**Disclaimer** This syllabus is to be used as a guideline only. The information provided is a summary of topics to be covered in the class. Information contained in this document such as assignments, grading scales, due dates, office hours, required books and materials may be from a previous semester and are subject to change. Please refer to your instructor for the most recent version of the syllabus.
**Books used:**
“Organic Chemistry Laboratory Manual” by Anne Padías
“Making the Connections” by Anne Padías

**Schedule**

<table>
<thead>
<tr>
<th>LAB</th>
<th>DATES</th>
<th>EXPERIMENTS</th>
<th>Report Type</th>
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| 1   | Tu 1/21 – Mo 1/27  
*Monday labs meet for the first time on Jan 27!* | CHECK-IN  
NMR visit  
Exp. 1b: NMR Review and Problem set | Problem set in class |
| 2   | Tu 1/28 – Fr 1/31  
*Monday labs meet again on Friday 1/31* | Exp. 2b: Diels-Alder Reaction | Calculation worksheet provided  
Discussion using disc. points in lab manual |
| 3   | Mo 2/3 – Th 2/6  | Exp. 3b: Nitration of Methyl Benzoate | Questions, no discussion |
| 4   | Mo 2/10 – Th 2/13 | Exp. 4b: Oxidation of Borneol to Camphor (New Green Procedure!) | Questions, no discussion |
| 5   | Mo 2/17 – Th 2/20 | Exp. 5b: Macrocyclic Synthesis (Heme Analog) | Discussion using disc. points in lab manual |
| 6   | Mo 2/24 – Th 2/27 | Exp. 6b: Qualitative Analysis of Aldehydes and Ketones | Questions, no discussion |
| 7   | Mo 3/3 – Th 3/6  | Exp. 7b: Aldol Condensation | Discussion using disc. points in lab manual |
| 8   | Mo 3/10 – Th 3/13 | Exp. 8b: FAME  
Start Exp. 9b | Questions, no discussion |
| 9   | Week of March 17 | Spring Break! | |
| 10  | Mo 3/24 – Th 3/27 | Exp. 9b: Multistep Synthesis of Tetraphenylcyclopentadienone | No report |
| 11  | Mo 3/31 – Th 4/3  | Contin’d | 2-week Report with Discussion |
| 12  | Mo 4/7 – Th 4/10 | Exp. 10b: OFF | Discussion using disc. points in lab manual |
| 13  | Mo 4/14 – Th 4/17 | Exp. 11b: Methyl orange | Questions, no discussion |
| 15  | Mo 4/27 – Th 5/1  | FINAL EXAMS AND CHECK OUT | |
General Policy of Organic Lab

Absences
You can't achieve the goals of organic lab by simply reading a book. You must spend time in the lab to learn techniques. For this reason, absences are not tolerated in this course. Because of limited resources we have established the following policies:
1. If you miss and fail to make up two or more lab classes, you will not receive a passing grade. It is your responsibility to provide proof of your presence in a certain lab by having your TA sign your notebook at the end of the lab.
2. If you miss a lab, it is best to contact your TA (e-mail) as soon as possible to avoid problems. If you know in advance you will be missing a lab, talk to your TA before the class meets.
3. Times are scheduled for the make-up labs. It is again your responsibility to demonstrate to your TA that you actually did the experiment, by having the TA who is present sign your laboratory notebook and by signing the logbook present in the make-up lab room. If you do not do this, you should expect that your TA will not accept your lab report.
4. Unless you can present very valid reasons, you can only make up a maximum of two labs in the make up labs.
5. Most experiments are maintained for one week after their scheduled week and are not available after that. Experiments with special equipment requirements might not be available the second week. You should always perform any necessary make-up work prior to starting the currently scheduled experiment, i.e. you should try to do the experiments in the correct sequence.

General Comments
1. All lab work must be completed by Thursday April 24. Only students having valid, written medical excuses will be allowed to do experimental work after this date.
2. You are responsible for clearing your locker at the time you leave the course. You must check out of your locker AND clear your record with the Preproom by Thursday May 1. If you do not check out, the Preproom will do it for you, assess you a $10 charge and encumber you. All charges associated with the lab can be paid in the Bursar’s Office in Administration.
Reports, Quizzes and Exams

On-Line Modules and Pre-Lab Quizzes

On D2L, all the prelab material is posted: this consists of several PowerPoint modules and quizzes. Each week you should go on-line and complete the quizzes for that week’s experiment before 10 pm on the day before your lab meets. The modules and the quizzes ensure that you have the necessary knowledge to complete the lab. The sum of all the quizzes (100 points) will constitute 10% of your grade in the course.

It is clear that these quizzes are to be taken on the Honor System. We hope you will see the virtue of taking the quiz independently. The software will respond to your quiz answer and give you information about the experiment and about the correct answer in the event you made a mistake. It is meant as a learning tool more than a testing tool.

Also note that you won’t be able to access the quiz until you view the accompanying module.

Reports

Specific instructions regarding the writing of the reports can be found in your lab manual and techniques book. Reports are due during the following lab session.

The discussion is the most important portion of the lab report. Discussion points are delineated in your lab manual for each experiment. The discussion has to be submitted into the Dropbox on D2L before you come to lab to check for plagiarism. Don’t copy somebody else’s discussion; use your own words and ideas to discuss the important points.

In-Class Quizzes

At the beginning of some labs (at least five times per semester), your TA will give you a short quiz. The intention for these quizzes is to make the students aware of the basic knowledge they have to master, to keep this knowledge up to date and to reinforce the concepts presented in the on-line quizzes. This quiz will contain some of the following components: a simple calculation (concentration, % yield, etc.), a nomenclature question, a question on the previous lab, and a question regarding the current lab.

Each in-class quiz accounts for 20 points, for a total of 100 points during the course of a semester. This is a rather large portion of your grade. If you miss a lab, or go to make-up lab, it is your responsibility to contact your TA to take the quiz.

Final Exams

The final exam is administered during the last lab period of the semester. It will consist of questions similar to the quizzes and questions similar to the ones listed at the end of each experiment. The final exam will be written by your TA, and will give him/her an opportunity to specifically test you on the concepts taught during the semester. In addition there is a “common final”, which is given to all students registered in a course.
Grades

The grade you earn in this course will be a measure of how well you have achieved the previously stated objectives. Because our goals are substantially different from those in the lecture course, it is not unusual for a student to earn different grades in lecture and lab. The assignments and their point values, unless stated otherwise by your instructor, are as follows:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Assignment Description</th>
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<tbody>
<tr>
<td>10%</td>
<td>On-line quizzes throughout the semester on D2L.</td>
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<tr>
<td>10%</td>
<td>5 In-class quizzes @ 20 points each</td>
</tr>
<tr>
<td>48%</td>
<td>9 reports @ 40 points each and 1 two-week report @ 80 points, NMR problem set and polymer report @ 20 pts each</td>
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<tr>
<td>12%</td>
<td>Instructor evaluation of your lab techniques (including lab notebook evaluation)</td>
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<tr>
<td>20%</td>
<td>Final exam (TA-generated final and a common final for all lab sections)</td>
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<tr>
<td>TOTAL</td>
<td>100%</td>
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The grade you receive will have the following meaning:

**A:** Student demonstrates a thorough understanding of the concepts and principles presented in the course. In lab, an “A” student will consistently demonstrate a keen awareness of safety issues and proper laboratory protocol. The student will efficiently use the time available to complete the experiment successfully and collect as much data as is possible, possibly including things that may not have been originally planned. The notebook entries will coherently and succinctly allow for reconstruction of what happened in the lab -- nothing will be missing. Data summaries will be highly organized and absolutely complete including well-constructed tables and graphs necessary to understand the analysis. Discussions will present a clear and well-informed argument of the discussion points delineated in the lab manual.

**B:** Student demonstrates a significant understanding of the concepts and principles presented in the course. In lab, the “B” student will consistently demonstrate good habits regarding safety and proper laboratory protocol. The student will make efficient use of available time to complete the experiment and collect sufficient data to proof their results. Notebook entries will adequately allow for reconstruction of what happened in the lab, although some things may be missing. Data summary will be organized and relatively complete. Discussions will present a conclusion and discuss how the data collected leads to this conclusion.

**C:** Student demonstrates a superficial understanding of the concepts and principles presented in the course. In lab, a “C” student will not be very successful in completing the experiment and collect a limited quantity of data, with only minimal concern for safety and proper laboratory protocol. Notebook entries will be limited and often inadequate to reconstruct what happened in lab. Data summaries and experimental results will be disorganized and incomplete. Discussions will contain a catalog of results, but no effective arguments are presented regarding the conclusions.

**D:** Student completes course requirements, but does not demonstrate any significant mastery of course objectives or command of material presented.

**E:** Student does not complete course requirements.

**I:** The grade of I will only be awarded at the end of the semester, when all but a minor portion of the course has been satisfactorily completed, and the student has a compelling reason why he/she cannot complete the course.

The final grade will reflect the predominant performance over the course of the semester. A point-scale will be employed to relate the various grades issued. 70% of the total possible points will correspond to a “C”, 80% to a “B” and 90% to an “A”.
Organic chemistry laboratories have a rather bad reputation as being dangerous. This reputation is still based on a vision of laboratories of about 50 years ago and on the omnipresent explosions whenever the hero in an action movie enters a laboratory. However as you will find out, working in a laboratory is quite safe. All you need is a little knowledge and a lot of common sense.

We have recently become a lot more aware of the short term and the long term effects that chemicals might have on the human anatomy. The sweet smell of benzene and the odor of dichloromethane are now forever associated with cancer. Abbreviations such as DDT, PCBs and dioxins now result in a reaction of fear from most people, and legitimately so. The word "chemical" conjures up a feeling of suspicion, even though everything around us is made up of chemicals in the true sense of the word. Chemistry has brought us society as we know it today, with nylon, antibiotics, painkillers, CD discs, computer chips, brightly colored fabrics, and low-fat margarine. As with everything, a balance has to found.

In a laboratory environment, many dangers associated with chemistry, and in particular organic chemistry, are amplified. Explosions and fires can happen, but usually do not. For those eventualities, the safety rules are established and will be strictly enforced. Vigilance is always required. Any time a person is in a Chemistry building, they should be somewhat paranoid and more attentive than in any other building.

An important part of any laboratory course is learning to perform experimental work in an appropriately safe and efficient manner. For this reason, your grade, as well as your own safety, will depend on your knowledge of the following rules and regulations. Most of them will already be familiar to you due to your experiences in other lab courses, but some will be new because of the unique safety hazards present in organic laboratories.

- No one is allowed to work in the laboratory unless an instructor is present.
- Unauthorized experiments are absolutely prohibited.
- There is a very clear dividing line between the classroom area and the laboratory area in each of our labs. Classroom rules apply to the desk area, while laboratory rules strictly apply once the line into the lab section is crossed.
- No smoking, eating or drinking are allowed in the laboratory. Never taste anything in the lab.
- Absolutely no cell phones or iPads etc are allowed in the lab room area. Electronic devices can reside in the classroom area during the entire lab period.
- The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one’s self. See: [http://policy.web.arizona.edu/~policy/threaten.shtml](http://policy.web.arizona.edu/~policy/threaten.shtml).
- Due to the danger of fumes and splashes, protective GOGGLES (or a full face shield) must be worn at all times by all persons in the lab whenever any experimental work is being done. This includes visitors, students and instructors. Remember, your eyes are the most vulnerable part of your body.
- Lots of people wear contact lenses. It has been shown that wearing contacts is not more dangerous than wearing glasses in the lab, as long as goggles are worn, but you have to very aware of the fact that you have these contacts in your eyes. If you use contacts, remove them as soon as possible if an accident occurs.
- Due to the danger from chemical spills, you have to dress appropriately for lab.
  a. A lab coat is required.
  b. Fully enclosed shoes are also required.
  c. Shorts and nylon stockings are discouraged.
  d. The clothing you wear to lab should be close-fitting. Billowy sleeves are more likely to catch on things, causing a potential for breaks or spills.
- Long hair must be tied back to keep it out of chemicals.
- Know the location of the eyewash, shower and fire extinguisher. Know how and when to use them.
- Know the proper methods for disposal of all wastes:
  a. Solid wastes go into the crock in the cabinet hood.
b. Liquid organic wastes go in the appropriately labeled bottle in the cabinet hood. Do not overfill the organic waste bottle!

c. Broken glass **MUST** be deposited **ONLY** in the appropriately marked boxes. Due to the danger of broken glass, the custodians will not collect paper trash containing glass.

d. **Only** non-chemical non-glass waste goes in the garbage cans.

e. Only wash water solutions should go down the drain. Care must be taken to ensure that water solutions of heavy metals and water solutions having pH values greater than 9 and less than 6 do not go down the drain.

- Be considerate of your fellow workers. Clean up chemical spills immediately, including drips on reagent bottles. Most of the chemical burns that occur in our courses originate from spills. Proper lab technique includes cleaning up spills *immediately*.

- Never leave an experiment in progress unattended, especially if heating is involved. Should you need to leave the lab while an experiment is in progress, get your instructor or a neighbor to keep watch over your reaction while you are gone.

- Nearly all organic compounds are flammable; therefore, flames are prohibited in our organic labs. You must also remember that highly volatile compounds, like ether and acetone, can be set on fire by heating devices.

- Aisles must be kept free of obstructions, such as backpacks.

- Never fill a pipet by mouth suction.

- Avoid contamination of reagents.

- Use the cabinet hoods when so instructed.

- Do not use any glass containers, such as beakers or crystallizing dishes, to get ice out of the ice machine. If it breaks, it is impossible to see the glass shards in the ice, and a fellow student could get seriously cut if they put their hand in. Use the plastic scoops attached to the ice machine.

- The faucets for the deionized water are necessarily made out of plastic. Treat them with some gentleness!

- Should any accident or injury occur to you or one of your neighbors, notify your instructor immediately so he/she can help minimize problems. If you get acid on your skin, start washing with water even before asking questions.

- Immediately report any hazardous conditions to your instructor.

- Immediately report defective equipment to the instructor so that it can be repaired.
Student Conduct & Academic Integrity

Behavior in this course is governed by the University's *Code of Academic Integrity* and *Student Code of Conduct*. Copies are available from the University's Dean of Students Office (Old Main) and from the Department of Chemistry’s Teaching Support Office (Koffler/CBS 201). The guiding principle of academic integrity is that a student's submitted work must be the student's own work. In this course, students sometimes work in groups to collect experimental data and to analyze their results. This can lead to misunderstandings regarding academic integrity. The following is expected.

* You will adhere to all rules and regulations regarding safe laboratory practices as detailed in the lab manual, in the “Student Safety Agreement”, and by the instructor. Failure to do so may be considered a code of conduct violation and can result in expulsion from lab.
* Each and every scheduled lab period, you will actively participate in the performance of experiments and collection of data. Failure to perform two or more weeks of experimental work will result in a failing grade.
* If you perform a lab in another TA's class, it is your responsibility to prove that you did perform the experiment. This is accomplished by having the TA in whose lab you work sign your notebook entries. If you do not do this, your TA will not accept your lab report.
* Lab reports are individual efforts. You are to submit your own, original work for all assignments. In those cases when you work with other students collecting and analyzing data, you must indicate in your report which data are yours and who provided any other results you present. Failure to attribute laboratory results to the person responsible for collecting the data is an academic integrity violation. Likewise, group analyses must be so identified. Submission of any material that is substantially the same as some other written document (e.g. another report, a journal article, a textbook) and is not properly attributed constitutes an academic integrity violation.

Special Needs and Accommodations Statement

Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, http://drc.arizona.edu/. You must register and request that the Center or DRC send me official notification of your accommodations needs as soon as possible. Please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. The need for accommodations must be documented by the appropriate office.

Confidentiality of Student Records

http://www.registrar.arizona.edu/ferpa/default.htm

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.