

- Instructor:** Professor Todd A. Stone
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- Office:** Simon Hall 005A
- Office Hours:** Tuesdays and Thursdays, 10:15 – 11:15 PM in CH046
- Required Text:** Chemistry C117: Principles of Chemistry and Biochemistry I, Laboratory Manual, Seventh Ed., C. Reck, J. Robinson, T. Stone, and K. Arnold, Hayden-McNeil Publishing, Inc., Plymouth, MI.
- Website:** <http://courses.chem.indiana.edu/c117/default.asp>
- Course Objective:** To learn the fundamentals of proper laboratory technique and to apply this knowledge to the mastery of solving analytical problems.

Requirements

1. Attendance at laboratory lectures is **imperative and required**. Background information pertaining to the current laboratory assignment will be discussed in detail. Additionally, important experimental points will be addressed to allow more insight into the techniques that will be applied while performing the experiment.
2. Similar to lecture, attendance in lab is crucial. The laboratory accounts for 40% of the C117 course final grade. Missing more than two labs constitutes a substantial portion of the course, and ***students who miss three or more lab periods, fail to submit three or more lab reports, or any combination thereof will automatically fail C117.***
3. Student clickers are **required** for lecture participation. Often, questions similar to those posed in the lab manual will be introduced to reinforce scientific concepts. The points earned via clicker responses this semester will be used to assess student understanding of concepts and calculations necessary to successfully perform each experiment.
4. Before reporting to lab to begin an experiment, complete the prelaboratory assignment questions and submit them to the lab instructor. Students should demonstrate that the details of the current experiment are well understood before experimental work begins. To this end, the Introduction section of the final lab report should be completed before lab work is initiated, and **MUST be typed when submitted for grading.**
5. Prepare a formal laboratory report based on the experimental findings. All reports will be due the lab period following completion of an experiment, and **MUST be neatly prepared and typed** following the format outlined below. Students should also submit a copy of the original data collection page that was recorded in the lab notebook with the formal report. Staple it to the back of your formal laboratory report. ***In addition, print a copy of the C117 Lab Report Grading Rubric and attach it to the front of your report.*** The lab AI will use this to give valuable feedback.

6. To prevent plagiarism, the class will be making use of Indiana University's subscription to Turnitin.com. Each student will be expected to upload his or her formal laboratory report to Turnitin.com **before** arriving to the lab period in which the report is due. ***Students failing to submit a lab report to Turnitin.com by the time the scheduled lab period begins will lose 10% per day for that lab report assignment.*** For more information about instructions and procedures regarding Turnitin.com, consult the C117 website or your Associate Instructor.

Grading

The laboratory portion of this course accounts for ~40% of the C117 final grade.

<i>Assignment</i>	<i>Point Value</i>
<i>Lab Skills and Safety Exercise</i>	15
<i>11 Lab Lecture Participations – 4 points each (drop lowest)</i>	40
<i>11 Prelab Assignments – 7 points each (drop lowest)</i>	70
<i>11 Formal Laboratory Reports – 25 points each (drop lowest)</i>	250
<i>Lab Final Exam</i>	125
<i>Total</i>	500

NOTICE: Most laboratory assignments will be graded on a percentage basis and then converted to a point total. In other words, if you receive 70% on a formal laboratory report, this constitutes 17.5 points out of a possible 25 total. No grade changes on any assignments will be considered beyond one week from the assignment return date.

Laboratory Makeup Policies

No makeup laboratory sessions will be offered at any time or for any reason. NO EXCEPTIONS. The instructors realize that unforeseen events and illnesses do arise without warning. For this reason, the lowest scores on the lab lecture participation, prelab assignments, and lab reports are automatically dropped. This is a fair policy to all students, allowing absence from an assignment of each type without a grade penalty. **USE YOUR DROPS WISELY!**

Students are not allowed to attend other lab sections in order to make up labs, and no additional assignments will be dropped for any reason.

If you know you will be unable to attend a scheduled laboratory or lab lecture due to a University sanctioned event (*e.g.* Official IU functions, Religious holiday, etc.), it is **your** responsibility to make arrangements with the professor **beforehand**. You must notify the professor **at least one week in advance**.

Laboratory Rules

- **Appropriate attire must be worn at all times when performing experiments in a chemical laboratory. No shorts, short skirts, short shirts (bare midriffs), ties, flip flops, or sandals will be allowed. Long pants and closed toe shoes are required.** Students not meeting these requirements will not be permitted to enter the laboratory.
- **Safety goggles must be worn at all times when in the laboratory. The instructor is authorized to deduct 10% from your formal laboratory report score for EACH INFRACTION of this rule.** Persistent offenders will be expelled from the laboratory for the remainder of the experiment. Please note that the stockroom does not loan goggles, so students failing to bring protective eyewear must either purchase a new set or return to retrieve them.
- Contact lenses may trap chemical vapors near the eyes. For this reason, contacts should not be worn in the laboratory.
- If you have long hair, tie it back to prevent contact with chemicals on the benchtop.
- **Tardiness:** Students reporting late create inconveniences for instructors and stockroom personnel, and might miss important information provided at the beginning of the lab period. For this reason, 5% will be deducted from your formal report score for each 5 minute increment in which you are late to your lab section's scheduled start time. In addition to losing points, students arriving more than 15 minutes late will be forced to complete experiments alone, and will **NOT** be permitted to obtain data from other students in order to complete the experiment.
- Do not wait for an emergency to familiarize yourself with the location and proper operation of safety equipment in your laboratory.
- **Notify your AI IMMEDIATELY in the event of ANY chemical spill or injury, no matter how minor.** The associate instructor is trained to manage these situations and will help obtain the attention necessary to rectify the problem.

Academic Integrity

Students in this course are advised to become familiar with the *Code of Student Rights, Responsibilities, and Conduct*, a publication distributed by the Student Ethics Office. It is the professor's decision to determine, based on acquired evidence and student interviews, whether or not misconduct has occurred. Academic misconduct in C117 will be dealt with **SEVERELY**, and sanctions may range from deduction of points to a failing grade for the entire course. ***Plagiarism of laboratory assignments, collaboration on lab reports, fabricating data, cheating on an examination, and copying prelab assignments are all examples of academic misconduct. Infractions of these types will generally result in the maximum penalty being enforced, which is usually an academic F in this course.*** All cases of academic misconduct will be promptly reported to the Dean of Students as well as to the Dean or Director of the student's school.

Laboratory Schedule

The schedule of experiments as well as a listing of important announcements regarding course material is available on the website. Please check frequently for updated information, tips and advice on how to best perform experiments, and lecture note postings.

Keeping a Laboratory Notebook

The laboratory notebook is an extremely useful tool for record keeping, jotting down observations, and performing quick calculations. It is essential that the notebook is kept conscientiously to assure outstanding performance in this course. Lab notebooks must be a permanently bound record book, and all entries made in **permanent ink**. Neatness is critical to laboratory technique, and proper notebook documentation should reflect logical procedures and intelligible information not only to the student, but also to any trained analyst who would like to repeat the work or complete an unfinished investigation.

At no time should original data be altered, erased, or covered using white out. Errors in calculations or observations may be noted by drawing a single line through the offending information. The experimentalist should make a note to clarify why the particular datum or observation has been excluded.

In an effort to keep the lab notebook well organized, a table of contents and numbered pages are required. Each page upon which data has been collected and observations made should have the collection date as well as the initials of the instructor. Sign and date each page of collected data in the notebook. ***You must have your AI sign your data page before departing the laboratory.***

Other points to consider:

- Enter all data in a clear and organized manner. It may be useful to set up the data page before collecting experimental results.
- Clearly label all entries, **including units!**
- When instruments are used, record the brand, model, and serial number. It is crucial to document all parameters used to control the instrument and their values.
- Affix copies of all plots, spectra, or other significant items of scientific merit in the notebook.
- Show at least one example of each type of calculation involved in your final data analysis.

Lab Reports and Writing Skills for C117: Principles of Chemistry and Biochemistry I

One of the most important aspects of science is learning to communicate using both the written word and the oral tradition. Communicating the details of a scientific study – stating a theory or question to study, summarizing what is known about the system under study, describing the experimental details, providing the data from experiments, discussing the meaning of the results, and drawing a conclusion about what was learned in these series of experiments – is a critical part of the communication of science. Therefore, one of the objectives of this course is to develop your communication skills through the preparation of formal laboratory reports. In C117, the following format will be used:

Lab reports will be due ***at the beginning of the scheduled laboratory section immediately following the period in which the experiment has been performed.*** A penalty of 10% will be assessed for **each day the lab report is late.** There will be no exceptions to this policy for any reason. To assure that students are adequately prepared to perform experiments, portions of the laboratory report should be completed before the experiment commences. These sections will be comprised of the prelaboratory assignment and the lab report Introduction section. The Introduction **MUST** be typewritten. Each section of the formal laboratory report will be addressed further below.

In addition to the points described in detail below, all reports should be typewritten in a common 12 point font (like Times New Roman) with 1" margins. Page numbering should be included at the bottom and pages should be arranged in sequential order, taking care to include all sections of the report. Attach relevant graphs or plots that cannot otherwise be included within the body of text at the end of the report, and staple the pages together **neatly.** Each section will have an assigned total point value that will not vary between experiments. However, the allocation of those points within a specific section will be tailored to the specific demands of each individual laboratory experiment.

A sample laboratory report is provided on the course website for reference.

Formal Laboratory Report Sections

1. **Title** – Each report must be headed by the title of the experiment being performed, which is found in the C117 laboratory manual. The title should be centered at the top of the first page of the report. In addition, include your name, lab section meeting time, date, lab partner's name, and AI. See the sample report on the website for clarification.
2. **Introduction (20%)** – The *Merriam-Webster Online Dictionary* defines introduction as “a part of a book or treatise preliminary to the main portion.” The purpose of this section is to present a brief synopsis of the experiment that was performed and to describe reasons why it was believed the experiment was necessary. You must

- address reasons that would be answered by **doing** the lab, not by reading the lab text. **Simply copying or paraphrasing the lab manual is not acceptable.** Students must present relevant background, theory, and a logical objective for completing the work. If asked, "Why did you include this information in your introduction?" you should be able to defend your position.
- 3. Results (25%)** – Data (raw or refined) collected during the course of the experiment will be presented here in the form of charts, graphs, tables, etc. as appropriate. **Tables must be well organized, tidy, use appropriate labels and/or units, and given clear, descriptive titles.** All calculations required to arrive at experimentally important results will appear in this section. In the event that several similar calculations are needed (*e.g.* multiple runs of the same titration to calculate a molarity), it is sufficient to include one sample calculation. Please observe rules regarding the use of appropriate significant figures. Show an example for each different type of calculation you include in your report in this section. Also include **text** that describes observations, trends in the data, or other noteworthy information also. If it was required to generate plots or charts during the course of the experiment, a copy must be included in this section. **All plots must have a clear, descriptive title, axes must be labeled with appropriate units, and any linear regression analysis must be printed within the confines of the plot.** Results should not be interpreted in this section, but in the discussion section below. Any equations should be properly formatted using the *Equation Editor* feature in Microsoft Word to ensure ease of interpretation by readers of the report and to facilitate neatness.
 - 4. Discussion (40%)** – The discussion section is arguably the most important part of the laboratory report, in that it addresses the **interpretation of the results obtained above and their significance.** It is here that the experimentalist will describe what the results mean and what appropriate conclusions may be drawn from careful analysis of the data. Conclusions presented here should not be in list form, but written in carefully crafted paragraphs. One to two sentences simply won't do a report justice! If the experiment fails, don't despair! Even a disastrous experiment may be salvaged in the discussion if the reasons for experimental failure are discussed and improvements or suggestions are put forth. If results were inconclusive or you cannot draw a reasonable conclusion, state why this is so. **Equally important is a thorough discussion of sources of error inherent in the completion of the experiment.** For instance, why might a concentration be in error if a graduated cylinder was used instead of a volumetric pipette to measure volumes? Your AI can assist you in assessing the error associated with balances, burettes, thermometers, and various pieces of glassware that will be used in the C117 laboratory. **The "Points to Consider" at the end of the each experiment in the lab manual are intended to guide you in writing the discussion. Make certain you have answered these questions as well within your formal report.**
 - 5. References** – To cite external sources throughout the report, endnotes must be used. Complete bibliographic information should be listed in the endnotes for all references in APA style. ***Remember, it is not sufficient to simply list references at***

the end of a report without properly indicating where the borrowed material within the text occurs!!! A link to APA style and citations is provided on the course website. It is the duty of all scientists to properly cite material obtained from outside sources, ***including journals, websites, the C117 lab manual, or other resources! Failure to do so invokes severe consequences!***

6. **Writing Quality (15%)** – The ability to clearly relate scientific findings to the greater community is essential in chemistry. Therefore, **points will be deducted if your writing lacks clarity, grammatical correctness, punctuation, or contains misspelled words. The accepted standard for scientific papers is use of third person (do not use “I”, “we”, etc.) and past tense (since the experiment was already completed!).** Refrain from the use of tortured syntax, redundancy, or obvious conclusions such as “the goal of this experiment was to learn titration.” Instead, use more insightful comments like, “titration was used to assess water quality of a sample taken from a quarry containing limestone deposits...” **Before handing in your formal lab report, use the spell checker, attach all relevant data pages, and staple the pages together in numerical order.**

Notes about Plagiarism

All students must author their own lab reports, despite the fact that data will be collected with the aid of a lab partner. **Each student must complete all calculations and submit reports strictly on his or her own. Any evidence of copying or cheating will invoke strict penalties such as failure in this course with an academic F which cannot be removed from the academic record.**

Remember to properly reference any ideas, quotes, or statements that are not your own. Plagiarism is more than simply copying materials word for word – it is using another person’s ideas or phrases without giving credit to that person, warranting the most severe penalties. If you have questions about how to properly cite material, consult your AI.