

**CHEM 2085**  
**Chemistry for the Life Sciences III, Lab**  
**Fall 2017**

---

**Instructor:** Dr. Angela Perkins  
**Email:** [aperkins@umn.edu](mailto:aperkins@umn.edu)

CHEM 2085 is the accompanying lab for CHEM 2081 (lecture), which is the third semester in a three-semester sequence of courses designed to provide a strong chemistry background for students pursuing degrees and careers in the life sciences. Upon completion of this course, the desired outcome is that the student (1) can identify, define, and solve problems; (2) can locate and critically evaluate information; (3) has mastered a body of knowledge and mode of inquiry; (4) can communicate effectively; and (5) has acquired the skills for effective and life-long learning.

**Required Course Materials:**

- Duplicating lab notebook, 75 - 100 pages in length. You may purchase the one from Hayden-McNeil that is sold in the bookstore with reference material printed on the covers or one from an independent supplier.
- Course content provided through the class Canvas site
- *"Laboratory Techniques in Organic Chemistry"*, by J.R. Mohrig, D.G. Alberg, G.E. Hofmeister, P.F. Schatz, and C.N Hammond, 4th Ed.; W.H. Freeman and Company, New York, **2014**.
- Approved splash proof goggles. The two options for goggles that can be found at the bookstore in Coffman Union are shown in the photos below. You may have already purchased these as they are the same that are required for CHEM 1065.
- Optional Materials: Though not required, it is recommended that a lab coat be worn to protect both you and your clothing while doing experimental work. The laboratory coat should be 100% cotton (not a polyester blend - check label carefully) and of the appropriate size so that sleeves do not extend beyond wrists. Laboratory coats are available for purchase in the medical section of the bookstore in Coffman Union for \$25-30. Try on the coats hanging on the racks to be sure to purchase the correct size.

**Course Information:** All information related to this course can be found on this Canvas site. All handouts, pre- and post-lab questions can be found on the appropriate page for each experiment. I will be using the Announcements function to send out any information that relates to the entire class. Using this function, also give you a place where you can find all communications coming from me related to lab that I send to the entire lab.

**Emails:** My email is the primary source of contacting me outside of lecture and lab. If you are ill or have an emergency situation, email me as soon as possible to let me know what the circumstances are so that I can best address the situation with you and your TA. Please copy or include the name of your TA on all relevant correspondences related to CHEM 2085. Additionally, please be respectful of my email and look at the course Canvas site for answers to common questions.

**Dress Code:** You must be wearing approved safety goggles and have all skin covered from the neck down in order to participate in the laboratory, short-sleeved shirts are fine, tank tops are not (shoulders must be covered). Additionally, pay careful attention to your feet; there should be no exposed skin around your feet and ankles. Your shoes need to fully cover your feet (no sandals, no ballet flats etc - and pairing socks with them does not make them allowable). If you do not come to lab dressed appropriately, with goggles, you will be asked to leave and will not have the opportunity to make-up the experiment.

**Attendance:** Attendance in lab, for the entire period is required. Missing more than 15 minutes of a lab period will be considered an absence.

**Withdrawls:** Because 2081 and 2085 are supposed to be taken concurrently, you cannot withdraw from one class without withdrawal from the other class. This policy is strictly enforced until **November 6th**. After 11/6, we assume that you have completed enough of one class to be able to carry forward if you choose to withdraw from the other class. If you have questions, please contact Dr. Perkins.

**Safety:** Each student is expected to follow all safety protocols/information found in the class and on the Canvas site. In addition, a contract confirming your understanding of the safety rules, waste handling, and other important protocols of the course will be given and your signature is required before any lab work can be performed.

Any student found performing unauthorized experiments or behaving in an unsafe manner in the laboratory may be removed from the laboratory at any time. Whether or not behavior is unsafe is at the discretion of the instructor, and this includes failure to properly respond to instructions in a timely manner. Removal from this laboratory may be for a period of time as short as the remainder of the current lab period or as long as the remainder of the course itself, depending on the circumstances.

**Waste Disposal:** It is extremely important that each and every student disposes of their chemicals in the proper manner according to the waste disposal instructions given at the end of every experiment. Improper handling of waste will lead to a point deduction from your preparation points for each lab, since you should know from your preparation how all your waste will be disposed. Repeated offenses will warrant removal from lab and a zero recorded for that day's experiment.

**Grading:** Your grade for this course will be based on the sum of the points earned from the following assignments. There is no extra points or individual extra credit that can be earned.

<b>Lab Reports:</b>	<b>250 points</b>
Extraction of Essential Oils	100 pts
Glucose Pentaacetate	150 pts

<b>Worksheets:</b>	<b>350 points</b>
Safety Contract	6
Yield Calculation	14
Biodiesel/IR Tutorial	30 pts
<sup>1</sup> H NMR	30 pts
Banana Oil	50 pts
Cinnamic Acid	40 pts
Thiamine	50 pts
Oxidation of Borneol	50 pts
Fluorescent Coumarin	40 pts
Iodination of Vanillin	40 pts

<b>Canvas Quizzes:</b>	<b>60 points</b>
<b>Notebook/Preparation</b>	<b>40 points</b>
<b>Discussions/Technique</b>	<b>50 points</b>

**TOTAL 750 points**

**Lab Reports:** All lab reports must be uploaded to the TurnItIn link found under the tab for the appropriate experiment. Lab reports must be uploaded to the TurnItIn link before the start of your lab meeting on the day it is due. You must also turn in a paper copy to your TA. Be sure to follow the directions given in the lab report guidelines to make sure that you turn in all information. A lab report will be deducted (10% per day) for failure to upload your formal report to TurnItIn on time.

All written work should represent your own original data (from your experimental notebook) and scientific interpretations. While all experiments are done in pair or groups, your lab report should be completed individually. On the page corresponding to each individual experiment you will find extra directions given for the specific lab reports.

**Worksheets:** For all non-lab report experiments, you will be given a worksheet with questions and data tables that you will need to fill in related to the experiment. These will be given to you in lab or can be found on the course website. You may also be asked to attach notebook pages or characterization data (IR or NMR spectra, UV traces, etc). These should be stapled to your worksheet to avoid separation. All worksheets will be due at the start of the lab on the day they are due as indicated by the course calendar (assignment due in green) or on the experiment page. It is your responsibility to make sure that your TA can understand and grade your work. Anything that is unclear or illegible will be given no credit.

**Notebook/Preparation:** You will be expected to maintain your own laboratory notebook IN INK containing all information even experiments done in pairs.

Notebook: Be sure to record all data into your lab notebook so that you can do any calculation or answer any questions on your own if you run out of time in lab. Your notebook should contain a thorough account of your experimental procedure so that someone else could use your notebook and repeat the experiment without getting the handout for the experiment. The calculations that you do should be present when important. You should also be sure to record all reading from equipment, i.e.: scales, thermometers, etc. For any printed off data (graph in excel, UV traces, NMR or IR spectra etc), you should be sure to hold onto as this will be collected with your worksheets.

For random experiments, your TA may collect your notebook pages for grading. Make sure that everything is legible.

For some experiments, you will be asked to compare the data from your experiment to those from another group who possibly started with slightly different materials, concentrations etc. In these instances, data will be uploaded to google documents or will be shared on the board in lab. You should make sure that you have access to this data for answering questions (written in your notebook or on a separate piece of paper), but the specifics of their procedures do not need to be in your notebook, but you should be aware of how their data is different.

Preparation: It is extremely important to come to lab prepared for each experiment. You can then work safely and efficiently and with understanding of the chemical principles and techniques being studied. Notebook preparation will be described in a handout the first day of lab (and posted to the course website). Your preparation for lab will be evaluated for random experiments by either collection of notebook pages or through a quiz at the start of lab. We are looking for proper data tables with information and proper outlining of the experiment.

**Discussion/Technique:** For many experiments that you perform in lab this semester, there will be an associated discussion that will be moderated by your TA but where you will be expected to provide answers. You will be asked to actively participate in these discussions. Some discussions will happen at the start of lab and as a group your lab section will discuss some of the details of the experiment. Other discussion sessions may happen at the end where you will be asked to present your experimental data so that your lab section can do a comparison and analyze the data. You will get

graded on your participation and contribution to these discussions so be sure to pay attention to what is going on and feel free to ask questions if you are looking for clarification.

Your TA will also be evaluating your participation in discussion and your technique most days in lab. This encompasses how well you are prepared, your ability to work confidently and efficiently in the lab, your attentiveness to safety, and your ability to properly dispose of waste. This will be worth 5 points each day. The average grade for this will be 3 out of 5 points.

**Canvas Quizzes:** There will be a quiz in Canvas for the first day of most experiments. These will be related to prelab readings that you are to do before coming to lab. These may be related to lab safety, techniques being used and specifics of an experiment. The experiment page for each experiment will tell you in the prelab preparation section if you have a quiz due. These quizzes will be due before the start of lab on the day indicated.

**Submitting Assignments:** Your assignments will be collected at the start of lab on the day that they are due. They should be turned in directly to your TA. Any assignment not turned in at the start of lab (first 5 minutes), will be considered late and 10% will be deducted from the score. Anything not submitted by the end of the lab period will be considered late work. See below for information about late work. If you are absent from lab on a day that an assignment is due, you have 24 hours to get your assignment submitted to your TA. Assignments can be left for your TA (by you or someone else), by submitting them into the lock box outside 115 Smith Hall. The box is marked with CHEM 1086/2085 (make sure it ends up in the correct box). You are responsible for getting it to the box within 24 hours **and** for emailing your TA that your assignment is in the box. This box should only be used if you are absent from lab or if you have approval from the instructor to submit work late as described below.

**Late Work:** In general, late work will NOT be accepted. However, under extreme circumstances late work MAY be accepted with penalty if cleared with instructor (Dr. Perkins). Approval for lab work must be requested by the day following the work due date. Please note that simply needing more time or having a busy schedule do not qualify as extreme circumstances. Please also note that there is a absolute deadline for ALL lab work corresponding to the last day of your lab section (Check-Out Day) and there will be absolutely NO work accepted after this deadline. See lab schedule for the last week of lab.

#### **Scholastic Dishonesty Policy:**

*"The College of Science and Engineering assumes that all students who enroll in its programs are serious about their education and expects them to be responsible individuals who demand of themselves high standards of honesty and good personal conduct"- College of Science and Engineering (<https://cse.umn.edu/r/scholastic-integrity/>)*

Any act of scholastic dishonesty is regarded as a serious offense and is not tolerated. As applied to CHEM 2085, this means that copying lab reports or falsifying data will not be tolerated, this includes chemical structures. Additionally, altering a piece of graded work and then submitting it for a regrade is also an act of scholastic dishonesty.

**Partner work** - Throughout the semester you may be asked to work in pairs or groups. It is expected that you will share data, but all interpretations should be your own. Be sure to reference any source materials that you used to answer questions, such as a textbook or Mohrig, and be careful to either rephrase in your own works or to correctly use quotation marks when appropriate.

**TurnItIn** - It is required that all lab reports for this course be submitted to the TurnItIn plagiarism prevention programs on the Moodle site. This program analyzes each report for content matching with data and reports from students currently in this course and Internet sources. Please note that the software not only recognizes text that is copied from another report but also ChemDraw files or graphics, which is not permitted.

**A student guilty of scholastic dishonesty will be awarded a grade of zero (0) for the assignment involved and the incident WILL be reported to the Office for Student Academic Integrity. In the case of serious or repeated offenses an "F" grade will be given for the course.**

**Policy Statements:**

**Overlapping and Back-to-Back Courses:** Enrolling in overlapping or back-to-back courses that do not allow for enough travel time to arrive at our class meetings on time is prohibited. For more information see: <http://policy.umn.edu/Policies/Education/Education/Overlappingclasses.html>

**Student Conduct Code:** As a student at the University you are expected to adhere to the Board of Regents Policy: Student Conduct Code. To review this policy see:

[http://regents.umn.edu/sites/regents.umn.edu/files/policies/Code\\_of\\_Conduct.pdf](http://regents.umn.edu/sites/regents.umn.edu/files/policies/Code_of_Conduct.pdf)

**Student 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 a student's 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/>.

**Teaching and Learning:** The materials provided in this course are intended only for the students officially enrolled in this section and are to be used to learn and practice the course material. Disseminating class notes, videos, exams, etc.... beyond the classroom community or accepting compensation (in the form of cash or trade, such as access to study website) undermines instructor interests in their intellectual property while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community and are not allowed. For additional information please see:

<http://policy.umn.edu/Policies/Education/Education/Studentresp.html>

**Sexual Harassment:**

<http://regents.umn.edu/sites/regents.umn.edu/files/policies/SexHarassment.pdf>

**Equity, Diversity, and Equal Opportunity:**

[http://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity_Diversity_EO_AA.pdf)

**Disability Resource Center:** Students with special needs should contact the Disability Resource Center, which will provide a letter to share with the instructor on how those needs shall be accommodated. <https://diversity.umn.edu/disability/>

**Lab Schedule:** The assignment due is listed. This does not include any prelab preparation that will need to be done for the start of a new experiment.

Week	Monday	Tuesday	Wednesday	Thursday
1 (9/4 - 9/8)	No lab	No lab	Check-In	Check-In
2 (9/11 - 9/15)	Biodiesel/IR Tutorial (Day #1) - pairs  Due: Safety Contract	Biodiesel/IR Tutorial (Day #1) - pairs  Due: Safety Contract	Biodiesel/IR Tutorial (Day #2) - pairs  Due: Yield Calc	Biodiesel/IR Tutorial (Day #2) - pairs  Due: Yield Calc
3 (9/18 - 9/22)	NMR Tutorial - pairs  Due: NMR #1	NMR Tutorial - pairs  Due: NMR #1	Banana Oil (Day #1) - individually	Banana Oil (Day #1) - individually
4 (9/25 - 9/29)	Banana Oil (Day #2) - individually  Due: Biodiesel	Banana Oil (Day #2) - individually  Due: Biodiesel	Banana Oil (Day #3) - individually  Due: NMR #2	Banana Oil (Day #3) - individually  Due: NMR #2
5 (10/2 - 10/6)	Dibromination of trans-Cinnamic Acid (Day #1) - individually	Dibromination of trans-Cinnamic Acid (Day #1) - individually	Dibromination of trans-Cinnamic Acid (Day #2) - individually	Dibromination of trans-Cinnamic Acid (Day #2) - individually
6 (10/9 - 10/13)	Extraction of Cloves (Day #1) - pairs	Extraction of Cloves (Day #1) - pairs	Extraction of Cloves (Day #2) - pairs  Due: Banana Oil	Extraction of Cloves (Day #2) - pairs  Due: Banana Oil
7 (10/16 - 10/20)	Make-up/Catch-up Lab  Due: Dibromination	Make-up/Catch-up Lab  Due: Dibromination	Thiamine (Day #1) - individually	Thiamine (Day #1) - individually
8 (10/23 - 10/27)	Thiamine (Day #2) - individually	Thiamine (Day #2) - individually	Oxidation of Borneol to Camphor (Day #1) - individually  Due: Cloves Extraction	Oxidation of Borneol to Camphor (Day #1) - individually  Due: Cloves Extraction

<b>9</b> <b>(10/30 - 11/3)</b>	<a href="#">Oxidation of Borneol to Camphor</a> (Day #2) - individually  <b>Due:</b> Any Make-up Work	<a href="#">Oxidation of Borneol to Camphor</a> (Day #2) - individually  <b>Due:</b> Any Make-up Work	<a href="#">Glucose Pentaacetate</a> (Day #1) - pairs (one does alpha and one beta)	<a href="#">Glucose Pentaacetate</a> (Day #1) - pairs (one does alpha and one beta)
<b>10</b> <b>(11/6 - 11/10)</b>	<a href="#">Glucose Pentaacetate</a> (Day #2) - pairs  <b>Due:</b> Thiamine	<a href="#">Glucose Pentaacetate</a> (Day #2) - pairs  <b>Due:</b> Thiamine	<a href="#">Glucose Pentaacetate</a> (Day #3) - pairs	<a href="#">Glucose Pentaacetate</a> (Day #3) - pairs
<b>11</b> <b>(11/13 - 11/17)</b>	<a href="#">Glucose Pentaacetate</a> (Day #4)  <b>Due:</b> Oxidation of Borneol	<a href="#">Glucose Pentaacetate</a> (Day #4)  <b>Due:</b> Oxidation of Borneol	<a href="#">Coumarin</a> (Day #1) - pairs	<a href="#">Coumarin</a> (Day #1) - pairs
<b>12</b> <b>(11/20 - 11/24)</b>	<a href="#">Coumarin</a> (Day #2) - pairs	<a href="#">Coumarin</a> (Day #2) - pairs	<b>No Lab</b>	<b>No Lab</b>
<b>13</b> <b>(11/27 - 12/1)</b>	<a href="#">Iodination of Vanillin</a> (Day #1) - pairs	<a href="#">Iodination of Vanillin</a> (Day #1) - pairs	<a href="#">Iodination of Vanillin</a> (Day #2) - pairs  <b>Due:</b> Glucose Pentaacetate	<a href="#">Iodination of Vanillin</a> (Day #2) - pairs  <b>Due:</b> Glucose Pentaacetate
<b>14</b> <b>(12/4 - 12/8)</b>	Make-up/Catch-up Lab  <b>Due:</b> Coumarin	Make-up/Catch-up Lab  <b>Due:</b> Coumarin	<b>No Lab</b>	<b>No Lab</b>
<b>15</b> <b>(12/11 - 12/15)</b>	Check-Out  <b>Due:</b> Vanillin	Check-Out  <b>Due:</b> Vanillin		

