

Course Syllabus

CH 205: Laboratory for Chemistry 202 (1 credit)

Prerequisite: CH 202

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Student learning outcomes: The successful learner will acquire the skills to use the techniques and equipment commonly found in the chemistry laboratory. Students in this course will reinforce what they are learning (or have learned) in CH 201/202 through hands-on experimentation and data collection.

Welcome to CH 205! Although working in a laboratory can be a challenging experience, there are several resources to help you: the CH 201/202 textbook, the Mole Hole, your TA, and your fellow students. We strongly encourage you to utilize these resources. Although you will be required to focus on the details, the key to understanding chemistry is to grasp the “big picture,” or how all the little things you are learning are parts of the complete description of how matter and energy interact.

Please check your ONID email account regularly. Occasionally important course updates are sent via email. You should also check your CH 205 Blackboard site often, since this is how you will access pre-laboratory quizzes, course documents, etc.

You will be given two hours and fifty minutes to complete a laboratory. Laboratories for this course have been tested, and the time allotted is more than enough for completion of the assigned tasks. Inability to perform the assigned tasks in the allotted time indicates a greater need for organization and preparation to be carried out by the student.

Upon check-in you will also be required to purchase a laboratory coat and goggles if you do not already own them. **We require you to wear your coat and goggles at all times in the laboratory.** Closed-toed, closed-backed shoes with rubber soles and pants are also necessary for entry into the laboratory. Students without proper protective equipment will be asked to leave until they return with proper equipment.

Week	Laboratory Activity	Points Allotted		What's Due?
		Quiz	Submission	
1	Spreadsheets	-----	10	Spreadsheets
2	Check in	4	---	—
	Green Crystal Synthesis 1			
3	Martin Luther King Holiday	-----		No lab meeting
4	Green Crystal Synthesis 2	4	26 [‡]	
5	Spectrophotometry part 1	4	26 [‡]	Coord. Cpd. 1 & 2
6	Spectrophotometry part 2	4	26 [‡]	Spec. 1
7	Iodine clock reaction part 1	4	—	Spec. 2
8	Iodine clock reaction part 2	4	56 [‡]	—
9	Preparation of a Solar Cell	4	26 [‡]	Rate Law (Full Report)
10	No laboratory - checkout	—	—	Solar Cell

[‡]Includes four points allotted to the laboratory notebook.

Pre-Laboratory Preparation

We would like students to come to the laboratory with a strong understanding of what they are setting out to accomplish. It is both for the safety of the student and the ease of instruction that we ask you to read the laboratory activities beforehand. Therefore, you will be given quizzes on the background and procedure prior to entering the laboratory. These quizzes will be available on the CH 205 Blackboard site, and **must be completed by 11:59 pm the day before your lab section meets**. Not only does this require you to read the procedure, it allows you to formulate questions about the laboratory activity as well.

Expectations for Experimentation

It is very important to arrive at your laboratory session on time. **Students arriving more than 10 minutes late will lose four points from their laboratory activity, and students arriving more than 30 minutes late will not be allowed into the laboratory and will receive a score of zero for their laboratory activity.**

Computers with built-in calculator software will be present for most laboratory activities, but you are encouraged to bring your own calculators to facilitate data processing. You **will not** be permitted to use the calculator on your phone while in the laboratory.

The Laboratory Notebook

For this course, you will be required to keep a running account of your experimental procedures in a laboratory notebook. **Before leaving the laboratory, you must have your TA initial your laboratory notebook. This will serve as your proof of attendance, and notebooks without TA initials will receive a score of zero for that laboratory activity.** TAs will not initial your notebook until your laboratory work area is clean and all equipment is cleaned and accounted for.

You will need to obtain a laboratory notebook with at least 50 numbered, duplicate pages. The notebook recommended for this course is *Roaring Spring #77646*. These notebooks are available at the OSU Beaver Store; they are usually found **upstairs** with the other notebooks.

The laboratory notebook is an essential part of the laboratory (in some cases serving as a legal document) and we feel it is very important for anyone continuing on in a career involving data management from multiple tools to know how to effectively write in a notebook. **Use a pen for writing in your laboratory notebook.** You do **not** need to re-write the entire procedure from this manual; rather, you should give a detailed running account such that someone reading your notes could recreate what you have done. Some things that should be included are:

1. Your name (and partner's name, if applicable).
2. The date the experiment was performed.
3. The title of the experiment.
4. Data and results, often organized in tables.
5. A record of observations, thoughts, and perhaps questions.

Other guidelines for the laboratory notebook:

6. Record observations in ink.
7. **Keep your own notebook, even when working in a group.**
8. Deletions are correctly made by placing a single line through the deleted material as in the example: Example.
9. Always take care when recording numerical values and include units! Remember, someone reading your notebook should be able to duplicate/understand what you have done.

Submissions

All submissions, unless otherwise noted, must be typed; handwritten submissions will not be graded.

For most laboratory activities you will be asked to perform calculations and complete the "For Submission" exercises that are to be handed in the following week. Some laboratory activities, however, will require a full laboratory report which should include:

1. An **Abstract** outlining the purpose of the experiment, the tests carried out, and the measured values obtained. Do not include details about errors that occurred, etc. This section is essentially a brief summary and should typically be around only four or five sentences in length.
2. A **Theory** section describing pertinent theory of the chemistry involved. This is where you should describe the underlying concepts of how the laboratory activity works. You could write this before you even do the experiment. This section should typically be about $\frac{1}{2}$ to one page in length at the most.
3. A **Procedure** section detailing what was actually done in the laboratory. In most cases, it will suffice to simply write something such as "All procedural information for this laboratory activity is described in the *CH 205 Laboratory Manual*, pages 33-36." There's no need for you to simply re-write the information contained in this manual. Specific masses etc. should be reported with data.
4. A **Data** section containing all measurements taken during the laboratory with proper units. This section should include things like well-organized tables and pertinent observations. This section should not contain calculated results (those belong in the following section); rather, it is a representation of the data and observations you collected during the laboratory activity. If you collected graphical data, the plots should be included here with titles and properly labeled axes. The length of this section will vary.
5. A **Calculations/Results** section containing one algebraic expression of each mathematical operation carried out followed directly by one example calculation. If several calculations were done the same way, you do not need to show a calculation for each. The results may be reported in a table. Be sure to include any measurements of error, if applicable.
6. A **Conclusions** section in which you provide a summary of the experiment and results. This should be more in depth than your abstract and will typically be about two paragraphs.
7. A **References** section because you didn't come up with the idea to run these tests on your own. In science, if you give credit where it is due, people will want to reference you too!

Making good art, in the form of graphs and tables, is an important scientific skill that will carry over well into all science-based disciplines. We ask that you adhere to these guidelines in making your typed report as readable as possible:

1. Please use no less than 11-point font in your typed reports.
2. For plots, please label all axes (include appropriate units) and include a title or a descriptive caption with a figure number.

Grading

The first laboratory activity is worth 10 points. Most other laboratory activities are worth 26 points: 22 for the submission and 4 for the notebook. You are required to do one fully-written-up report this term. The fully-written-up laboratory will be worth 56 points. If one of your absences is during the experiments for the fully-written-up laboratory, you will have to get data from your peers and credit them in your report. Your single lowest grade will be replaced by your average grade on other assignments of similar point values. Your final laboratory portfolio **must** include:

- The corresponding pre-laboratory quiz or quizzes
- The *Introduction to Spreadsheets, Equations, and Figures* activity
- The fully-written-up laboratory

Your TA should post your scores on Blackboard within one week of you turning in your submission. **If scores are still not posted after this time, please contact the Laboratory Instructor.**

Final grades will be based on the following standard distribution:

<i>Overall Percentage</i>	<i>Course Grade</i>
93.33 – 100.00	A
90.00 – 93.32	A–
86.66 – 89.99	B+
83.33 – 86.65	B
80.00 – 83.32	B–
76.66 – 79.99	C+
73.33 – 76.65	C
70.00 – 73.32	C–
66.66 – 69.99	D+
63.33 – 66.65	D
60.00 – 63.32	D–
<60.00	F

Due Dates and Absence from Laboratory

Laboratory assignments, other than the spreadsheets lab, are due by 6:00 pm one week after the day your laboratory section meets (generally it will be most convenient for you to submit your work directly to your TA in the laboratory the following week). **Any work submitted to a TA after 6:00 pm on the due date will receive a score of zero. No “make-up” laboratories are allowed.** Absence from the laboratory will result in a score of zero for that day’s activity. Only under extraordinary circumstances (hospitalization, death in the immediate family, etc.) will a student be granted an “excused” absence, and only then after it has been approved by the Laboratory Coordinator.

Academic Dishonesty

Collaboration is a key aspect of laboratory work, and we encourage you to work with fellow students in the laboratory. **All submitted materials, however, must be your own, individual work.** It will be assumed that identical papers indicate copying, and each individual paper will receive a grade of zero for all or part of the work. For more information on OSU's student conduct policies, please see: <http://oregonstate.edu/admin/stucon/achon.htm>

Laboratory Safety

Safety is our number one priority in the chemistry laboratory. Please read and follow all the safety instructions in this manual (see the following pages) as well as any supplementary instructions from your TA or instructor.

Environmental Impact

In CH 205 we seek to reduce the environmental impact of the course and implementing "green chemistry" practices whenever possible. You can do your part by following the chemical disposal guidelines described in each laboratory write-up. If you are ever unsure of how to dispose of a chemical please ask your TA for guidance.

Students with Disabilities

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting (email is preferred) the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541.737.4098.

Acknowledgements

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