**FALL 2015 CHEM 104: GENERAL INFORMATION AND SYLLABUS**

Prof. K. H. Theopold Lecture Section: 030 Lab Sections: 030L – 038L

OFFICE: 214 Lammot du Pont Lab Office hours: M,W.F: 11am - noon

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1. Lecture/Discussions/Laboratory

**Lecture**: Class meets TR, 2:00 – 3:15 PM, in BRL 101. PRS (i.e., clickers) will be used in class to assess comprehension.

**Discussions**: Discussion sections will be held at the following times and locations:

Mondays, 3:35 – 4:50 PM, in CLB 109 – Meredith Klabnik

Tuesdays, 11:00 AM – 12:15 PM, in QDH 024 – Nichol Reisher

Wednesdays, 3:35 – 4:50 PM, in CLB 109 – Abdullah Albalushi

Thursdays, 3:30 – 4:45 PM, in SHL 109 – Raaj Singh

Fridays, 8:40 – 9:55 AM, in BRL 205 – Nina Golojuch

Click on this link to enter your choice of which discussion session you will be attending. There is a limited number of spaces in each section. <https://docs.google.com/spreadsheets/d/1IJDTBe0NbjK2u2VQaQI49deKgJsLpZVK3JfxyEj_r9A/edit#gid=0>

**Laboratory**: Meets at the specified times in QDH 064. If you have previously completed the lab (satisfactorily), and wish to apply your prior lab grade to the present course, please see me ASAP (no later than 9/4/15).

**Credit by Exam**: Sign up ASAP. Exam to be given Th, 9/3, 7-10 PM. Meet at 204 BRL.

1. Course Material

**REQUIRED:**

**Textbook**: *Chemistry*; Open**stax** College, ISBN 978-1-938168-39-0. This e-book can be downloaded - **free of charge!** – at <https://www.openstaxcollege.org/textbooks/chemistry>

**Lab Manual**: M. E. Kramer, J. Wingrave, *Experiments for General Chemistry*, 3rd edition, UD Dept. of Chemistry & Biochemistry. ISBN 978-0-7380-4815-4

**PRS Device**: i – clicker (both the original i-clicker and the new i-clicker 2 will work)

**Lab Protection:**   Safety Goggles are **REQUIRED AT ALL TIMES IN THE LAB!**

**Long Pants, Shoes & Shirts with Sleeves Required.**  
**NO** **Shorts, Skirts, Sandals, Open-Toed Shoes or Bare midriffs.**

**Calculator**: a NON-PROGRAMMABLE, NON-GRAPHING CALCULATOR

1. Tentative Grading Scheme

Course: 3 Midterm Exams at 120 points each – 360 pts

14 Weekly Quizzes (lowest 3 scores dropped) – 80 pts,

11 Laboratory Experiments - 200 pts (see below)

1 Final Exam - 180 pts

~ 40 PRS (clicker) questions - 40 pts

2 CURE Surveys – 20 pts

TOTAL: 880pts

Laboratory: Each lab: Prelab Quiz 10 pts, Experiment 40 pts, Post Lab 10 pts. 60 pts total per lab. Sum of lab scores normalized to 200 pts toward final grade.

Letter Grade: I am unable to set absolute point cutoffs for specific grades. Accordingly, CHEM 104 will be graded ‘on a curve’ (see Wikipedia), meaning your final grade (based on the total of all points you have amassed) will depend on the grand average score of all students in the class. That average will be the B/C dividing line. Lest this sound too abstract, here are the grade cutoffs for last year’s class, as percentages of 880 pts (A > 72.4% > B > 60.0% > C > 47.8% > D > 35.4% > F). Disclaimer: these numbers are for guidance only and will likely be slightly different this semester. In effect this means that it is rare for students to actually ‘fail’ CHEM 104, but to get an A requires substantial and sustained effort.

1. General Information
2. **Lecture**
3. Lectures emphasize main themes and concepts. You are responsible for all related material in the textbook, even if it is not explicitly covered in class.
4. Read the relevant chapter in the textbook before coming to class. This will make the lectures more meaningful and will position you to ask questions.
5. Attendance is strongly encouraged (it is empirically known to enhance your performance in CHEM 104). In any event, you are responsible for all material covered during lecture, including announcements.
6. There will be three (3) exams given in class. Tentative exam dates:

**1**: 9/29 **2**: 10/29 **3**: 12/3

Bring a Photo-ID to the exam, to allow verification of your identity. Absolutely **NO USE OF CONNECTED DEVICES** (Phones, smart watches, etc.) during exams; violation will prompt immediate collection of your exam.

1. There will be NO MAKE – UP EXAMINATIONS. If one exam is missed and excused, the (prorated) score on the final will be substituted for the missed exam score. Additional missed exams will result in scores of zero (0).
2. You may find it useful to maintain a running list of chemical terms, symbols, and equations for review purposes. **You are allowed to prepare and use in any exam one (1) 4” x 6” index card, on which you can write equations, constants, and formulas of your choice.**
3. **Discussion Sections**
4. As a *new initiative during 15F*, CHEM 104-030 will have discussion sections held every day of the week. They will be conducted by undergraduate teacher’s assistants, who have previously taken CHEM 104 and have excelled in the class.
5. A frequent ‘complaint’ of CHEM 104 students has been that ‘numerical problem solving’ has not been emphasized enough in the lectures, while it plays a significant role in the exams. This is both true and unavoidable; because the lectures are meant to introduce concepts, there is not enough time to do lots of example problems – although we will do some. Therefore the discussion sections will emphasize problem solving. Old exams, problems from the textbook, or questions you might have will be discussed and explained.
6. Attendance of any discussion section is voluntary (not required). However, you will be asked to sign up for one discussion that fits into your schedule; to this end, please click on the link below to enter your selection.

<https://docs.google.com/spreadsheets/d/1IJDTBe0NbjK2u2VQaQI49deKgJsLpZVK3JfxyEj_r9A/edit#gid=0>

1. **Laboratory**
2. Labs begin in the week of Monday, Sept. 14.
3. SAFETY GOGGLES are required in the laboratory. You will NOT be admitted to the laboratory without a pair of approved splash goggles. You can purchase these at the bookstore.
4. Read the Experimental Procedure before coming to Lab! Make sure that you understand what you will be doing. Lab will begin with a short written quiz, followed by some relevant instructions by your TA.
5. Laboratory Work: Experiments will be performed in groups of 2 students (or on your own). No groups of 3 or more collaborators! All laboratory work, including calculations and results, is to be completed and turned in before you leave the lab.
6. Post Lab Assignments: Post lab assignments are follow up material to the lab that has just been completed. It is turned in before you leave the lab.
7. It is expected that all scheduled labs will be completed. If a lab must be missed, tell you lab instructor ahead of time if possible, and present a valid written excuse. If possible, arrange to do the experiment in another section that week (permission of that section’s TA is required). If a lab is missed because of an unexpected emergency, present a valid written excuse to the instructor upon your return. Missed labs CANNOT be made up and will be either EXCUSED or UNEXCUSED.

### EXCUSED LABS will not be counted in computing your lab average. An EXCUSED LAB must have a written excuse from a parent, doctor, or other responsible person. This should be given to your TA.

### B. UNEXCUSED LABS will result in a score of zero (0) for the lab, which will be counted in computing your lab grade.

### THERE WILL BE NO MAKE UP LAB SECTIONS. A significant number (>3) of missed labs (EXCUSED OR UNEXCUSED) will result in a grade of Incomplete (I) for CHEM 104. The latter can be converted into a passing grade only by doing all labs over in a subsequent term

**C. Sakai website**

1. The Sakai website for CHEM 104 can be accessed at: sakai.udel.edu/portal. Check it regularly!

2. ‘Announcements’ will be used to disseminate important information (e.g.

changes of schedule, etc.) to all participants in the class.

3. ‘Resources’ will be a repository of various materials that might be helpful to

you (such as copies of old exams, etc.) Some of these may be linked to in the

‘Home’ directory (e.g., the Lecture Capture files).

4. “Tests & Quizzes’ provides access to the weekly quizzes (see below).

5. ‘Forums’ are for the discussion amongst students (and occasional input from

the instructor) of chemical issues and problems arising during the class. Use

them to pose chemistry questions that are likely of general interest and concern, and if you know the answer to a question, chime in! If you ask me a chemistry question via e-mail, I may post it in a Forum. In general, my e-mail address should only be used for personal matters related to CHEM 104.

6. ‘i>clicker’ is where you register your clicker. No points without registration!

7. ‘Gradebook 2’ is where we keep track of all your scores.

8. ‘Chat Room’. The virtual ‘water cooler’; use it to share opinions,

information, chemistry gossip, etc., etc.

**D.** **Quizzes**

There will be a quiz due each Wednesday (except the week of Thanksgiving), dealing with the subject matter currently being discussed in class. Quizzes are accessed and submitted electronically on Sakai. You are allowed 3 submissions for each quiz and the highest score is automatically recorded. Quizzes are due by midnight on Wednesdays. If you do not take the quiz on time, you can still take it until midnight on Sunday of the same week, but you will only have one submission and it will be marked late.

There will be ~14 quizzes assigned throughout the semester. The 3 lowest scores will be dropped, and the best ~11 scores will be counted for a possible total of 80 points. Quizzes are an open book problem and learning situation. Their scheduling is designed to keep you current in CHEM 104. You may have to read ahead.

**E. CURE Surveys**

To aid me in making future versions of CHEM 104 as effective as possible, I am asking for your input in the form of two surveys (one pre-course and one post-course survey). These surveys do not ask chemistry questions, and your answers are not graded. However, to encourage participation, you will receive some points merely for taking the surveys. **Note**: To receive these points, you must send me a copy of your ‘proof of participation’, which you will receive upon completing each survey (the easiest way is to take a ‘screenshot’ and send it to me by e-mail). To receive credit, the **deadline** for sending me proof of participation is Sunday of the first week of class. For more information see: <https://www.grinnell.edu/academics/areas/psychology/assessments/cure-survey>.

The URLs for the surveys will be posted in the ‘Home’ directory of the Sakai site.

**F. Web Resources**: A place to go for more problems, information and some demos:

Purdue U:   <http://chemed.chem.purdue.edu/genchem/index.html>

### **G. Important Dates**

Tuesday, September 1 First CHEM 104 lecture

Monday, September 7: Labor Day. No classes or discussion sections

Monday, September 14: Labs begin

Tuesday, September 15 Last day of free drop/add

Tuesday, September 29: EXAM 1

Tuesday, October 27: Last day to change registration or withdraw

Thursday, October 29: EXAM 2

Thursday, December 3: EXAM 3

Friday, November 20: Thanksgiving break begins after classes end (10pm)

Monday, November 30: Classes resume after Thanksgiving break

Friday, December 11: Last day of classes

Monday, December 14: Final Exams begin

Saturday, December 19: Final Exams end

**H. EXAM REGRADING POLICY**

In large, multi – section classes, much of the grading of exams is done by the teaching assistants. This is a necessary practice and is supervised by the professor of the course. Nonetheless, inconsitencies in grading sometimes occur. There may be instances during the course of this semester where you believe that an error has been made in grading your work (our apologies), and the correction of the error would result in a higher grade for you. The purpose of my regrading policy is to address such situations.

If you believe that an error has been made in grading or totaling the score on your exam, you may submit the exam for regrading. To do so, attach a piece of paper to the front of the exam, which states which questions you would like to have me reconsider and return the entire exam at the next class meeting. DO NOT write on or alter the exam in any way! I will reconsider the questions, make any necessary adjustments to your grade, and return the exam to you in class at some future time. It is strongly recommended that you consult the posted answer keys (under ‘Resources’ on the Sakai site) before you submit your exam for regrading. I reserve the right to recheck the entire exam when you submit it for regrading.

IT IS A VIOLATION OF BOTH THIS POLICY AND THE UNIVERSITY OF DELAWARE POLICY ON ACADEMIC INTEGRITY TO CHANGE ANSWERS ON YOUR EXAM BEFORE SUBMITTING THE EXAM FOR REGRADING. Exams will be randomly photocopied and compared to any resubmitted work. Students who commit academic dishonesty in this, or any other way (e.g. copying from another student’s exam) will be prosecuted through the University of Delaware Student Judiciary System.

**I.** **CHEM 104 Course Learning Goals**

*(Numbers in parentheses indicate the departmental learning goals (http://www.udel.edu/chem/goals.html) with which each course goal is aligned.)*

**After successful completion of this course, a student should be able to:**

1. Describe key intermolecular forces and apply this knowledge in connecting molecular structures and physical properties of condensed states. (1)
2. Interpret/construct simple phase diagrams. (1)
3. Discuss the factors involved in solution formation and apply this knowledge in explaining/predicting the behavior of solutions; explain the effects that solutes have on solvent properties, and interpret experimental data/calculate predicted properties based on these effects. (1, 5)
4. Identify species as acids or bases according to various classification systems, and predict/interpret their chemical behavior according to these models (including gas phase, aqueous and nonaqueous solvent conditions); predict/rationalize pKa, pKb values for compounds based on molecular structure and inductive, resonance and steric effects. (1)
5. Explain the characteristic features of a system at equilibrium, evaluate a system’s status with respect to equilibrium, and interpret/predict/calculate the effects of perturbations of said equilibrium. (1)
6. Describe the basic features of structure determination through x-ray crystallography; know and apply the characteristics of simple unit cells and packing motifs in calculating/interpreting densities and packing efficiencies of crystalline solids; describe/explain/visualize common ionic structures and predict their occurrence using radius ratios; calculate/predict lattice energies for ionic compounds. (1)
7. Know the distinguishing features/common types/formulas of electrolytes; apply that knowledge in explaining/visualizing/predicting the molecular level behavior of such substances in solution; explain/predict/calculate the quantitative conductivity behavior of electrolytes in solution. (1)
8. Explain/apply the connection between electronic structure and periodic trends in the prediction/analysis of the physical and chemical behavior of elements and compounds. (1)
9. Describe the characteristic features of covalent bonding and explain/apply their relationship to physical properties; write/analyze Lewis structures and explain/predict molecular geometries and polarities for covalent compounds; explain/apply valence bond and molecular orbital theory in evaluating bonding in covalent molecules and extended solids. (1)
10. Describe empirical gas laws; explain/apply kinetic theory in the analysis/prediction of the behavior of ideal and real gases. (1)
11. Interpret/propose experiments and analyze kinetic data to determine reaction orders, rate laws, activation energies and mechanisms; explain/interpret/predict reaction mechanisms based on kinetic data, molecular structure and collision theory. (1, 5)
12. Explain the distinguishing features of voltaic and electrolytic cells, calculate cell potentials, and use/interpret reduction potential data to explain/predict chemical behavior; discuss key features of different types of batteries and electrolytic processes. (1)
13. Work together with other students in discussing ideas, evaluating information and formulating solutions to problems. (8)
14. Communicate ideas clearly and effectively in written and oral formats. (10)
15. Find and evaluate sources and information needed in solving problems. (3)