CHEM 1212K Lab Syllabus, Fall 2015

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The Freshman Chemistry Program welcomes you to our courses and the fifth floor of Clough Commons. Our goals are to help you experience chemistry firsthand, develop practical skills and knowledge, and apply principles from lecture to real scientific data and observations. The policies and procedures described herein are designed to ensure safety and fairness in the Freshman Chemistry courses, the enrollment of which can exceed 1500 students in some semesters.

The text for the laboratory portion of CHEM 1212K is the 2015-2016 edition of a custom lab manual from Hayden-McNeil, "Chemistry 1211K/1212K Lab Manual - Chemical Principles I & II" that is available in the bookstore.

Labs meet once a week for 3 hours. Lab times are Monday through Friday 12 – 3 pm, 3 – 6 pm, or 7 – 10 pm. ***Lab attendance is mandatory.*** For more details, please see the Lab Policies/Rules outlined below.

I. Lab Structure – For each lab experiment you need to complete the following.

1. **Pre-lab:** Knowing what you're doing in the lab and why you're doing it helps you be safe and efficient. Read the experiment, answer the pre-lab questions (legibly) on tear-out sheets and bring those sheets to the lab. Your completed pre-lab is your "entrance pass" to begin an experiment—you will not be allowed into lab without a completed pre-lab.
2. **Lab:** This is the fun part! Investigate the topic of study according to instructions in the lab manual, recording data in your laboratory notebook. Neatness is important here! Carbon copies of your lab notebook pages must be turned in at the end of the lab period, but keep the originals in your lab notebook. To earn credit for a pre-lab and lab report, it is necessary to attend lab and collect your own data; *using another students' data without attending lab is prohibited*.
3. **Post-Lab:** The data you collect during an experiment will display interesting patterns, which reflect deep chemical phenomena. The goal of post-lab work is to expose these patterns and communicate their significance. Reports will build as the semester progresses to help you develop proficiency in writing all the sections of a scientific report. See the end of the syllabus for an overview of the sections due with each lab report, and note that important ideas for each section are included on the lab T-Square site. **Reports are due at the *beginning* of the next lab period.**

   Lab reports will consist of one or more of the following sections. We will build to a full lab report as the semester progresses. *A T-Square announcement will tell you each week what sections are required in the lab report; a schedule at the end of this syllabus also lists the sections of reports.*

   I. *Cover/Title Page*: Title, Name, Date, Section & TA, Lab Partner(s), and Honor.
   II. *Abstract:* This is a summary of the results obtained, their broader significance, and the major conclusions of the study.
   III. *Data and Results*: Observations and data (in tables) go here—student notes for the experiment will describe all results that should be reported. Sample calculations for calculated quantities should also appear in this section (student notes will describe these also). Sample calculations must be typed!
   IV. *Discussion*: Discuss significance of the experimental data and calculated results. Discuss any sources of possible errors. Answer all discussion questions in the lab manual.
   V. *Conclusion*: Lacking all the messy details of the discussion, conclusions are the broad ideas suggested by the data and results of the experiment. Unanswered questions and paths for additional study are also included here.
   VI. *References*: Please note that references should be placed *inline* in reports.[1] See the previous sentence for an example! Twenty points will be deducted from lab reports lacking references.

4. **Carbon copies from lab notebooks:** For us, carbon copies of your lab notebook pages serve as an empirical record of what happened in the lab. They are an essential piece of the scientific argument at the root of each of your lab reports, and a lab report without notebook pages is unconvincing. Carbon copies of your notebook pages must be signed by your TA and turned in at the end of lab *on the day you complete the experiment*. It is your responsibility to obtain a signature on your notebook pages from your TA. Notebook pages without TA signatures are considered invalid (since they could have been fabricated). Late notebook pages will result in a loss of 10 points the first day and 2 points each day thereafter.

Lab Practicum/Quizzes: Twice a semester, combined practicum/quizzes will be given at the beginning of lab (see the attached schedule). These assessments will address your technique directly by requiring you to carry out operations from

[1] Evans, M. *How to Write Awesome Lab Reports*, 2nd ed.; Georgia Institute of Technology: Atlanta, 2013.

past experiments and will also test your understanding of lab-related concepts. If you require ADAPTS accommodations for a lab practicum/quiz, please let Dr. Evans know at least *one week* in advance of your lab practicum/quiz.

II. Lab Grades – Lab grades represent 22.5% of your overall course grade. You must achieve a 60% in lab to be considered passing the whole class. **Please see your TA as soon as possible if you fall below a 60% in lab**. There are 12 experiments, 12 pre-labs, 12 post-lab reports, 1 safety quiz, and 1 assignment during the week of Labor Day (Data & Results Practice). Your lab grade will be calculated as a percentage out of 1560 points. Note that your lowest total experiment score—the sum of your pre-lab and lab report scores for an experiment—will be dropped in the calculation of your lab grade.

Assignment (#)	Points/Assignment	Total
Pre-labs (12)	10	120
Lab Reports (12)	90	1080
Safety Quiz (1)	50	50
D & R Practice (1)	100	100
Lab Quizzes (2)	90	180
Technique & Safety (13)	10	130
Dropped Experiment (1)		–100
TOTAL		*1560*

Professional scientists have their own way of communicating through writing, and learning this style is an important goal of CHEM 1212K. Good scientific writing recognizes the importance (and limitations) of empirical data, acknowledges and connects to previous work, communicates theoretical ideas clearly and concisely, and relies heavily on figures and graphs. Scientific writing is a difficult skill to master, so don't kick yourself for struggling with it in CHEM 1212K! To demonstrate our expectations of your scientific writing skills, your post-lab report for Experiment 16 will be harshly critiqued. Half of the points you lose on this lab reports will be immediately returned to you.

Technique & Safety (T&S) Grade: Safe, efficient laboratory technique ensures the safety of those around you and leads to high-quality data (and post-lab reports that are easier to write). The "Technique & Safety" grade associated with each lab (10 points per lab) reflects the care you take in that lab to follow lab safety policies and work efficiently. Points will be docked for violations of lab policies, including a lack of gloves or glasses/goggles. The assignment of T&S grades will be at the discretion of your TA and the laboratory instructor; you may ask your TA for a copy of his/her T&S grading policy at any time.

III. Lab Participation

- Laboratory work is not a passive activity. We expect you to arrive ON TIME and prepared to do your work, having read the experiment.
- Your TA has worked hard to get the lab ready for you. Pay attention to details that the TA covers in the beginning of each lab session. To be successful in the lab, you'll need both theoretical and practical knowledge.
- You will probably work in pairs for most of your lab work. Be a good lab partner: distribute labor, check one another on issues of safety, and help one another understand the experiment.
- Safety in the laboratory is *the most important concern*. Do not do any unauthorized experiments, and use safe practice in the laboratory. Unsafe chemists are sloppy, inefficient, and (at worst) dangerous!

IV. Lab Reports

- You will be given general guidelines for report preparation in your lab and they may vary from week to week. At the very least, check T-square weekly for guidelines for your upcoming report.
- *You must prepare your own report individually* even if your data was obtained in conjunction with other student(s). See *Collaboration in Lab* below for more information.
- Each lab report is due at the *beginning* of the next lab period unless otherwise stated on the schedule below. A penalty of 10 points per school day will be assessed for each day that a report is late up to 7 school days. After 7 school days, lab reports will **NOT** be accepted—reports are worth 30 points after 7 school days and 0 points thereafter.
- Late reports should **NOT** be given to your TA. They must be turned in at the Freshman Chemistry stockroom in Clough 578. ***E-mail your TA to notify him/her that your report has been placed in the late box.***
- **Re-grade Policy:** Your TA grades your work based on a rubric provided by the Freshman Program faculty. If you have questions about why something was graded a certain way or what you can do to improve your lab report scores, talk with your TA first. You may submit a formal re-grade request to your TA if you have a specific concern. Re-grade requests must be submitted in writing or via e-mail within 7 days of the graded lab report being returned to you. To submit a re-grade request, either (a) attach a written description of your grievance to your lab report and give it to your TA or (b) send an email to your TA with specific information about why you believe the initial grading was incorrect. Freshman Program faculty should be contacted if you and your TA cannot reach a mutually agreeable decision. At meetings to discuss re-grades with faculty, both the student and TA must be present.

V. Collaboration in Lab

- We want you to have fun in lab and learn. Effective education is collaborative by nature. You may consult students, TA, faculty and staff as you learn chemistry.
- *However, your report of YOUR chemical findings must be your own!* This means that you must create your own data tables, results, plots, calculations, sample calculations, etc. on your own. Word processing makes it easy for lab partners to share figures and text using copy/paste. DO NOT DO THIS! The best way to learn the scientific method is to write your own lab reports from start to finish. Copying and pasting figures, tables, or text constitutes plagiarism and is a violation of the GT Honor Code.
- TA's are bound by the Honor Code to notify the Freshman Chemistry faculty of any suspected plagiarism of laboratory reports. If you are concerned about potential plagiarism associated with one of your reports, please consult your teaching assistant—do this before turning in your report! Honor Code violations will initially be addressed by the faculty of the Freshman Chemistry Program, and will only be referred to the Office of Student Integrity if a mutual agreement is not reached. For more information, please see the Georgia Tech Academic Honor Code (http://osi.gatech.edu/plugins/content/index.php?id=46).

Freshman Chemistry Lab Policies/Rules

Lab Safety

- Proper attire is required in lab at all times. *Anyone lacking appropriate dress is forbidden from entering the lab.* Proper attire includes...
    a. Close-toed shoes covering the entire foot.
    b. Long pants covering the entire leg. Capris are never in fashion in the chemistry lab. *While standing, no skin may be exposed below the waist.*
    c. A cotton lab coat.
    d. Safety glasses or goggles. *Eye protection must be donned immediately upon beginning work in the lab and may not be removed until you walk out the door.*
- Gloves must be worn in the laboratory throughout the duration of the day's experiment. Replace gloves that have become excessively sweaty or dirty—using many gloves is OK!
    a. Gloves should be donned just before beginning the day's experiment.
    b. To avoid contaminating us poor saps who work in Clough (and for other good reasons), gloves must be removed upon leaving the lab.
- Eating, drinking, and smoking are prohibited in the laboratory. The only thing entering one's body during the laboratory period should be a 78:21 mixture of $N_2(g)$ and $O_2(g)$.
- Cell phones may not be used in the laboratory, except in specific circumstances at the discretion of the teaching assistant. Students must consult their TAs prior to using a cell phone (including the use of apps) in the laboratory. Gloves must be removed prior to using a cell phone.
- All accidents, including minor spills, should be reported to the teaching assistant.
- At the end of the lab period, lab areas should be left clean (i.e., as they were when lab began). Hands should be washed before leaving the lab.
- Waste must be placed in appropriate containers. If you are in doubt about where to put a substance, ask the teaching assistant or lab coordinator.

Lab Materials

- Lab manual (see pg. 1).
- Lab notebook that makes carbonless copies. It does not have to be new.
- Lab coat, 100% cotton. You will need to buy a lab coat, as all labs at GT now require them.

Lab Attendance

Lab attendance is required except for excused absences. Your TA is in charge of granting you an excused absence, so if in doubt, ask your TA prior to a known absence. Excused absences include:

- Sporting events sanctioned by Georgia Tech.
- Cases in which the Dean of Students issues an excused absence. These are issued for true emergencies such as a severe injury, death in the family, etc. Visit the Dean of Students to apply for an excused absence in this case.
- Illness. Bring a doctor's note to your TA to verify your illness.
- Absences sanctioned by the Student Academic and Financial Affairs Committee (SAFAC). Contact the committee at least three weeks prior to a planned absence.

Fall 2015 Schedule of Labs

Week Of	*Experiment*	*Assignment(s) Due*
17-Aug	*No labs*	–
24-Aug	16 Paper Chromatography	Pre-lab 16; Safety Quiz
31-Aug	24 Kinetics of CV + NaOH	Pre-lab 24; report 16
7-Sep	*No experiment; attend lab to turn in report*	Report 24
14-Sep	17 Chemical Equilibrium & Beer's Law	Pre-lab 17; Data & Results Practice
22-Sep	18 Acids & Bases	Pre-lab 18; report 17
28-Sep	19 Buffers	Pre-lab 19; report 18
5-Oct	20 pH Titration; Lab Practicum/Quiz 1 (16, 24, 17)	Pre-lab 20; report 19
12-Oct	21 Thermodynamics of Borax Dissolution	Pre-lab 21 (W - F); report 20 (all)
19-Oct	25 Synthesis of Metal Oxalates	Pre-lab 25 (all); report 21 (W - F)
26-Oct	23 Electrochemistry	Pre-lab 23; report 25
2-Nov	26 Redox Titration	Pre-lab 26; report 23
9-Nov	28 Coordination Chemistry; Lab Practicum/Quiz 2 (18 - 21, 23)	Pre-lab 28; report 26
16-Nov	27 Acid Rain	Pre-lab 27; report 28
23-Nov	21 Thermodynamics of Borax Dissolution	Pre-lab 21 (M - T); report 27 (M - T)
30-Nov *(Dead Week)*	Checkout and Cleanup	Report 21 (M - T); report 27 (W - F)
7-Dec	*No labs*	–