CHEMISTRY 4311W
Advanced Organic Chemistry Laboratory – 4 credits
University of Minnesota, Department of Chemistry
Fall Semester 2016
Further Course Information on Moodle

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1. Getting Started/Communication

1.1 COURSE OBJECTIVE:
Acquire and demonstrate the skills necessary to achieve success when engaged in undergraduate directed research at the University of Minnesota, when pursuing graduate studies in chemistry or allied fields, or as an employee in industrial or academic chemistry labs.

1.2 GOALS:
- Learn and appreciate relevant chemistry concepts.
- Develop your capacities for critical and independent thinking.
- Plan, implement, and optimize laboratory procedures in the area of organic chemistry synthesis, including the preparation, purification, and spectroscopic characterization of compounds.
- Learn and become proficient in computer-aided tools for literature retrieval, as well as for data acquisition and analysis.
- Communicate your experimental results and conclusions in a clear, accurate, and concise manner, with accepted scientific format and terminology. (Note: this is a writing-intensive course).

1.3 INSTRUCTOR/CONTACT INFORMATION:
Professor George Barany, 435 Smith Hall, 612-625-1028 (direct line and voice mail), barany@umn.edu [please provide clear subject lines that make it obvious to me that your message is related to this course, Chem 4311]. I try to visit the lab most days and am available for private office meetings as needed [please use e-mail to set up appointments].

1.4 TEACHING ASSISTANTS/CONTACT INFORMATION:
Sean Ross (rossx636@umn.edu), Matthew Porter (porte622@umn.edu), and Yuanxian Wang (wang4174@umn.edu). Outside of the laboratory, the TAs can be reached at the given e-mail addresses. These knowledgeable TAs are integral to the success of the course. They will attend lectures and contribute to the discussion; they will supervise the laboratories including to provide instructions for use of equipment; to consult on techniques and procedures; to demonstrate software and internet resources, etc.; and they will grade notebooks and reports. Occasionally, issues arise that cannot be resolved directly with your TA or your instructor – in such cases, please contact Head Organic Chemistry TA Sarah Wegwerth (wegw0013@umn.edu).

While you are encouraged to be independent for most laboratory procedures, you will need to check in with your TA on each and every working day as you enter the lab, and check out with your TA as you leave that same day. In addition, certain experimental procedures and setups require TA approval and/or participation because of safety considerations. Finally, in the unfortunate circumstance that your experiment results in a spill, breakage, or any other sort of accident, you must inform your TA immediately so that a safe resolution, including cleanup, can be achieved.

1.5 STOCKROOM:
Patrick Schildt (schi0246@umn.edu) is the Lab Service Coordinator. The teaching stockroom, 595 Kolthoff, is staffed each day that we meet, from 12:20 – 4:25P.M. The stockroom attendants is Jessica Jannusch (jjanusc@umn.edu).

1.6 MOODLE/E-MAIL:
The course Moodle site (moodle.umn.edu) will be kept current, and each time an update is made, you will find out about it from me during lecture and/or in an e-mail announcement. E-mail is considered the official communication tool of the University of Minnesota, and you are expected to check your @umn.edu email account at least twice daily. As necessary, I will use e-mail to convey announcements, clarifications, and other information that are important for you to know about. Technical point: In order to preserve the privacy of individual students, e-mails are sent to myself, and the
email accounts of the entire class roster are pasted into the bcc (blind carbon copy) field.

Cost: $86.25 (new), $64.75 (used), $51.75 (new rental), $43.15 (used rental) or $38.25 (e-book, 180 day subscription) from the University bookstore. The book is also available through amazon.com. While not optimal, it is probably OK to use an earlier edition.

1.8 LAB MANUAL: Procedures are provided to you in a timely manner [in-class handouts and/or Moodle]

2. Grades and References

2.1 GRADING:

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<td>Lab Report 3</td>
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<td>Lab “citizenship” (i.e., safety, cleanliness)</td>
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<td><strong>Total:</strong></td>
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*There are no mid-semester exams and no final exam associated with this course.* Grading of lab reports, and other assessments, are carried out in a self-consistent manner by each TA for the cohort of students s/he is responsible for. Please let us know, at the beginning of the semester, if your preferred name and gender pronoun is different from that provided in the official University of Minnesota class roster.

The overall course grades will use the +/- system. The basic letter grades are defined by the University of Minnesota Senate as follows:

**A**: Achievement that is outstanding relative to level necessary to meet course requirements.

**B**: Achievement that is significantly above level necessary to meet course requirements.

**C**: Achievement that meets the course requirements in every respect.

**D**: Achievement that is worthy of credit, though it fails to meet fully the course requirements.

**F**: Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an “I” (incomplete).

It is hoped that every student will successfully complete and pass this course. If, however, it becomes necessary to drop, you must officially withdraw from the course following the rules for your college.
2.2 ENRICHMENT OPTION: Some students will be able to complete all assigned work, including their Final Report, on an accelerated timeline. If this applies to you, please meet with your instructor and TA in order to plan a realistic program of additional experimental work that you can carry out during the final month of the semester. Your results will be reported in an Enrichment Bonus Report, due on the day your checkout. Some of this work will challenge you to conduct yourself with a higher degree of independence, and you are encouraged to try more speculative approaches for which we cannot “guarantee” success. Students who pursue the enrichment option conscientiously will get a “bump” in their letter grade, e.g., from B’ to A-. Students already carrying out work meriting the maximum grade of A, who also pursue the enrichment option, can expect an enthusiastic reference letter when applying for future opportunities.

2.3 REFERENCE LETTERS: A number of students come back to me several months or even several years after completing the course with requests that I write reference letters in support of their applications for jobs, professional schools, or honors. If you anticipate making such a request at a future date, please retain all of your returned, graded labs to show to me at the time of your request. This is necessary due to a University of Minnesota policy that requires me to destroy all grade records after one year.

3. Expectations

3.1 CREDITS AND WORKLOAD: One credit is normally defined as equivalent to an average (over a full semester) of three hours of learning effort per week necessary for an average student to achieve an average grade in the course. This particular 4-credit course meets for one hour of lecture and ten hours of lab per week [many students can complete their day’s work in less than five hours]. Technically, that leaves only another hour per week outside of the classroom and lab, but in practice, a student who will achieve an average grade might spend an additional five hours per week on preparations, reading, calculations, data analyses, and writing reports. Most students who will achieve an above-average grade devote even more time to this course. Reminder: There is no final exam, so that also allows you to increase the number of hours per week.

3.2 DUE DATES, ABSENCES, AND LATE WORK The majority of the points that determine your letter grade are based on three mid-semester reports and a Final Report that are turned in to your TA at the beginning of the appropriate lab session. Due dates and other relevant information are provided at the end of this Syllabus. Work that is turned in late will be given a 3% deduction for every day that it is late. However, the deadline for the Final Report cannot be extended; most students will submit it on the day that they checkout. It will be accepted up to the last day of instruction for the semester, Wednesday, December 14 (with no penalty). The TAs will grade work and return it to you in a timely manner, following which you may want to meet your TA and/or instructor for follow-up discussions about how you can improve your performance with the experimental work, as well as how it is written up.

We are not in a position to schedule makeup lab sessions. Legitimate absences such as major illness and/or family emergencies that affect a student’s ability to complete all assigned work will be considered on a case-by-case basis, and handled in a fair manner. See the following website for relevant University of Minnesota policies:
http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html

3.3 REPORTS / NOTEBOOKS / COMPUTER SOFTWARE / WEBSITES: An important part of being a capable chemist is the clear communication of your results to other chemists. There will be several reports due, each more sophisticated than the previous. Therefore, this course is considered “writing-intensive.” We provide a handout detailing what kind of information should appear in reports, including formatting issues, as well as what goes into a good laboratory notebook. Assignments and reports are turned in directly to your TA at the beginning of the lab period, and there is a modest penalty for late work.
Another important part of this course is to gain experience and competence with the use of computerized tools that allow you to access information about chemicals, draw structures, process spectroscopic data, etc. These include ChemDraw, Reaxys, SciFinder, and Web of Science, among others. We provide a detailed handout [different depending on whether you use PC or Mac] that specifies programs for you to download onto your own laptop, as well as useful websites that the University of Minnesota has licensed for student and staff access. [Important note: Off-campus access to some of these programs and websites requires a virtual privacy network (VPN), and we also provide instructions on how to do this]. Programs are set up both in our laboratory and in the Chemistry Department Student Microcomputer lab [101D Smith; http://chem.umn.edu/academics/resources/microcomputer-facility; open Monday – Thursday, 9:00 A.M. – 9:00 P.M.; Friday, 9:00 A.M. – 5:00 P.M.; Saturday, 11:00 A.M. – 4:00 P.M.], Daniel MacEwan (chemcaim@umn.edu), Computer-Aided Instruction Manager.

3.4 SCHOLASTIC DISHONESTY:

You are expected to do your own academic work and cite sources as necessary. Failure to do so is considered scholastic dishonesty, and includes plagiarizing [which means misrepresenting as your own work any part of work done by another]; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)

As a general matter of University of Minnesota policy, “a student who has been determined to have cheated may be given an “F” or an “N” for the course, and may face additional sanctions from the University.” For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html

Specifically with respect to this laboratory course, there have been (thankfully, not many) occasions in the past when two or three students submitted work that was identical in some portions. This is not acceptable, and results in a severe grade penalty. Your data, interpretations, graphics, etc., must be your own.

The Office for Student Conduct and Academic Integrity has compiled a useful list of FAQs: http://www1.umn.edu/oscai/integrity/student/index.html

The University of Minnesota policies continue with: “If you have additional questions, please clarify with your instructor for the course.” In the context of this class, you are not allowed to collaborate on the specifics of assignments, but you are allowed (in fact are even encouraged) to consult with your TA and classmates about more general aspects. On the reports that you turn in, it is absolutely necessary that you follow standard chemistry protocols for citing sources, be they written or on the internet, for the experimental procedures followed, for your interpretations of data, and for previously published work in the field that provides background and puts your own contributions into perspective.

3.5 STUDENT CONDUCT CODE:

The University of Minnesota seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.
As a student at the University of Minnesota, you are expected to adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf

Note that the conduct code specifically addresses disruptive classroom conduct, which means “engaging in behavior that substantially or repeatedly interrupts either the instructor’s ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities.” Obviously, these considerations extend to our laboratories.

3.6 USE OF PERSONAL ELECTRONIC DEVICES:

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

The potential question about electronic devices during exams is not relevant to this course, but we have no restrictions on your use of electronic aids or computers inside and outside of the classroom and the lab as a way for you to access information, take notes, and process your data. It is unacceptable to use electronic devices or computers for any purpose unrelated to our learning goals, e.g., checking your Facebook page, texting your friends, or watching YouTube clips or complete TV shows or movies, etc., etc. [don’t laugh, I have seen students do all of these during class]. Also, the ringers on your cell phones should be turned to mute or vibrate, and if you happen to like Sudoku, KenKen, or (especially) crossword puzzles, I will be happy to provide you with some, but please do not insult me or your fellow students who are here to learn by solving such puzzles during class time.

4. SAFETY

You must have approved safety goggles on at all times in order to protect your eyes, and you must wear appropriate clothing and shoes that minimize exposed skin. Specifically, we do not absolutely require, but strongly recommend, that you wear a lab coat. Food and beverages are not allowed in the laboratory. You should not be listening to music while working, not even with headphones. If you receive a cell-phone call, please conduct your conversation outside of the laboratory, e.g., in the hallway.

Before you are allowed to run your first experiment, you must complete three on-line safety quizzes, “Introduction to Research Safety,” “Chemical Safety,” “Chemical Waste Management” that are found at http://www.dehs.umn.edu/training_newlabsafety.htm, and submit to your TA the relevant printouts documenting your name and score [this requirement is waived if you can document having passed these previously, e.g., if you are carrying out directed research in the Chemistry Department]. The due dates for this are Monday, September 12 and Tuesday, September 13, at the start of the lab period.

Any student found performing unauthorized experiments or behaving in an unsafe manner may be removed from the laboratory at any time. The instructors determine whether or not behavior is unsafe, and this includes failure to respond to instructions in a timely manner. Depending on the circumstances, removal from the laboratory may be as short as the remainder of the current lab period or as long as the entire remainder of the course.
5. Personal Support and Responsibilities

5.1 DISABILITY SERVICES:
The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 or go to https://diversity.umn.edu/disability/ to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course.

5.2 MENTAL HEALTH AND STRESS MANAGEMENT:
As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu/

5.3 ADDITIONAL UNIVERSITY POLICIES / HELPFUL WEBSITES:
Appropriate Student Use of Class Notes and Course Materials:
http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html

Diversity Resources:
http://chem.umn.edu/about-us/diversity

Equity, Diversity, Equal Opportunity and Affirmative Action:
http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf

Sexual Harassment:
http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf

Student Conflict Resolution Center:
http://www.sos.umn.edu/index.html
6. Course Meetings/Due Dates/Calendar

6.1 LECTURE:

**Tuesday, 12:20 – 1:10 P.M., 331 Smith Hall.** The purpose of the lecture period is to announce and discuss specific and general aspects of the subject matter, and to distribute all course handouts. While attendance is not taken, it is very much in your best interests to be present for all lecture sessions. Note that occasional pop quizzes given during the lecture period will be factored into your grade.

**Additional Lectures.** For each of the first three weeks of the course, we will have a mandatory bonus lecture/recitation. Bring along your laptop computer to the indicated rooms at the indicated times. There, you will be shown how to use various software and internet resources that are essential for your success in this course.

**Supplementary Lectures**

**Wednesdays (Kolthoff 140)**
- September 7, 3:30 – 5:15 P.M.
- September 14, 3:30 – 5:15 P.M.
- September 21, 3:30 – 5:15 P.M.

**Thursdays (Smith 100)**
- September 8, 3:30 – 5:15 P.M.
- September 15, 3:30 – 5:15 P.M.
- September 22, 3:30 – 5:15 P.M.

6.2 LABORATORY / STOCKROOM:

Our experimental work is carried out in 591 (instrument room), 593 and 594 Kolthoff (same level as the lecture room). You are assigned to either:

**Section 002:** Monday and Wednesday, 12:20 – 5:20 P.M. (TA: Sean Ross)

**Section 003:** Tuesday 1:25 – 6:25 P.M. and Thursday 12:20 – 5:20 P.M. (TAs: Mathew Porter and Yuanxian Wang)

Due to safety rules limiting the number of students in any given laboratory at a given time, you are allowed to work only within your assigned time period.
6.3 Assignments (with points), Due Dates, and Target Return Dates
(subject to change if unusual circumstances come up; see relevant policies in the Syllabus)

Lecture Begins
All, Tues, Sept 6

Check-in / Supplementary 1
Software demos and tour of spectroscopic facilities
M/W Wed, Sept 7 T/Th Thurs, Sept 8

Online safety modules due/computer software setup)

Safety modules (part of lab citizenship - safety quizzes must be completed before starting any lab work) 25 pts
M/W due Sept 12 (start of lab period) T/Th due Sept 13 (start of lab period)

Computer software setup 25 pts
M/W due Sept 12 (start of lab period) T/Th due Sept 13 (start of lab period)

Supplementary 2, Literature Searching, ChemDraw. Reaxys, SciFinder (and continue Experiment #1)
M/W Wed, Sept 14 T/Th Thurs, Sept 15

Supplementary 3 Advanced Literature Searching, Web of Science, Room (and continue Experiment #2)
M/W Wed, Sept 21 T/Th Thurs, Sept 22

Lab Closed (Thanksgiving)
M/W Wed, Nov 23 T/Th Thurs, Nov 24

Checkout M/W Dec 12 T/Th Dec 13

Notebook check 1 Weeks 3-8 Randomly checked at TA discretion during lab 25

Notebook check 2 Weeks 9-14 Randomly checked at TA discretion during lab 25

Spectra check 1 Weeks 3-8 Randomly checked at TA discretion during lab 25

Spectra check 2 Weeks 9-14 Randomly checked at TA discretion during lab 25

Class engagement Intermittent i.e., Pop quizzes, attendance, participation 50

Lab engagement Intermittent i.e., Attendance, participation 25

Overall lab technique Intermittent TA Observations 25

Experiment #1: Green Chemistry: Diels-Alder Reaction in Water Suggested up to 3 lab periods 100 pts

Start date: M/W Mon, Sept 12 T/Th Tues, Sept 13


Experiment #2: Compound Identification Suggested up to 3 lab periods 100 pts

Earliest start date:\ M/W Sept 19 T/Th Sept 20

Compound Identification: M/W due: Oct 10 T/Th due: Oct 11


Experiment #3: Amino Acid and Peptide Chemistry: Preparation and Characterization of Diketopiperazines Suggested up to 10 lab periods 250 pts

Earliest start date:\ M/W Sept 26 T/Th Sept 27

Draft report 3: M/W due: Oct 31, return: Nov 7 T/Th due: Nov 1, return: Nov 8


Experiment #4: Amino Acid and Peptide Chemistry: Hydantoins and Diketopiperazines Suggested up to 13 lab periods 300 pts

Earliest start date:\ M/W Oct 24 T/Th Oct 25

Draft report 4 (hard deadline*) M/W due: Nov 30, return: Dec 7 T/Th due: Dec 1, return: Dec 8

Final Report:\ All: due during your lab period on Dec 12 or Dec 13, or on Dec 14 to Barany office

TOTAL: 1000 pts

^ Suggested start date to stay on schedule

* Note that Draft Report 4 may include plans for experiments that have not yet been completed

* May turn in earlier

\ If you can commit to turning in Report #4 by Dec 5 (M/W) or Dec 6 (T/Th), you may begin experimental work for the Enrichment Option on Nov 16 (M/W) or Nov 17 (T/Th). Enrichment Bonus Report due no later than Dec 14 (both sections). 

* Please provide stamped, self-addressed envelope for return
6.4 Calendar:
Lecture each Tuesday, 12:20 – 1:10; Additional lecture dates noted on calendar - see § 6.1.

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Key: ○ - M/W due dates          □ - T/Th due dates

Suggested lab periods:
Experiment 1 - ..........................  
Experiment 2 - ..........................  
Experiment 3 - ..........................  
Experiment 4 - ..........................

Note that the schedule assumes overlap of labs, i.e finishing up one lab while starting the next.

7. Final Words

Excellence will be rewarded. Your grade is a function of your own diligence and efforts. The TAs and I work hard to provide every opportunity for each student in this class to be successful. The study of organic chemistry is not a competition. It is a learning experience. In terms of the laboratory experience: come prepared, work safely, be accurate, and keep your eyes open.