 pm - 6:05 pm  
CNED: Sa 8:00 am -12:00pm

Required Materials:
1. There is no required textbook for this course – lab handouts will be distributed.
2. Safety goggles
3. Carbon-copy laboratory notebook (available in the bookstore). Note: f you still have many pages left in last semester’s lab notebook, you are welcome to continue using that one.

Grading:

Lab Notebooks 30%  
Quizzes 30%  
Lab Reports 30%  
TA evaluation 10%

Letter ranges: A >85%; B >70%; C >60%

(This is an absolute grading system – i.e. you are NOT in competition with your neighbor!)

There is no final exam.

Chemistry 118 - Organic Chemistry Laboratory II (Spring 2004)  
http://www.georgetown.edu/faculty/jas2/CHEM118.html  

Prof. Jennifer Swift  
Office: 647 Reiss, 7-5567  
email: jas2@georgetown.edu  
Office Hours: M 10:00-11:00 am or by appt
# TENTATIVE SCHEDULE (Spring 2004)
(May be adjusted in the event of unexpected university closings)

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
</table>
| 1    | Jan 12     | lab check-in: new students only  
                      Flashlight survey: all students |

**Chemistry Lab & the Library** (Dubin rm, LAU)

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Jan 19 (MLK Day)</td>
<td>Intro to Library Resources Useful for Chemistry</td>
</tr>
</tbody>
</table>

*Everyone should plan to attend one of the following four sessions held at non-standard times:*

1. Tu (1/20) 3-5pm  
2. W (1/21) 4-6pm  
3. Th (1/22) 10:15am-12:15pm  
4. Th (1/22) 3-5pm

**Module 1: Dye Synthesis & Dyeing**

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Jan 26</td>
<td>Grignard Dye Synthesis</td>
</tr>
</tbody>
</table>
| 4    | Feb 2       | Azo Dye Synthesis  
                *(Module 1 lab reports due week of Feb 9th)* |

**Module 2: Standard vs “Greener” Approaches to Nylon Synthesis**

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Feb 9*</td>
<td>Adipic Acid Synthesis I</td>
</tr>
<tr>
<td>6</td>
<td>Feb 16 (Pres Day)</td>
<td>Adipic Acid Synthesis II</td>
</tr>
</tbody>
</table>
| 7    | Feb 23     | Acid Chloride & Nylon 6.6 Syntheses  
                *(Module 2 lab reports due week of Mar 1st)* |

**Module 3: Polymers, Gels and Crystals: An Original Class Research Project**

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
</table>
| 8    | Mar 1 QUIZ | Synthetic Modification of Biopolymer I  
                ----(SPRING BREAK)---- |
| 9    | March 8 (Sp Break) | Synthetic Modification of Biopolymer II |
| 10   | March 15   | Gel Formation & Crystal Growth |
| 11   | Mar 22*    | Crystal Extraction & Data Analysis  
                *(Module 3 lab reports due week of Apr 5th)* |

**Module 4: Bio-Organic Applications**

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
</table>
| 13   | Apr 5 QUIZ | --Easter Break Week--  
                TBA |
| 14   | Apr 12 (Easter Br) | TBA |
| 15   | Apr 19     | TBA  
                *(Module 4 lab reports due week of Apr 26th)* |

<table>
<thead>
<tr>
<th>Week</th>
<th>RECITATION</th>
<th>LABORATORY EXPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Apr 26*</td>
<td>Make up lab (if necessary), check-out**</td>
</tr>
<tr>
<td>17</td>
<td>May 3</td>
<td>Summary, Flashlight survey</td>
</tr>
</tbody>
</table>

**At the end of the semester, you must check out of your locker or else be charged a fine.**

* = CHEM 116 exam days
COURSE GUIDELINES

RECITATION: The Monday recitation will introduce the background and theory of the experiment(s) to be performed in the upcoming week(s). Attendance at the Monday recitation is mandatory. Attendance will be taken. Missing the lecture without a valid reason (and appropriate documentation) will negatively impact your grade.

LABORATORY: Your success and safety in carrying out the experiments in this course requires that you are fully prepared to perform the experiment when you arrive in the laboratory. When you walk into the laboratory, you should know exactly what you are going to do and why you are going to do it. Advanced planning ensures that the labs can be completed in the allotted period of time, and that lab safety practices will not be compromised for you or those working near you. At the beginning of each lab period, the TAs will instruct you where various chemicals and waste disposals are located in the laboratory room. If you have any unresolved procedural questions after the Monday recitation and the TA briefing, ask your TA’s at the beginning of the lab period. While we obviously all try not to spill reagents on ourselves and others, I would generally advise against wearing your best clothes to organic laboratory, as a number of experiments this semester will use acids, bases, or colored compounds that can permanently stain clothing.

Makeup Policy: If you have a legitimate reason for missing one of your regular lab sections, see me and we will try to arrange to have you perform the lab in a different section that same week. In cases of serious illness or family emergency, see me as soon as possible. If you have a systematic conflict (e.g. an extracurricular activity) or other problem that would force you to miss more than one lab period, it is your responsibility to resolve it at the beginning of the semester.

LABORATORY NOTEBOOKS: Each student is required to purchase a carbon-copy laboratory notebook from the bookstore. The yellow pages are to be removed and handed in to the TA at the end of each lab period. Your lab notebook grade will be mainly derived from the level of detail and completeness of the entry.

The purpose of a laboratory notebook is to create a permanent detailed record of the experiment performed during the laboratory period. Each experimental entry should begin with a statement as to the motivation behind the experiment (i.e. what is the fundamental question(s) you are hoping to address?) as well as any pertinent background information that is important to the experiment (i.e. MW, mp, % purity of compounds, where chemicals purchased from?, etc.). It is important that during the experiment, any important observations, problems, or changes in procedure be noted. All quantitative information (i.e. reagent amounts used, yield in weight and percentage, physical appearance, and physical properties) as well as qualitative observations such as “the rxn turned black” or “bubbling stopped after about 5 minutes” should also be recorded. Qualitative can sometimes be every bit as meaningful as quantitative data. Each experimental entry should conclude with a 1-2 line summary statement, stating your initial assessment of the experiment’s success and/or the quality of the data obtained. Notebook entries should be written in a well-organized form, with sufficient detail, and in “neat enough” penmanship so that if another person with some basic knowledge of organic chemistry techniques were to pick up your notebook, he/she could reproduce your experiment exactly based solely on what is written.
Other advice on maintaining a good laboratory notebook: Your lab notebook should be identified with your name and address, course name and number, lab section and your TA’s name. Each page should have your name and date on it. On the inside cover of your notebook is a table of contents - this section should include a descriptive title for each experiment, experiment number, and appropriate page numbers.

Example:

<table>
<thead>
<tr>
<th>Expt#</th>
<th>Experiment Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Recrystallization of a Solid</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Simple &amp; Fractional Distillation</td>
<td>7</td>
</tr>
</tbody>
</table>

All notebook entries must be in ink. Avoid the using scratch paper - though your intention may be to later write something more neatly in your notebook, scratch paper information all too often tends to get lost. Mistakes should not be erased or completely blotted out, but should remain legible (the information might later turn out to be valuable). Lightly cross out the old entry and write in the new one with a brief explanation if necessary.

LABORATORY REPORTS: Depending on the nature of the experiments performed, laboratory reports will take different forms. Most will consist of a series of questions and/or short answer essays (with word limits), which will be distributed with the module handouts. For several modules, you will also be asked to write up your experimental procedure and/or results in a style and format that is consistent with that of common Chemistry journal articles (examples will be provided). Most journal articles consist of distinct sections - abstract, introduction & background, experimental section, results & discussion - each of which has a particular style & purpose. Good writing skills are an important aspect of all sciences, and can be developed with practice. Writing expectations and how-to’s will be discussed in greater detail during recitation.

Note: Please turn in two copies of each lab report to your TA. The report may be either typed or handwritten. Lab reports are due one week after an assignment or module is completed. Late laboratory reports will be penalized 10% for each day late and will not be accepted more than one week after the due date (no exceptions!).

QUIZZES: The quizzes are designed to test your understanding of the procedures you performed in the laboratory (i.e., for each step in the experiment, why did you do what you did?) and to diagnose your comprehension of the reaction mechanisms and theory behind the experiments. This may also mean applying what you learned in lab to similar reactions. There will be no make up quizzes; legitimate absences will require full documentation.

A few words about academic honesty: Each student is expected to conduct his/her experiments, prepare lab reports and take quizzes with the integrity expected of a Georgetown University student as outlined by the Honor Council Standards of Conduct. In a laboratory course, dishonesty can mean several things. Quizzes are to be taken independently (giving and/or receiving answers is a direct honor code violation). For some lab experiments, you will work in pairs/groups in which you will share data, however copying another student’s laboratory report is dishonest. “Fudging data” such as product quality and yield also is academically dishonest. (Note: there is no product grade for the class, so there should be zero incentive to alter the data.) It is very important, however, that you do report accurately the product quality and quantity, because if a particular experiment proves to be universally problematic, we will be able to adjust the series of experiments in this course for future years.
LABORATORY SAFETY RULES

The primary concern of all students in a chemistry laboratory should be safety. Therefore, observation of the following safety rules is mandatory for all students enrolled in Chemistry 118. Failure to observe these rules will result in the student (a) losing points on the lab report for that experiment; and/or (b) being asked to leave the laboratory, with a grade of zero for that experiment; and, in particularly persistent cases, (c) being removed from the course.

1. Safety goggles must be worn at all times in the laboratory. Goggles should be worn to protect your eyes, not your forehead. Those who normally wear contact lenses are strongly encouraged to wear glasses instead, as some chemicals and vapors can become trapped in the contacts and cause eye irritation.

2. Shoes that cover the feet (not sandals) must be worn while in the laboratory. Pants or long skirts are recommended.

3. If you have long hair, you should tie it back.

4. No eating, drinking or smoking in the laboratory. Do not bring large coats or bags into the lab; these items can be stored in the lockers in the hallway.

5. Know the locations of all eyewash fountains, safety showers, fire extinguishers and emergency exits in the laboratory.

6. Open containers of organic solvents should never be heated directly on the hotplate or Bunsen burner, but instead in a hot water bath on the hotplate in the hood. When heating extremely volatile solvents (e.g. diethyl ether, pentane), the hot water bath should be removed from the hotplate before putting the flask in it.

7. Open flames should be used only when so instructed by the TA, and never when solvents are present.

8. Concentrated mineral acids and strong bases should only be dispensed in the hood, and should be used with extreme caution (e.g., while wearing gloves).

9. Any dry paper products (e.g. paper towels, kimwipes) that have been used to wipe acid spills need to be put in a separate container, not the regular trash. In years past, exothermic reactions initiated by acid-soaked paper products in the general trash cans have ignited fires.

10. Broken glass (including disposable pipettes and microscope slides) should be placed in the broken glass container near the front of the lab (never in the trash can).

11. Chemical waste should be placed in the appropriate labeled container in the hood. Be careful to put the waste in the correct container. Never dump chemical waste down the sink, or in the trash can, unless instructed to do so by your TA.

12. No unauthorized experiments or use of lab equipment.

13. Laboratory work is only permitted during the scheduled lab period when the instructor or TA is present.

14. Any accidents (including but not limited to fires, chemical spills, broken glass, or injuries) no matter how small should be reported to the TA immediately.