SYLLABUS FOR HONORS GENERAL CHEMISTRY LABORATORY II
CHEM 1954

Course Description and Co-Requisites:

An introduction to the experimental techniques employed in the determination of the physical and chemical properties of matter. Three hours of laboratory per week. Co-Requisite: Chemistry 1952 is normally taken concurrently. Note: This course can be used to satisfy the university Core Science & Technology First Level (SA) requirement. To determine if this course in combination with another course can satisfy the GenEd Science & Technology requirement, see your advisor.

<table>
<thead>
<tr>
<th>Section</th>
<th>CRN</th>
<th>Day</th>
<th>Time</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>7228</td>
<td>Tuesday</td>
<td>2:00 – 4:50 pm</td>
<td>Dr. Andrew Price</td>
</tr>
</tbody>
</table>

Contact Information:

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Office</th>
<th>Email</th>
<th>Ext.</th>
<th>Office Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Andrew C.</td>
<td>BE 222C</td>
<td>acprice</td>
<td>1048</td>
<td>MWF 1:00-2:30, or by appointment</td>
</tr>
</tbody>
</table>

Course Goals: This course will concentrate on developing skills used in analytical chemistry and quantitative analysis and on demonstrating aspects of chemistry covered in the lecture course, Chemistry 1952. In addition to these goals, you will learn how to develop an experimental plan and to write a laboratory notebook and scientific reports.

Course Style: For most of the experiments you will not be given complete instructions; you will need to develop portions of the experiment yourself based upon your knowledge and your experimental skills. You will develop and improve upon your experimental skills and become more familiar with the Vernier LabQuest® system. You will receive instructions on how to write the lab reports and you will be required to answer several post-lab exercises that pertain to your results and the theory behind the experiment. To perform all the experiments effectively, it is essential that you do all of the background reading and prepare as well as possible prior to the laboratory. In some of the experiments, a portion of your grade will be determined by the quality of your results.

Drop/Add: During the first two weeks of the semester, students may only register for open Lab sections with permission from Dr. Price in consultation with the other instructors. The last day to drop a course without a record of the class appearing on the transcript is Monday, January 27th.

Withdrawal: In weeks three through eight of the semester, a student may withdraw only with their advisor’s permission. This is Temple University’s Policy (#02.10.14). There is no need to seek a lecturer’s or instructor’s signature. The course will be recorded on the transcript with the notation of “W,” indicating that the student withdrew. A student may withdraw from no more than five courses during his/her undergraduate career.
A student may not withdraw from the same course more than once. After week eight, students may not withdraw from courses and will receive a letter grade. The last day to withdraw from a course is Wednesday, March 18th.

Incompletees: An incomplete, or “I”, will only be given in accord with Temple University’s Policy (#03.12.13). An “I” cannot be assigned until the specific requirements have been met and the Agreement for Issuing an Incomplete form has been signed by the instructor and the student prior to submitting the form to the Dean’s Office or Dean’s Designee for final approval. To obtain an “I”, at least 50% of the work for the course must be completed, a student’s accumulated point total must be more than 75% of the total number of possible points, and there must be a valid reason acceptable to academic advising. For students who are assigned a grade of “I”, all previous scores will stand and will be used in the calculation of the final score and grade when the course is completed. No “I” designation may be requested after the final exam has been administered.

Course Materials:

1. **There is no lab manual for purchase.** The procedures and all relevant information for the lab experiments are posted on the Canvas site: CHEM 1954 Honors General Chemistry II Lab Spring 2020.

2. **Chemistry Top Bound Student Lab Notebook,** published by Hayden-McNeil; ISBN-13: 978-1930882003. This is required for all students enrolled in CHEM 1954 and can be purchased at the Temple University Bookstore or on Amazon. You may continue to use your lab notebook from last semester.

3. **Red Safety Book – General Guidelines for CST, Biology and Chemistry Labs.** All students enrolled in a lab course at Temple must purchase this book from the Ritter Hall copy center, room 234.

4. **Scientific Calculator** that includes exponential and log functions. Note that the possession, use and sharing of graphing and programmable calculators, cell phones and other digital devices is strictly prohibited when taking lab quizzes and exams.

5. **Safety Glasses or Safety Goggles.** These can be purchased at the Temple University Bookstore, or hardware stores such as Lowe’s or Home Depot, and must meet the ANSI Z.87.1 1989 requirements.

**Attendance and Make-up:** Labs will meet during the second week of the semester. Students are expected to attend all laboratory meetings, to arrive on time, and to be prepared. Students are required to attend their registered laboratory section at the scheduled time. Students who arrive more than 15 minutes late may not be admitted. Cell phones should be switched off during laboratory sessions and kept in bags/backpacks. The use of ear/head phones is not permitted. It is the student’s responsibility to note any announced schedule changes and their implications to graded work.

**Laboratory Absences:** If you are absent, you should contact your instructor by email ASAP (ideally in advance, but no more than 24 hours after the missed lab period). In order to be eligible to make up the missed experiment, a valid reason and documentation are required. Your instructor will decide if you can make up the missed experiment. Because each experiment is only available for 1 week during the semester, each experiment can only be made up during “its” week. If the student is ineligible for makeup, a score of zero will be reported for the missed lab. If the student is absent from two or more labs, the student should meet with his/her academic advisor to develop a “recovery plan” and/or discuss withdrawal from the course with their instructor.
**Inclement Weather:** The most accurate and up-to-date information can be obtained directly from the University’s home page. In the event of a cancellation, it should be assumed that any exams or graded work will be due at the next class meeting unless otherwise stated.

**Grading and Grades:**

<table>
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<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Lab Reports (9, ~70 pts each)</td>
<td>600</td>
</tr>
<tr>
<td>Pre-Lab Quizzes (best of 10, 10 pts each)</td>
<td>100</td>
</tr>
<tr>
<td>Lab Notebook</td>
<td>50</td>
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<tr>
<td>Lab Exam</td>
<td>150</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>900</strong></td>
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Approximate grades (as a percent) as are follows. **Note that this grading scale may change depending on the class average.**

- A or A–: 90 – 100
- B+ or B or B–: 80 – 89
- C+ or C or C–: 70 – 79
- D: 60 – 69
- F: 0 – 59

It is important to understand that the lab course is separate from the lecture course. Therefore, grading is independent of the lecture, and a separate letter grade is assigned for Chemistry 1954.

If lab reports are submitted on time and in the proper format, every effort will be made to return them no more than two weeks later. Lab report scores will be posted in the gradebook on Canvas. Students should verify that the posted scores are correct. If there is a discrepancy, the scores recorded in Canvas prevail unless the work can be produced. It is the student’s responsibility to submit work directly to me and to collect it when returned.

If the scoring of a lab report is disputed, the student must contact me to resolve the issue within two weeks after the assignment was returned. After the two-week window, your instructor has no obligation to consider grade disputes. Students should confirm scores with me before the last class meeting to ensure there are no transcription errors.

If the student disputes the course letter grade, he/she must contact me within 6 months of the close of the semester. Grade changes are warranted only if there was an error in the calculation of the grade and must be approved by the Dean’s Office.

**Cheating:** Students are expected to adhere to the highest standards of academic honesty. Collaboration and discussion are encouraged, but all lab reports are to be written in the student’s own words. Teamwork is a critical part of some lab experiments; each student is expected to perform an equal share of the experimental work, and each group of students is responsible for writing their own lab reports. Cheating of any kind is not tolerated, see **Student Code of Conduct**.

**Student Rights and Responsibilities:** The University has a policy: **Student and Faculty Academic Rights and Responsibilities**. Temple University is a community of scholars in which freedom of inquiry and expression is valued. Each member of the University community is expected to have respect for the rights of others, to conduct one’s self in a manner that is compatible with the University’s mission, and to take responsibility for one’s actions. To fulfill its functions of promoting and disseminating knowledge, the University has authority and responsibility for maintaining order and for taking appropriate action, including, without limitation, exclusion of those who disrupt the educational process. Please refer to the Student Code of Conduct.
Help: Take full advantage of all of the academic support services available at Temple University. These include my office hours, and the Student Success Center, SSC, Tuttleman Learning Center, Suite 100.

Disability: Any student who has a need for accommodation based on the impact of a disability should contact me to discuss the specific situation as soon as possible. Contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to arrange reasonable accommodations for students with documented disabilities, DRS.

Preparation, Assignments and Important Information:

Quizzes and Exams: Students are not allowed to have cell phones or other digital devices on their persons while taking a quiz or an exam. Cell phones/digital devices are to be placed in bags/backpacks. Students who are caught using cell phones and other digital devices during a quiz or exam will leave the room and will receive a score of zero. This violation will be reported to the Dean and the Vice-Provost who will then take the appropriate disciplinary action. Only pens/pencils and scientific calculators (non-programmable and non-graphing) are allowed.

Laboratory Meetings and Lab Reports:

- Before attending a laboratory session, you should read the laboratory experiment and any relevant background reading prior to lab. Be prepared to ask questions about the experiment. It is strongly recommended that you write something in your lab notebook that will enable you to perform the experiments without consulting the experimental procedures that are posted on Canvas. You may not carry the printed copy of the experimental procedure into the lab (unless otherwise specified by the instructor). Lab work must be done by consulting only your lab notebook. You will not be allowed to refer to any other books or papers in the lab unless specified by the instructor. Printed-out procedures may not be posted into lab notebooks.

- Be prepared for a lab quiz which will be administered during the first 5-10 minutes of the lab period. You may refer to your lab notebook while taking the quiz. Adequate preparation is required for your safety as well as the safety of your fellow students. Lab quizzes are worth 11% of the total number of points for the course. Your best 10 quiz scores will count towards your final grade. Students with consistently low scores on lab quizzes will likely earn a C-level grade in the course.

- The pre-lab lectures and demonstrations are an integral part of the course and may take up to 30 minutes. For some of the experiments the material that is being presented by your instructor may complement that of the lecture component of this course. There may be several occasions when material that you are responsible for in the lecture course will only be covered by reading the background information and performing the experiments. During the pre-lab lecture, you may be given information on how to perform the laboratory more efficiently. Therefore, you must be prepared to listen carefully, remain alert, and take notes in your lab notebook.

- In the case of some lab experiments, a post-laboratory meeting may be held before the end of the scheduled lab meeting. Attendance is mandatory at these meetings.

- Complete and bring a printed copy of the required laboratory report or other assignments from the previous experiment. All lab reports must be handed in before the lab quiz begins, otherwise points will be deducted from that lab grade. Instructions on the information that is required in your report will be available on Canvas.
and explained by your instructor during the pre-lab lectures. For some of the lab reports, you will use a template that will be available for you to download from the Canvas course site. All formatting guidelines should be followed explicitly, otherwise points will be deducted.

- For all the experiments, you will be assigned a lab partner to work with. You will work with different lab partners on different experiments during the course of the semester. One lab report will be submitted per group. The number of students in one group may be 2 or 3. All students in the same group will receive the same lab report score. It is expected that all members of the same group contribute equally to the preparation of the lab report. **However, If you feel that you are part of a dysfunctional group whose members cannot meet in a timely manner to work on the report together, then you can submit your own (individual) report. Please notify your instructor if this is the case.**

- Most lab reports are due two weeks after an experiment is completed, at the beginning of the lab period. Lab reports are considered late if handed in after the lab quiz has started. After that time a penalty of 10 points will be deducted from your lab report grade for each day that the report is late. Late lab reports should be delivered directly to your instructor. If you leave your report in a mailbox, under an office door, or give it to a third party, then you will be held responsible if it is lost or delayed. If you are unable to directly deliver your lab report, please retain a copy and email your instructor requesting that he/she check his mailbox or office. If you make up a lab, you will be required to hand in your lab report on the date prescribed.

**The Laboratory Notebook:** Your laboratory notebook is a permanent record of all your experimental work in the laboratory and your observations and data from each experiment. The following guidelines will help you develop a format, which, while unique to this course, will serve as a basis for all future work.

- Most of the laboratory experimental procedures, tables, safety notes, etc., must be written in your laboratory notebook before you carry out the experiment. Because you may modify your experimental procedure during the laboratory session, additional procedures or data tables may be put in the notebook during the lab.

- You may not carry the printed copy of the experimental procedure into the lab (unless otherwise specified by the instructor). Lab work must be done by consulting only your lab notebook. You will not be allowed to refer to any other books or papers in the lab unless specified by the instructor. Printed-out procedures may not be posted into lab notebooks.

- The laboratory notebook serves several functions. It is a reminder of the important steps of a procedure. Therefore, you should, prior to lab, record a summary of the procedure to be used in the form of an outline. This will help you to become familiar with the procedure before performing it, to formulate questions you may have about the process, and to remind you of the techniques used to collect the data. Any procedural changes announced prior to or during the lab should also be recorded.

- The notebook is a record of all your observations and data. Observations, and sometimes your thoughts and conclusions about these observations, may be written in concise, abbreviated sentences. Other data should be written in the form of tables when possible. Ideally, these tables should be made prior to lab. Tables should read vertically with sufficient room for data from multiple trials.

- All observations and data should be recorded in your notebook in black or dark blue ink. Under no circumstances should you write data on scrap paper. Write down all extra data in your notebook; do not
trust your memory. Label everything in your notebook with proper units. If some data is misreported, do not obliterate like this: 34.52. Instead draw a single line though it, like this: 34.52. You will often find that "bad" results were acceptable or explainable after all. Record the raw and calculated numbers using the appropriate number of significant figures.

• In industrial and academic research, the laboratory notebook serves as a legal document for the purposes of patents, publications, and even the source of evidence for malpractice suits. Thus, it must be a bound notebook and written in ink.

• The notebook is your personal record. It should be orderly, complete, and reasonably neat; however, it need not be "a work of art". The organization of a notebook is facilitated by a table of contents in the front of the notebook, which should be updated weekly.

• If you do not understand any part of the experimental procedure, ask about it. You will be a safer and more efficient lab worker if you enter the lab with a thorough understanding of the work you are going to do.

Setting Up Your Lab Notebook:

• On the top part of the outside cover of your notebook print your name, CHEM 1954, your laboratory day (Tuesday) and your section number (see page 1). Use a label or a taped “sticky note”.

• Be sure to place the periodic table between the yellow “copy” page and the page the follows it in order to prevent bleed through.

• Each notebook page should have the experiment number, experiment title, date when the lab experiment was performed, your name, your lab partner’s name, course number and section number. Before leaving the lab, you should have your instructor sign and date in the “witness/TA” boxes before you leave the lab. Carefully remove (note perforation) the yellow copy page(s), staple them together (if more than one), and give them to your instructor before leaving the lab.

• On the inside cover you should see a Table of Contents. During the semester fill in the information in the columns for each laboratory experiment.

• Each laboratory experiment should be started on a new page.

• As stated above, you should write something in your lab notebook that will enable you to answer questions on the pre-lab quiz and to perform the experiments without consulting the experimental procedures that are posted on Canvas. Summarizing the background information and outlining the procedure in your own words is strongly recommended.

• During the experiment you should record all observations and data and include any relevant calculations. Try to group the data together so it is easy for you and the instructor to read. Use titles such as “Calculations” or “Data” for various sections of information. Always put data in tables. You can leave some space between the sections.

• Do not add information from a current experiment to a page dated earlier.

• If you have any empty pages, put a cross through them.
Laboratory Safety and Chemical Hygiene: Students are required to conduct themselves professionally and in a safe manner, as outlined in the safety release form that you must sign and file with your instructor. Students who are acting unprofessionally or unsafely will be ejected from the lab without the possibility of a make-up. In order to comply with Federal Laws and OSHA regulations, students are required to come to lab dressed properly.

- Long pants must be worn. Shorts, skirts, dresses, etc. are not permitted in the lab at any time. Arms should be covered to the elbow and midriffs should not be exposed. Long hair should be tied back.

- All students are required to wear a full-length lab coat (provided in lab) at all times for all experiments.

- Shoes/sneakers that cover the entire foot should be worn. Flats, sandals, clogs, open-top, or open-toe shoes are not permitted in the lab at any time.

- Students must absolutely wear a pair of ANSI Z87.1 approved safety goggles or glasses the entire time they are in the laboratory. The Chemistry Department does not keep spare goggles/glasses to lend to students. It is the students’ responsibility to bring their goggles with them to the lab meeting.

- Students who come to class dressed improperly or without goggles/glasses will not be permitted to work in the lab and will be told to leave the laboratory by the lab instructor and/or Dr. Price and/or any other faculty member in the Chemistry Department.

- Neatness and cleanliness are important for everyone’s safety in the laboratory. The cleanliness of your work area is your responsibility. The cleanliness of the entire lab, particularly balance areas, sinks and fume hoods, is the responsibility of the entire class. If the lab is not left clean and neat, the responsible individuals or the entire class may have their grade lowered.
<table>
<thead>
<tr>
<th>Date</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 14</td>
<td>No Lab. See Expt. 1 for assignment.</td>
</tr>
<tr>
<td>Jan 21</td>
<td>Expt. 1 – Intermolecular Forces and the Determination of Enthalpy of Vaporization</td>
</tr>
<tr>
<td>Jan 28</td>
<td>Expt. 2 – Gibbs Free Energy of a Dissolution Reaction</td>
</tr>
<tr>
<td>Feb 4</td>
<td>Expt. 3 – Equilibrium and Le Châtelier’s Principle</td>
</tr>
<tr>
<td>Feb 11</td>
<td>Expt. 4 – Acids, Bases, Salts and Buffers</td>
</tr>
<tr>
<td>Feb 18</td>
<td>Expt. 5 – Acid-Base Titration Curves: Determination of pK_a and pK_b of Weak Acids and Bases</td>
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<tr>
<td>Feb 25</td>
<td>Expt. 5 (continued)</td>
</tr>
<tr>
<td>Mar 3</td>
<td>SPRING BREAK</td>
</tr>
<tr>
<td>Mar 10</td>
<td>Expt. 6 – Determination of K_{sp} for a Metal Hydroxide</td>
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<td>Mar 17</td>
<td>Expt. 7 – Determination of Molar Mass by Freezing Point Depression</td>
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<tr>
<td>Mar 24</td>
<td>Expt. 7 (continued)</td>
</tr>
<tr>
<td>Mar 31</td>
<td>Expt. 8 – Kinetics: Determination of Reaction Order, Rate Constant and Activation Energy</td>
</tr>
<tr>
<td>Apr 7</td>
<td>Expt. 8 (continued)</td>
</tr>
<tr>
<td>Apr 14</td>
<td>Expt. 9 – Electrochemical Cells</td>
</tr>
<tr>
<td>Apr 21</td>
<td>Lab Final Exam (details provided in early-April)</td>
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</tbody>
</table>

Note that it may be necessary to alter the course schedule due to inclement weather or for instructional purposes. It is the student’s responsibility to take note of any announced changes.