UNIVERSITY OF DELAWARE
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY
CHEM 103H SYLLABUS
(Sections 080, 081 and 082)

	Fall 2012
	SEMESTER/YEAR
CHEM 103H	Honors General Chemistry I
COURSE CODE	COURSE TITLE
3 3	4
LECTURE/LAB HOURS	CREDITS
Chemistry, 4th ed. by Olmsted & Williams*	
ISBN# 978-0-471-47811-9, Price: ~$220 (new)	Wiley
REQUIRED TEXT	PUBLISHER

***Note: *Chemistry*, 4th ed. by Olmsted & Williams can be purchased at a much-reduced price from several online used bookstores. Just search half.com or amazon.com with the ISBN above.**

ALEKS General Chemistry I Homework **	UD Bookstore or www.aleks.com
i>clicker (personal response remote)	UD Bookstore
Lab Manual	Posted in Sakai for printing
Laboratory Safety Goggles***	UD Bookstore
Calculator (preferably a TI-84 or similar)	UD Bookstore or other retailer
ADDITIONAL REQUIRED MATERIALS	AVAILABLE THROUGH

**If you purchase your ALEKS Homework access code through www.aleks.com, be sure to click the "Sign up now!" link under the login textbox, then enter the Course Code (provided by the instructor via email). It is recommended that you not purchase your ALEKS Homework until instructed to do so by the professor – refunds are not available for this product.

***Laboratory safety goggles are required. Safety glasses will not be acceptable.

15 Weeks	Dr. Meredith C. Wesolowski
LENGTH OF SEMESTER	PROFESSOR
BRL135 / 302-831-6251	mcw@udel.edu
OFFICE / PHONE	UD EMAIL ADDRESS

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LOCATIONS/TIMES

Class Meeting Times/Locations: All sections meet on M, W & F in Alison Hall West, Room 206.

Section 080: 10:10-11:00 am
Section 081: 11:15-12:05 pm
Section 082: 12:20-1:10 pm

Weekly Discussion Sections:

Weekly discussions will be held Wednesdays, 5-8 pm in GORE218 (excluding exam weeks). You will be assigned to a 5-6 pm, 6-7 pm or 7-8 pm discussion.

Laboratory Meeting Times (in Drake (QDH), Room 006):

Section 080L: R 9:30-12:30 pm
Section 081L: R 12:30-3:30 pm
Section 082L: R 3:30-6:30 pm
Section 083L: R 7:00-10:00 pm

Office Hours (Dr. Wes):

Room: BRL135
Day/Time: Every M & W from 2 – 4 pm or other times by appointment.

Out-of-Class Exam Dates/Time*:

Exam 1: October 3, 2012; 5-7 pm in SHL130
Exam 2: October 31, 2012; 5-7 pm in SHL130
Exam 3: November 28, 2012; 5-7 pm in SHL130
Final Exam: TBA

*All lecture sections will meet together for the four common out-of-class exams (see above). Individual arrangements for an examination will be made for students who have a legitimate academic or religious conflict with the scheduled exam time.

TA Office Hours and Contact Information

Complete the following during your first Laboratory meeting (Sept. 6, 2010). Your Laboratory TA will serve as your first line of contact regarding the laboratory component of the course. Please respect your lab TA both as a mentor and as a fellow student. Your TA possesses extensive background knowledge in chemistry that they will be happy to share with you as it relates to CHEM103H. Please keep in mind that your TA is also a student enrolled in graduate-level courses that demand much of their time outside of CHEM103H responsibilities. Please observe their office hours or email well in advance to make other meeting arrangements.

Laboratory Section and Time: _____

Teaching Assistant (TA): _____

TA Office: _____

TA Email Address: _____

TA Office Hours: _____

Laboratory Partner/Study Group Contact Information

Complete the following during the first week of laboratory or discussion. You will be assigned to a laboratory group (of 3 or 4 students) for the duration of the semester. It is highly recommended that you ask your group members for some or all of the following information.

Laboratory Group Members, Emails & Phone Numbers:

_____

_____

_____

It is also recommended that you form study groups outside of laboratory/discussion, as research shows students do their most productive and effective learning when working in peer groups. Additionally, a healthy competition between laboratory sections will take place during the course of the semester (culminating in semester-wide prizes), so helping to make sure members of your laboratory section keep up with course materials is in your best interest from both a learning and competitive standpoint. Blank lines are provided for you to fill in Study Group contact information:

Study Group Contact Information

_____

_____

_____

_____

COURSE DESCRIPTION AND LEARNING GOALS

CHEM 103H is the first half of an Honors general chemistry sequence designed for students majoring in engineering or sciences other than chemistry. CHEM 103H deals with somewhat fewer topics, on a more conceptual basis, than the majors' chemistry courses; it differs from the regular CHEM 103 offering in its small class size, its emphasis on active, collaborative learning, and a more rigorous, process-oriented laboratory program. The dominant theme of the course is the connection between the molecular level attributes of matter (elemental composition, atomic structure and electronic configurations, bonding, molecular structure and intermolecular forces) and the observable physical and chemical properties of individual substances.

Open to incoming first-year UDHP students only. Pre-requisite: one year of high school chemistry. Co-requisite: MATH 114 or higher.

Below is a list of learning goals for this course. Numbers in parentheses indicate alignment with departmental learning goals listed at http://www.udel.edu/chem/goals.html. After successful completion of this course, students should be able to:

1. Describe key historical ideas and interpret/evaluate experimental evidence related to the atomic model of matter and the physical structure of atoms. (1)
2. Use the Periodic Table and knowledge of electronic structure to determine/analyze/predict properties of atoms, ions and compounds. (1)
3. Set-up and solve quantitative problems that require use of dimensional analysis, scientific notation and significant figures. (1)

4. Recognize and apply fundamental stoichiometric relationships in analyzing and solving quantitative problems. (1)
5. Understand and apply the concept of dynamic equilibrium. (1)
6. Understand how electrical and magnetic forces can influence the motion of ions and sub-atomic particles, and how such forces are used for various physical techniques in the chemical sciences. (1)
7. Assign/interpret names and formulas for ionic/binary compounds, know charges of common mono- and polyatomic ions, and use in balanced equations. (1)
8. Use chemical formulae or structures to correctly name inorganic and simple organic chemical species (and vice versa). (1)
9. Recognize, describe, and identify various chemical reactions in aqueous solutions, including redox, single & double displacement, decomposition, combination, precipitation, and acid/base neutralization; be able to predict behavior of species and/or products of reactions based on activity series, solubility rules and other reactivity predictors (hard/soft ions, strong/weak acids/bases, etc.). (1)
10. Set-up and solve standard calculations for determining values such as percent composition, limiting reactant and percent yield; apply these calculations to chemical species/reactions presented in various forms. (1)
11. Describe empirical gas laws; explain/apply kinetic molecular theory to analysis/prediction of the behavior of ideal and real gases. (1)
12. Describe how various forms of energy are used to describe/analyze/predict a variety of chemical and physical changes. (1)
13. Describe/explain/apply key observations an concepts of quantum theory; explain/apply the electronic structures of one-electron and multi-electron atoms; describe the relationship between emission/absorption spectra and changes in energy states; understand relationship between electron pairing and magnetic properties of atoms. (1)
14. Describe the characteristic features of ionic bonding and explain/apply their connection to the physical and chemical properties of ionic compounds. (1)
15. Describe the characteristic features of covalent bonding and explain/apply their relationship to the physical and chemical properties of covalent compounds; 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 compounds and network solids. (1)
16. Describe the characteristic features of metallic bonding and explain/apply their relationship to the physical and chemical properties of metals and alloys. (1)
17. Describe the different kinds of intermolecular forces and how they compare to one another and to intramolecular forces. (1)
18. Recognize and apply the characteristics of simple unit cells and packing motifs in calculating/interpreting densities and packing efficiencies of crystalline solids. (1)
19. 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; identify which properties of solutions are substance-dependent and which are substance-independent. (1)
20. Work together with other students in discussing ideas, evaluating information and formulating solutions to problems. (8)
21. Communicate ideas in written and oral formats. (10)

In addition, after successful completion of the laboratory component of this course, students should be able to:

22. Use computers for data acquisition and analysis. (5)
23. Use selected instrumentation (Vernier probes, spectrophotometers, etc.) for chemical analysis and characterization. (6)
24. Develop an awareness of chemical safety and hygiene. (7)
25. Develop the ability to work effectively in teams. (8)
26. Develop the ability to present technical information clearly and concisely in a written report. (10)

RESOURCES

The University of Delaware provides a number of resources for students, some of which are described below. Part of any successful university education is being proactive about your learning, so use these resources to your advantage.

Chemistry Library – http://www2.lib.udel.edu/branches/chem.htm
This small but convenient library is located across the hall from the undergraduate lounge (in BRL202) on the second floor of Brown Laboratory and contains resources specific to chemistry and chemical education. You can also search the full UD library catalog from computers in the Chemistry Library.

Campus-Wide Library Information - http://www.lib.udel.edu/
If you are looking for information not found in the Chemistry Library, the link above will allow you to search all UD library resources, including online publications. Be sure to note which library a printed item is found in – there are five total libraries spread across the UD campus. You can also request items not in the University's collection via interlibrary loan from this site.

Computer Resources
UD offers a many computing services for students, many of which are summarized in their welcome page for new students: http://www.it.udel.edu/welcome It is recommended that you read through all of these pages to insure you are fully connected and protected within the UD network. In addition, students can find technical support information at the following link: http://www.udel.edu/help/

Academic Support - http://www.aec.udel.edu/
UD offers free academic assistance to all students through their Academic Enrichment Center (AEC). Services include free tutoring and academic workshops. Those interested in becoming a tutor or peer mentor should consider utilizing these resources during their freshman year so that personnel within the AEC become familiar with you and your interests (although this is not a requirement for hire by the AEC by any means).

Writing Support - http://www.english.udel.edu/wc/
UD offers free assistance to students through their Writing Center. Services range from help with initial organization of ideas to polishing a final draft. Those interested in becoming a Writing Center tutor should consider utilizing these resources during their freshman year so that personnel within the WC become familiar with you and your interests (although this is not a requirement for hire by the WC by any means).

TECHNOLOGY

Canvas

Most course information will be posted within the UD course management system, Canvas (http://udel.instructure.com/). Students will be expected to log into Canvas on a regular basis to access a variety of files and information, as well as submit work for some assignments. Types of work to be submitted through Canvas include (but are not limited to), laboratory group work, blog postings, pre-lab quizzes and electronic submissions of some written assignments. An overview of the tools available within Canvas for use in CHEM103H will be presented on the first day of class.

iClickers

You are required to purchase an i>clicker remote for in-class participation. i>clicker is a personal response system that allows you to respond to questions posed during class; you will be competing with your classmates based on responses registered by your i>clicker. **You will need to bring your i>clicker remote during the first day of class, Aug. 28, 2012** (and you will receive an email from the instructor about this in advance). In advance of the first day of class, you will be provided with directions for registering your clicker. Once your remote is registered, your name will be associated with your i>clicker for the entire semester. It is recommended that you label your i>clicker remote such that it is clearly identifiable as your property. If for some reason, you cannot register your i>clicker, you will need to meet with the instructor one-on-one by **Friday, August 31, 2012**. i>clickers will be used almost every day in class, and you are responsible for bringing your remote daily.

ALEKS

ALEKS is an adaptive content mastery (a.k.a. homework) system (http://www.aleks.com) that you are required to use during the semester. Upon your first login to ALEKS, the system will give you some basic instructions on how to use the ALEKS interface. It will then ask you a series of questions (25-30 total) to assess your background knowledge of General Chemistry and its pre-requisites (basic math and algebra). You should not use any resource materials outside of the ALEKS interface when taking the first assessment – should ALEKS initially over-estimate your background knowledge in math and chemistry due to use of outside materials, it will eventually correct for this and you will ultimately spend more time in ALEKS down the road. After completing the assessment, ALEKS will report the results to you and your instructor in a pie graph. You can then begin to work through course concepts to be mastered in the ALEKS "Learning Mode". Once in Learning Mode, ALEKS will help guide you through only those content items meeting the following two criteria:

A) You haven't yet mastered a specific content item previously.
B) You are ready to learn it, based on what you know already.

ALEKS will rarely ask you to "learn" material you already know, nor will it try to teach you things for which your foundational skills make you unlikely to succeed. At certain points throughout the semester, ALEKS will ask you to complete additional Assessments to see how well you mastered recently presented concepts, as well as determine what future concepts you may already know. Again, using only those resources available in the ALEKS interface during these assessments will ultimately save you time down the road. Periodically, ALEKS will ask you to review content, and you should heed its suggestions, as ALEKS is able to predict which topics you are most likely to miss on up-coming Assessments. Since ALEKS is adaptive, time spent working on ALEKS homework will vary widely among students. Remember that ALEKS is outcome-driven, not effort-driven; you will need to plan your schedule accordingly to allow enough time to complete your weekly ALEKS work. The instructor and Undergraduate Teacher Assistants (UTAs) will provide assistance with concepts presented to you by ALEKS. See note below for information on technical assistance with ALEKS.

Notes on ALEKS Technical Support and Plug-in:

1) ***No one at UD* can provide you with competent technical support for ALEKS** (not your TA, UTA or instructor, nor any members of the IT staff). They don't have the knowledge of the system, your OS, browser, JAVA version, etc. needed to do so. **ALEKS provides rapid and competent technical support and can be contacted directly by visiting** http://support.aleks.com
2) Your browser uses the ALEKS plug-in when you are logged on to ALEKS. It is inactive at other times, and does not do anything except provide functionality for ALEKS. Installation of the ALEKS plug-in is automatic. When you access ALEKS, it will automatically check to see if the current plug-in is installed on your computer. If it isn't, the plug-in will be downloaded. You will then be asked for your permission to install the plug-in on your system. This is a safe operation for your computer.

   If you need to access ALEKS in the library, a computer lab, or another place where you don't have authorization to install software, use the ALEKS "streaming" plug-in. To use the "streaming" plug-in, follow these steps:

   1. Go to http://www.aleks.com/plugin and log in to or register with ALEKS as you normally would.
   2. Upon first login, ALEKS will automatically retrieve the ALEKS plug-in from the server and store it in the browser's "cache" memory. You don't need to grant any special user rights or privileges on a computer for this installation to occur.
   3. The plug-in will be available in the browser's cache until an updated version is available on the ALEKS server or until the browser's cache is cleared.
   4. Important: When you restart the browser and return to ALEKS, you must go to http://www.aleks.com/plugin. If you do not add "/plugin" to the end of the URL, ALEKS will attempt to install the standard ALEKS plug-in on the computer instead of using the streaming version of the plug-in.

Google Docs

You will be submitting your presentation reports, laboratory group work and individual laboratory reports to your instructor and TA via GoogleDocs (linked through Canvas). Google Docs can be accessed through both Canvas and directly through the GoogleApps account provided to you by UD (http://googleapps.udel.edu). Please make sure your GoogleApps account is active on or before the first day of class (see http://www.it.udel.edu/welcome/ for directions). Additional directions regarding use of GoogleDocs will be provided in class.

Course Email/Student Gmail Accounts

Class announcements may be distributed via email. Be sure to regularly check your UD Gmail account for course emails. To insure all emails reach you, it is recommended you make sure your GoogleApps account is active on or before the first day of class (see http://www.it.udel.edu/welcome/ for directions).

Laboratory iPads

You will be using iPads as electronic laboratory notebooks during the semester. In addition, most laboratories will require that you use iPads and additional laboratory technology for data collection. Your TA will provide you with specific directions on how to use the iPads and collect data during your first lab meeting (Sept. 6th). Although you will be able to email data and lab notebook entries from the lab room, it is recommended that you bring a USB drive to each laboratory session to save a back-up

copy of data collected. Each iPad is fitted with a liquid-protective cover and you should take care to keep the iPad safe and chemical-free during use.

Cellphones/Smartphones/PDAs/Personal Laptops

All use of cellphones/smartphones/PDAs (personal communication devices) and personal laptops is strictly prohibited during class time, laboratory sessions and out-of-class exams. Students wishing to text-message or go online must do so before or after meetings associated with CHEM103H. Research shows that, in addition to being an irritant to your instructors and TAs, **use of personal communication devices distracts from learning and measurably decreases student performance** (see http://bit.ly/L5jyZq as an example of this).

Technical Assistance

The UD IT Help Center provides a wealth of technical support for students, including connecting a Mac/PC to the UD network, anti-virus software installation, help using GoogleApps and assistance with Sakai. You can contact the IT Help Center by calling 831-6000 or visiting http://www.udel.edu/help/.

GRADING

There will be four total examinations during the semester (see exam schedule under Locations/Times), including three regular exams and one Cumulative Final Exam. The four exams count for a total of 60% of your final grade (15% each). For regular exams, emphasis will be put on those chapters most current since the last exam, but keep in mind that chemistry is a cumulative subject by nature. In addition, an in-class standardized ACS Final Exam covering CHEM103H topics will be given during the last week of class and students may use their score on the ACS exam in lieu of the Cumulative Final Exam. ACS Final Exam scores will be posted in Sakai within 24 hours. Students taking both the standardized ACS Final Exam & the Cumulative Final Exam will receive the higher of the two scores as their Final Exam grade. Point recapture (see below) is not possible with the standardized ACS exam. However, students taking both the ACS Final Exam and the Cumulative Final Exam are eligible for point recapture based on Cumulative Final Exam performance, even if their ACS score is ultimately used as their Final Exam grade. The remaining 40% of the course grade will be based on laboratory reports (20%), homework & problem sets (12%), presentation reports (3%) and participation (5%). Missed exams or labs will result in a zero (0) grade for that work. Under **very rare circumstances** (e.g., illness with a Doctor's note, etc.) make-up opportunities for missed exams or lab sessions will be allowed. Any make-up exams **need be taken prior** to the next scheduled class. It is the student's responsibility to contact the instructor **in advance of an absence** for permission to take, and to arrange details for taking a make-up exam or lab session. **There will be no make-up exam given for the Final Exam**.

Grading summary:

Out-of-class Regular Exams (3)	45%
Cumulative Final Exam or ACS Exam	15%
ALEKS Homework/Problem Sets	12%
Laboratory/Discussion	20%
Presentation Reports	3%
Participation	5%

Your grades in this course will be computed on the standard 100-point UD grading scale as follows:

A	=	93-100.0	C	=	73-77.9
A-	=	90-92.9	C-	=	70-72.9
B+	=	88-89.9	D+	=	68-69.9
B	=	83-87.9	D	=	63-67.9
B-	=	80-82.9	D-	=	60-62.9
C+	=	78-79.9	F	=	<60.0

Exam Point Recapture System

(Modeled on an approach adapted by Dr. Sue Groh and described by Dudley Herschbach in "Making Grading Less Painful", with M. Pickering, in Journal of College Science Teaching, vol. 21, pp.377-379, 1991.) Everyone has bad days now and again; unfortunately, sometimes they happen to fall on exam days. The point recapture system gives you a chance to make up for disastrous exams through an improved performance on the cumulative final exam. Most major concepts will be examined in both the regular and final exams; if you earn a higher percentage on a Cumulative Final Exam question than you did on the corresponding regular exam question, the higher score is used to recalculate your hour exam grade. Thus, if you learn what you didn't know before, in time for the final, you not only eliminate your misunderstanding, but get credit for your effort - making us both happy.

(Note: Point recapture is only available if a student takes the Cumulative Final Exam (see Grading above.))

Grading of Laboratories

Your grades in the lab portion of the course equate to your lecture grade via the following scale:

A	=	93-100.0	C	=	73-77.9
A-	=	90-92.9	C-	=	70-72.9
B+	=	88-89.9	D+	=	68-69.9
B	=	83-87.9	D	=	63-67.9
B-	=	80-82.9	D-	=	60-62.9
C+	=	78-79.9	F	=	<60.0

At the end of the semester, grades between sections will be normalized to ensure equity in grading.

Grading of ALEKS Homework

ALEKS is a content mastery system that continually tracks your progress through the assigned course topics. At any point during the semester, you can see how far you have progressed through course topics, with 100% being full mastery of all assigned topics. Since you are enrolled in an Honors section of CHEM103, it is assumed that you are fully capable of reaching 100% mastery during the course of the semester. Therefore, grading of homework in ALEKS will occur on the following scale, with full credit (6% of your final grade) awarded to students who reach **100% mastery** of the topics in ALEKS:

6%	=	100% in ALEKS	3%	=	70-74.9% in ALEKS
5.5%	=	95-99.9% in ALEKS	2.5%	=	65-69.9% in ALEKS
5%	=	90-94.9% in ALEKS	2%	=	60-64.9% in ALEKS
4.5%	=	85-89.9% in ALEKS	1.5%	=	55-59.9% in ALEKS
4%	=	80-84.9% in ALEKS	1%	=	50-54.9% in ALEKS
3.5%	=	75-79.9% in ALEKS	0%	=	<50% in ALEKS

You will be asked to complete your ALEKS homework on a structured timeline, with Intermediate Objective due dates. For each missed IO due date, up to 0.5% may be deducted from your total ALEKS grade. Be sure to keep up with IOs – they will help keep you on track in the course.

Problem Sets

Problem sets will be assigned regularly during the course. These activities will provide you with practice on comprehensive problems similar to those you will see on your out-of-class exams. Problem sets will be graded similarly to exam problems, but no point-recapture will be offered for missed points. Your total Problem Set grade will account for 6% of your course total.

Presentation Reports

During the semester, you are required to attend and report on three scientific presentations as per the directions posted in Canvas. Submission and grading of presentation reports will occur through Canvas. No points will be given for presentation reports that are determined to be fabricated or for missing reports.

Participation

You will be expected to participate in the course (during lecture, discussion and laboratory) on a regular basis (including worksheets, in-class problem solving, clicker questions, etc.). Points for participation in the course will be awarded based on instructor and TA observation. If you regularly participate as expected, you can expect to receive the full participation grade. If the instructor and/or TA finds you regularly missing class or not participating, you will be warned. If after a warning a lack of participation continues, participation points will be deducted.

Late penalties

Lab reports, homework and other assignments that are turned in late will be subject to a grade penalty, unless the situation has first been discusses with the course instructor or laboratory TA.

MANDATORY LABORATORY SAFETY TRAINING

You will receive lab safety training from your TA during the first lab section meeting. You must attend this training and sign a form stating you've received laboratory safety training before you will be allowed to participate in laboratory activities.

BASIC LABORATORY SAFETY PRECAUTIONS

Below is a listing of several important laboratory safety rules to be followed during all laboratory sessions:

Safety goggles must be purchased prior to your first laboratory meeting and are to be worn at all times during laboratory sessions. Failing to bring goggles to the laboratory or removing them during a laboratory session will result in expulsion from the laboratory. If you feel your goggles fog-up regularly or believe that they are uncomfortable to wear, know that just about everyone shares your opinions – but **do not take off your goggles at any point during a laboratory session!**

You MUST dress appropriately for laboratory sessions or will be turned away at the door (and therefore will miss the opportunity to complete, and get credit for, that week's laboratory).

Appropriate laboratory dress includes wearing clothing that covers as much skin as possible, such as pants, long-sleeved shirts and closed-toed shoes. It is recommended you wear old clothing during laboratory, as your clothing may become stained from chemicals used. **You WILL NOT BE ALLOWED IN THE LABORATORY if you are wearing any of the following**: shorts, short skirts, flip-flops, sandals or other open-toed shoes, sleeveless shirts or shirts that do not completely cover the midriff. Wearing of dangling jewelry is not recommended. Also, **it is highly recommended that you wear close-fitting, natural fiber clothing during laboratory periods**. Synthetic fibers are more prone to catch fire, can burn hotter and more quickly, and can melt & scorch skin more readily than natural fibers.

Food and beverages are not permitted in laboratory rooms. Consumption of food and beverages in laboratory rooms is forbidden at all times. A violation of this policy will result in expulsion from the laboratory (meaning you will miss the opportunity to complete, and get credit for, that week's laboratory). If a student needs to drink or eat during a laboratory period due to a medical condition, he/she must provide a doctor's note to the instructor/TA and asked to be allowed out of the classroom for a maximum of five minutes to drink or eat. Any food items brought to a laboratory should be kept in a closed backpack or case.

Backpacks should be kept in designated areas of the room and not placed in lab benches.

Use of contact lenses is not recommended during laboratory sessions.

Acrylic nails are a fire hazard and should not be worn during laboratory periods.

Long hair must be tied back during laboratory periods.

LABORATORY

The laboratory portion of this course provides the opportunity for "hands-on" explorations of a variety of chemical principles. The lab experiments have been chosen to complement and enrich (not duplicate) the expected course of activities in class; some labs will relate directly to topics from class, while others will illustrate further applications or related ideas. There will generally be some brief classroom discussion about each experiment, but you may find it useful to consult your textbook or other references for more background information about certain topics. In addition, you will do significant planning related to your laboratories during discussion sections. As many techniques you will be using may be new to you, standard chemical techniques and practices are outlined briefly in the Appendix to the lab manual.

Each laboratory session is overseen by a graduate teaching assistant (GTA or TA); typically graduate students in chemistry, TA's are responsible for maintaining a safe lab environment and for providing assistance and advice as you carry out the experiments. They also grade the lab reports, following the common grading schemes prepared and furnished by the course instructor (MCW); the course instructor, however, has ultimate responsibility for the lab and assigns the final lab grade. Questions about an experiment may be directed to the instructor and/or the TA's.

More information about the lab, including a discussion of what's expected in a lab report, may be found in the lab material provided on Canvas.

Lab Grading System

One of the goals of the laboratory component of this course is to expose you to the process of doing science. There is a myth about the scientific method (observation, hypothesis, experiment, analysis, and conclusion) that often is present in students' minds - namely, that these steps always proceed linearly and in sequence. In actuality, scientists stumble, collect data inaccurately, misinterpret or over-interpret results, miss significant aberrations, and so on. Science isn't a one-shot deal; one isn't always right or blessed with understanding at each and every stage. Chances are good that this will be your experience at times, too.

In order to minimize this problem, real-world science relies on the peer review system. When a scientist writes a paper describing some results, the paper is first submitted to other workers in that field for review. These reviewers look for problems in experimental design and execution, in data interpretation, and in analysis and extrapolation of results; if problems are found, the author is given the chance to correct them before the material is communicated to the rest of the scientific community.

We will utilize a similar system of evaluation in this course (based on an approach adapted by Dr. Sue Groh and described by Miles Pickering in "Making Grading Less Painful", with D. Hershbach, in the Journal of College Science Teaching, vol 21, pp.377-379 (1991)), with your lab TA serving as your initial peer reviewer. Lab reports will be graded according to the general guidelines below:

During the semester, you will be given four chances to resubmit a laboratory write-up for additional credit (this equates to about one out of every two lab write-ups). It is recommended you save these chances for labs requiring “major revision” or that are initially “rejected” (see below).

Each lab is nominally worth 100 points; of these, 5 points are reserved as "discretionary" points, to be awarded (in whole or in part) by the lab TA as a measure of adequate completion of the pre-lab questions (before lab!). An additional 5 points will be awarded to those students demonstrating an honest effort to execute proper lab techniques, properly caring for the materials & technology provided, and maintaining a clean working environment. An additional 10 points are set aside for the grading of electronic laboratory notebook entries (ELN) for each lab (one ELN entry per lab pair). Grading of group work/procedures developed during discussion sections account for an additional 10 points. The remainder of each lab report, then, may earn a maximum possible score of 70 points.

In conjunction with these 70 points, each lab report will receive one of the following ratings:

"Accepted"*:* the report is exemplary as it stands. A report that is "Accepted" will address all the areas mentioned in the lab guidelines/scenario completely and competently. Data are presented in accepted formats, both accurately and clearly; the reader should have no difficulty in making sense of the information gathered. The procedure should be clear enough that someone else could repeat the experiment. Calculations are presented logically and correctly. Relevant information regarding the lab is presented in complete sentences and in such a way as to demonstrate the writer's understanding of the concepts involved. The error analysis presents a discriminating look at sources of errors, rather than offering sweeping statements about "human error". The results and conclusions are summarized concisely. Labs with this rating will be awarded the maximum 70 points for this section.

"Accepted with minor revision". A report that is "Accepted with minor revisions" will typically have technical flaws, rather than conceptual errors. A technical mistake is one that does not reflect a misinterpretation of the concepts being addressed by the experiment; rather, it is more of an error in the "process" of doing or reporting the experiment (versus the "content" of the report). Mistakes such

as inadequate procedures, simple math errors, sloppy or unclear presentation of graphical or tabular data, weak error analyses, missing summaries, etc. are considered technical errors. Included in the "minor revision" category are reports that contain a single conceptual error, with or without a few technical flaws. If left uncorrected, labs with this rating will be awarded 55 (out of 70) points for this section.

"Accepted with major revision". A report that is "Accepted with major revisions" will typically contain two or more conceptual errors - i.e., mistakes related to the major ideas or concepts of the lab itself. Errors in presenting data or in calculation set-ups that lead to a flawed interpretation of the results require major revision, as do vague or ambiguous answers to questions. Reports with many technical errors may be downgraded to the "major revision" category. Either the lab TA or the professor should be consulted before revision is attempted. If left uncorrected, labs with this rating will be awarded 45 (out of 70) points for this section.

"Rejected": reserved for a report with multiple, substantial flaws. If left uncorrected, labs with this rating will receive no credit for this section.

It is your decision as to whether or not to revise and resubmit a report (again, you will be given four chances to do so during the semester). Any revised reports that become "Accepted" will be awarded 65 (out of 70) points. Revised reports that are still not completely acceptable will receive a grade no lower than the original. The final lab grade will be an average over all the experiments, using the points indicated above.

Lab reports will generally be due one week after completion of the experimental work; revisions are due at the next lab session after receiving the graded lab. Makeup labs are only possible if arranged in advance with the instructor. If you can't make your usual lab section for a legitimate reason, you may be able to get into another CHEM 103H section that week, depending on the availability of space: talk to your instructor and TA as soon as you recognize the conflict.

ADDITIONAL COURSE POLICIES

Class Format

"At times I felt the professor's notes became my notes without passing through either of our minds."

The traditional lecture approach to teaching is an excellent way to transfer information from one notebook to another; unfortunately, it's not necessarily an excellent way to develop a real understanding of chemistry. You don't learn how to ride a bike or speak French by listening to someone explain how to do it - you've got to try it yourself. To learn any subject well, including chemistry, you have to become actively involved in the learning process. The format of this course is designed to encourage that involvement by combining an active, group-centered introduction to concepts with whole class discussions and lectures. Participation is encouraged and expected in all these activities, as befits an Honors course (please note the 5% "participation" component of the course grade!). Keep in mind that **during class meetings we will not cover all of the concepts that you can expect to be tested on** – there simply won't be time. Understanding of more straightforward concepts can be gleaned from reading your book and working on related problems in ALEKS. By focusing on the more difficult concepts and problem solving in class and discussion sections, we can use our time together in a way that benefits you the most. Finally, if you find you don't fully understand something from the book, from working in ALEKS or during class, don't be shy to ask. To repeat an old but nonetheless accurate

adage, "the only stupid question is the one not asked" - if you have doubts about something, I can assure you that there will be others with the same question!

Group Work

You are encouraged (and in some cases, required) to work together in this course – both in and out of class. However, if you've collaborated with others in any way in preparing an individual assignment or laboratory write-up, you are responsible for (1) preparing your own answers in your own words, and (2) acknowledging your discussions with others by citing your collaborators' names in your assignment. **Work that appears simply to have been copied from another's paper will not be accepted from either student involved.** Please review the University's Code of Conduct regarding Academic Honesty found here: http://www.udel.edu/stuguide/12-13/code.html#honesty

Attendance

Because of our reliance on group work and the cumulative nature of the material, it is imperative that students attend every class, laboratory and discussion section. Students absent from class can expect a loss of participation points (see participation) and will be responsible for the material covered during that class.

Promptness is also important. Each class will begin at the scheduled time and you are expected to be in class and ready at that time. If an unexpected emergency arises, the instructor must be notified on the day of the missed class, lab or exam by calling 302-831-6251 or emailing mcw@udel.edu.

Note on classroom behavior: Behavior that shows a lack of respect for your classmates, TAs and instructor should not occur - e.g., routinely coming late to class, excessive/off-task conversations during class, etc. Cell phones, etc. must be turned off and put away during class. The instructor will deal with incidents of disrespect toward classmates, UTAs, TAs or the instructor strictly and immediately, with the potential for loss of participation points or more severe consequences as per the University Code of Conduct (see http://www.udel.edu/stuguide/09-10/code.html#disrupt).

Cheating & Plagiarism

In cases of suspected cheating, plagiarism, or fabrication of results, faculty are required to contact the Office of Student Conduct (http://www.udel.edu/studentconduct/) in advance of discussing the matter with the student(s) involved. The OSC then mediates any communication between the faculty and student(s) regarding an incident, and confirmed cases become part of the student's permanent record. The University of Delaware operates under a "three-strikes-you're-out" policy, whereby repeated offenses result in expulsion from the University. Please behave honestly in CHEM103H – in addition to being the right thing to do, it will save us all a lot of time and anguish.

HOW TO DO WELL IN CHEM103H

A standard rule of thumb for most college courses is that you should expect to spend 2-3 hours studying for every hour spent in class. This course is no exception - developing more than a superficial understanding of chemistry takes effort, and effort requires time. If you need help with time management skills, contact the Academic Enrichment Center; they offer sessions on time management, note-taking and reading strategies that you might find useful. Their web site is http://www.aec.udel.edu/. If you need help with organizational and grammatical aspects of writing

your Laboratory reports, visit the UD Writing Center (see http://www.udel.edu/writingcenter for hours, location and to schedule an appointment.

Here are some other recommendations, from former CHEM103H students:

- **Read the textbook.** It is impossible to discuss everything that you need to know in two 75-minute classes each week - that's where the text comes in. At the very least skim through the chapter as each new section is begun, to familiarize yourself with the vocabulary and general ideas. Then read the chapter in full while it is discussed in class. Reviewing the chapter summary often throughout and after reading a chapter is a good idea, too. Some hints for when you're reading more thoroughly: (1) Try to write a sentence that sums up the point of each section or subheading. (2) As you read, rather than highlighting everything, make small pencil marks in the margin at places that confuse you. Reread the section with an eye towards resolving the difficulty. When you've made sense of it, erase the mark. Continue until all the marks are erased. (3) Work some of the problems at the ends of each section and the chapter to test your ability to apply the material.

- **Review class notes within 24 hours of the class.** Taking good notes in class is much easier if you've followed the advice given above about reading first. You'll have a better idea of what's important and what isn't, and won't need to spend your time frantically writing down every word that's uttered. Even if you have prepared, though, notes that make sense as you write them today may not be as meaningful three weeks later. Many students find it helpful to take notes in class, marking comments or sections that are unclear, and then to rewrite the notes (either in a second notebook or on a facing page) before the next class. Generating this second set of notes is really a way of studying the material: you can look thing up that were not clear, or make a list of question to pose to the instructor. it gives you a chance to decipher sloppy handwriting or notes while things are still fresh in your mind, and helps move material from short term to long term memory.

- **Work through the example exam problems posted in Sakai** to prepare for the out-of-class exams. (And do not do this with the answer key open next to you - it's too easy to look at the answer and think you understand it without having made a reasonable attempt to get through the problem first.) This material will give you a sense of the general style and level of difficulty you may expect to see in this year's exams. Since it is impossible to deal with every type of problem and problem-solving approach in class, the old exams also serve as a supplemental course of instruction, in that, in addition to ALEKS homework, they may touch on areas that will not be explicitly discussed in class. Please note that in writing exams, I will assume that each student is aware of and has reviewed the topics covered on old exams and is also up-to-date on their homework in ALEKS.

- **Form an informal study group outside of class**. Compare your notes from class, work together on labs, and discuss things you find unclear. You'll find you're not the only one who gets confused, and talking things over can help improve everyone's understanding. Make sure you attempt the work on your own first, though, and that you can explain the answer yourself readily at the end. While copying others' answers without really understanding them may seem expedient at the time, remember that the truth comes out in the exams...

- **Seek help if you start to feel lost, ASAP**. Take advantage of the instructor's office hours, the UTAs' ALEKS help sessions, and/or your TA's office hours. Ask your instructor questions by e-

mail, IM through Google Chat, or make an appointment to see me. Not everyone comes into this course with the same background, and some may need a bit more guidance than others. I'm happy to meet with you to see what we can do to help you get the most from this course, but I can't help if I don't know about the problem. If you think that you need extensive outside help, the Academic Services Center often offers tutoring sessions in general chemistry; similarly, the CHEM-BIOC department maintains a list of people offering tutoring services for a fee.

- **Speak up in class**. Remember that participation is 5% of the grade - that's the difference between a 93 (A) and an 88 (B+). You don't have to have the "right" answer to get credit - you just have to be involved.

CHEM 103H 12F: TENTATIVE LECTURE SCHEDULE

Week of	Topics	Important Events/Due Dates
8/29-31	Course Introduction; ACS Pre-Assessment	**Objective 1 Due** (9/5) on Sections 1.1-1.7
9/5-7	Chapter 2; Mass Spectrometry	**Objective 2 Due** (9/9) on Sections 2.1-2.5 Discussion Section Topic = Groups & Lab Technology
9/10-9/14	Chapter 3	**Objective 3 Due** (9/16) on Sections 2.5, 3.1-3.3 **Problem Set 1.1 Due** (9/12) Discussion Section Topic = Lab 1A
9/17-9/21	Chapter 3; Lewis Structures (p. 346-348)	**Objective 4 Due** (9/23) on Sections 3.4-3.6 **Problem Set 1.2 Due** (9/19) Discussion Section Topic = Lab 1B
9/24-9/28	Chapter 4 (start)	**Objective 5 Due** (9/30) on Sections 3.6,4.1-4.4, 9.2 (p. 346-348) ***Attend Seminar #1 on or before 9/30*** *(report due within 7 days)* **Problem Set 1.3 Due** (9/28) Discussion Session Topic = Beer's Law
10/1-10/5	Chapter 4	**Exam 1** on Chapters 1-4.5 (10/3, 5-7 pm) **Objective 6 Due** (10/7) on Sections 3.6, 4.5-4.6
10/8-10/12	Chapter 4; Chapter 5 (start)	**Objective 7 Due** (10/14) on Sections 4.4-4.7 Discussion Section Topic = WQ Data, Analysis & Predictions
10/15-10/19	Chapter 5 (end); Chapter 6 (start)	**Objective 8 Due** (10/21) on Sections 5.1-5.6, 6.1 **Problem Set 2.1 Due** (10/17) Discussion Section Topic = WQ Data, Analysis & Predictions
10/22-10/26	Chapter 6 (end); Chapter 7 (start)	**Objective 9 Due** (10/28) on Sections 6.2-6.5 **Problem Set 2.2 Due** (10/24) Discussion Section Topic = Enthalpy
10/29-11/2	Chapter 7 (end); Chapter 8 (start)	**Exam 2** on Chapters 4.6-6 (10/31, 5-7 pm) ***Attend Seminar #2 on or before 10/31*** *(report due within 7 days)* **Objective 10 Due** (11/4) on Sections 7.1-7.6
11/5-11/9	Chapter 8 (end); Chapter 9 (start)	**Objective 11 Due** (11/11) on Sections 8.1-8.3 Discussion Section Topic = Lab 6 (Fluorescence)
11/12-11/16	Chapter 9 (end); Chapter 10 (start)	**Objective 12 Due** (11/18) on Sections 8.4, 9.1, 9.2 **Problem Set 3.1 Due** (11/14) Discussion Section Topic = Lab 7 (Distillation)
11/19	Chapter 10 (end);	**Objective 13 Due** (11/25) on Sections 9.4, 9.5, 10.1-10.4 **Problem Set 3.2 Due** (11/21)
11/26-11/30	Chapter 11	**Exam 3** on Chapters 7-11* (*most likely partial for Chapter 11) (11/28, 5-7 pm) **Objective 14 Due** (12/02) on Sections 11.1-11.6
12/3-5	ACS Exam Review (12/3); Optional ACS Exam (12/5)	**Exam Review & Optional ACS Exam** ***Attend Seminar #3 on or before 12/5*** *(report due within 7 days)*
12/7-14	Regular Final Exam	**(Cumulative) Regular Final Exam TBA**

CHEM 103H 12F: LAB EXPERIMENT AND REPORT SCHEDULE

Date	Experiment	Report Due For
9/6	Intro: Safety, lab techniques, lab technology & scavenger hunt	Submit ELN for Intro
9/13	Lab 1A - Job's Method	Submit ELN for Lab 1A
9/20	Lab 1B - Data Processing	Submit ELN for Lab 1B
9/27	Lab 2 - Steel % Composition	Submit ELN for Lab 2 Lab 1 Report DUE
10/4	Lab 3A: Field work	Submit ELN for Lab 3A
10/11	Lab 3B: Phosphate & Nitrate	Submit ELN for Lab 3B Lab 2 Report DUE, Lab 3A Data DUE
10/18	Lab 3C: Hardness & Alkalinity	Submit ELN for Lab 3C Lab 3B Data DUE
10/25	Lab 4: Enthalpy	Submit ELN for Lab 4 Lab 3C Data DUE
11/1	Lab 4B: Testing Enthalpy prediction Lab 5 - Characterization of Industrial Inorganic Compounds by Chemical Interactions	Submit ELN for Lab 4B and Lab 5 Lab 4 Prediction DUE
11/8	(Lab 5 cont., if needed) Lab 6 - Fluorescence Spectroscopy	Submit ELN for Lab 6 (and Lab 5, if needed) Lab 4 Report DUE
11/15	Lab 7A - Synthesis & Characterization of a Fluorescent Compound	Submit ELN for Lab 7A Lab 5 Report DUE
11/29	Lab 7B - Synthesis & Characterization (cont'd)	Submit ELN for Lab 7B Lab 6 Report DUE Submit in-class report/worksheets for Lab 7A & 7B