

**CHEMISTRY 120 A
INTRODUCTION TO CHEMISTRY
SPRING 2010 SYLLABUS**

Instructors

Duane Weisshaar Office: GSC 254 e-mail: duane.weisshaar@augie.edu
 Phone (274)-4812 Home: 339-7269 class website: faculty.augie.edu/~dew
 Office Hours: 9-10 daily or by appointment
 Diane Pullman Office: GSC 245-2 e-mail: diane.pullman@augie.edu
 Phone (274)-5053
 Office Hours: 10:30-12 T or by appointment

Class Schedule

Lecture - Discussion	1:00 - 1:50 MWF	GSC 241	
Lab A1 (DEW)	3:00 - 4:50 T	GSC 243	Assistants: Sarah Jamison, Cody Lensing
Lab A2 (DP)	8:00 - 9:50 W	GSC 243	Assistants: Nathan Truex, Rob Fick

Text & Supplies

CHEMISTRY, Burdge, 2009, McGraw-Hill (ISBN 978007302554-4 text only)
 ARIS access (ISBN 0073298069 / 9780073298061), can be obtained on-line
LABORATORY EXPERIMENTS FOR INTRODUCTION TO CHEMISTRY; Lindbeck, Chemistry Department, Augustana College, Sioux Falls, SD, 2009-10. This edition only, please. Available for purchase from in GSC 246a (chemistry office) - \$15.
Preparing for Your ACS Examination in General Chemistry - The Official Guide - recommended. Available for purchase from the division secretary in GSC 246a (chemistry office) - \$20 (several copies also on reserve in the library)
 Bound lab notebook with duplicate pages (carbon or carbonless) (available in the Bookstore)
 Safety Goggles with complete splash guard (available in the Bookstore)
 Scientific Calculator with log and 10^x (antilog) functions - **Programmable (graphing and/or alphanumeric) calculators are NOT allowed on exams.**

Grading Criteria

POSSIBLE POINTS		GRADING CUTOFFS	
Exams (4)	400	A - A-	1000 - 930 - 900
Homework	125	B+ - B - B-	870 - 830 - 800
Labs (11 * 25pts)	275	C+ - C - C-	770 - 680 - 650
ACS Final Exam	200	D+ - D - D-	630 - 580 - 550
TOTAL	1000	YOU CANNOT PASS THE COURSE UNLESS YOU PASS THE LAB (151 PTS OUT OF 275)	
Late assignments penalized 20%		Borderlines will be assessed on a case by case basis.	
No assignments accepted after 5 pm on the last day of classes			
Last day to drop or change to S/U is Friday, April 9.			

GENERAL GOALS AND EXPECTATIONS

Nature of the Course

Chemistry 120 serves both as a Core Course in Area 3.2 and as a prerequisite to other courses. The main objectives of this course are:

- General Goal of Area 3 - The liberally educated person, in addition to possessing skills and self-understanding, should have pursued broad intellectual experience in many fields of inquiry. To that end, the six parts of this area will acquaint the student with knowledge in many diverse fields.
- Specific Goal of Area 3.2 courses - This section [of Area 3] is designed to provide students with knowledge of science as a way to understand the world of nature, and of technology as the application of scientific principles to useful ends.
- Development of an understanding of some basic chemical concepts (e.g. bonding, equilibrium including buffers, stoichiometry, chemical kinetics, and oxidation-reduction) and their impact on human lives.
- Development of an analytical thinking/problem solving **process**. This will require abstract thinking skills as we seek to relate observable phenomena to the characteristics and behavior of atoms and molecules.
- Development of team skills through cooperatively working together in small groups.
- Development of an ability to follow oral and written directions (lab and lecture).
- Development of basic laboratory skills.

The last goal reflects that chemistry is an **experimental** science, i.e. that lab work is an integral part of the discipline. To address the various aspects of that goal, the laboratory experience in this course is designed with the following purposes in mind:

- Provide a hands-on illustration of concepts covered in lecture.
- Provide experience with the equipment and techniques used in chemistry with attention to safety issues.
- Illustrate the importance of following directions (written and oral), of organization, and of making observations in the lab.
- Develop the fundamentals of keeping a notebook and reporting results.

Teaching/Learning Philosophy:

TEACHING CANNOT OCCUR UNLESS YOU, THE STUDENT, ARE ACTIVELY INVOLVED IN THE LEARNING PROCESS!! Thus learning is **not a spectator sport**, it requires an active effort on the your part; reading, working problems, writing reports, etc. Much of learning is a "trial and error" process; we seldom get it right the first time, so learning also requires **PRACTICE, PATIENCE, and PERSISTENCE** (similar to participation in sports or music). The teacher **cannot make you learn**; the teacher is only a guide and a resource (a coach, if you will) to help you master the material and to sort the important from the trivial. You should not want or expect the professor to do it for you. *You should take charge of your education.*

What instructors expect of students:

- Read the chapters before they are discussed in class.
- Work problems every day.
- Come to class with questions and ask them.
- Read the lab and get organized before you come.
- Think about what you are doing in lab - don't just blindly follow the recipe.
- spend 6-8 hours per week **outside** of class efficiently studying (4 hour class * 2, rule of thumb).

What students can expect of Instructors:

- Will *not* lecture on everything.
- Will answer questions.
- Focus in class will be on the more difficult concepts, student questions, problem solving strategies.
- Brief presentation in lab highlighting safety issues and special directions or modifications.
- Will be available outside of class.

Tips

- This is a fast paced course - **START TODAY.**
- Form a study group.
- Make connections between what you see every day and what you are doing in class.
- Do all the assigned problems - "practice makes perfect" - a few every day.
- Make use of the Chemistry tutors available in GSC 262 (Seminar Room) every Monday through Thursday from 7-9 pm.
- Ask questions and persevere. The instructor wants you to succeed and will help if you just ask.

Attendance

It is expected that the student will be in the lecture or the laboratory! If you miss a lecture, YOU are responsible for finding out about any announcements, handing in problem sets, obtaining class notes from a classmate, etc. Absence from laboratory or examinations will be excused only because of Illness or Family Emergency! Unexcused absence will result in a '0' for the work missed.

Accommodating Disabilities and Special Situations

Any students with disabilities who need reasonable accommodation in this course are encouraged to speak with the instructor and lab instructor as soon as possible. Students with questions regarding disability services may contact Susan Bies at the Student Support Services Office, Career Center Suite, Room 100, in the Edith Mortinson Center, 274-5503, susan.bies@augie.edu.

Chemistry, by its very nature, involves handling of potentially hazardous substances. The labs in this course will teach you how to properly handle these substances while minimizing the range of exposure. However, exposure effects vary from person to person. So, if you have asthma, allergies, are pregnant, or have other special circumstances, please inform one of the instructors so we can plan appropriate accommodations for your safety.

Honor Code

As a community of scholars, the students and faculty at Augustana College commit to the highest standards of excellence by mutually embracing an Honor Code. As a College of the Evangelical Lutheran Church in America, we understand the individual and collective responsibility we have in fostering integrity. Ultimately, our purpose is to be an engaged body of academically excellent, highly articulate, and morally centered persons who learn about and examine the world together. We believe that only when we are honest with each other and ourselves can we begin to contribute to the world in a meaningful manner. To that end we pledge that we will abide by the highest standards of **academic integrity**, and that we will abide by the decisions of the joint student/faculty Honor Board. (The full description of the Honor Code is available at www.augie.edu/admin/acadaff/.)

What does **Academic Integrity** mean in this course?

- ▶ You do your own work on individual assignments (not copying others). On group assignments you contribute to the group effort and strive to understand all parts of the project, not just the part you do.
- ▶ In lab you are “true” to your data - your report reflects what *you* measured and observed; data is not changed or manufactured to fit expectations. If you missed collecting some data, see the instructor; don’t copy someone else’s data.
- ▶ Give credit where credit is due. When you gather data from the Web, books, magazines, etc. cite the reference (author, title, etc.).

I presume we are in this class to help each other learn some chemistry (yes, instructors learn in this class too), so I trust you to turn in work that reflects your efforts and also, that as individuals and in your small groups, to help each other adhere to the **Honor Code**. As a reminder of that commitment, when submitting a group assignment, each member is to **sign** it. In addition, the following statement will be appended to each exam:

On my honor, I pledge that I have upheld the Honor Code, and that the work I have done on this assignment has been honest, and that the work of others in this class has, to the best of my knowledge, been honest as well.

Signed _____

If you cannot, in good conscience, sign this pledge or an assignment or if you have other concerns about academic integrity in this course, please come visit with me (in confidence of course) or send me an e-mail note. At a minimum, students caught violating this code will receive a zero (0) on the assignment or exam and the incident will be reported to the Academic Dean in accordance with the Honor Code procedures.

Communication with the Class

The instructors will use your Augie e-mail addresses (@ole) for class announcements and general communication with the class and with individuals; check your e-mail daily. Email is sometimes erratic, so we will respond to every message you send. If you don’t get a response in a day or two, send your message again. Refer to your NSS manual or see the Help Desk (Madsen Basement) for details on accessing your e-mail. If you use another e-mail account, put a forwarder in your @ole account (contact the Help Desk for help in setting up a forwarder).

Moodle

Syllabus, other handouts, any powerpoint presentations used in class, answer keys to exams, and other information files for this class will be posted on Moodle under Chem 120A. The gradebook will be updated after each exam so you can check grades are recorded correctly and see how you stand. If you encounter problems with Moodle, please let the instructor know.

Logging in:

Go to <http://moodle.augie.edu> (from the Augie homepage, click “Students” and then “Moodle”)

- ▶ Log in using your Novell username (for example, mjsmith07). If this is your first time using Moodle, your Augie ID is your password. Please change your password - click on a your name in the upper right corner of the screen.
- ▶ If your instructor has already added you to the Moodle course, you will see your course listed on the left. Click the course name to enter the course. If you don’t see this course, let the instructor know.

Troubleshooting:

Most browsers are set to block file downloads. If you find that when you click a link, nothing happens, chances are your browser is preventing file downloads (even viewing some files is seen by the browser as a file download.) To override this security feature, right-click on the pale yellow security warning that appears in the upper part of the screen and select “Download file”. Then, go back and try the link again. This time it should give you the typical file download dialogue box (with choices of “Open”, “Save”, and “Cancel”.) Clicking “Open” should let you see the file.

Many browsers are set to prevent pop-ups. But, Moodle uses pop-ups for discussion forum posts. If you find that when you click a discussion post, nothing happens, chances are your browser is preventing it from popping-up. To override this feature, hold the CTRL key down while you click the discussion posting.

If you have any technical problems with Moodle, contact **Sharon Gray**, Augie’s Instructional Technologist. Her e-mail is gray@augie.edu. Her phone numbers are: 605-624-4907 (office), 605-624-8833 (home), and 605-670-0185 (cell).

Resources Beyond the Textbook

Feel free to consult with the **instructor** concerning any problems or questions you encounter in the course or about Augustana. Office hours each week are listed above, but I will be glad to help you at other times as well. Making an appointment will (usually) guarantee that I will be available, but it is not necessary, drop in any time. You may also communicate questions or concerns via e-mail to the instructor.

Chemistry Tutors are available at no cost in the Chemistry Seminar Room (GSC 262) Monday through Thursday evenings from 7-9 pm to provide tutorial help. Feel free to consult with them.

Chem 120 Website (faculty.augie.edu/~dew) also accessible from the Chemistry Department Home Page, provides the syllabus, web versions of most of the handouts, old exams, and links to a number of chemistry related sites. There is also a link to the McGraw-Hill website associated with our text.

A **Study Guide** accessible on Moodle and the class website outlines each chapter to be covered, highlighting the important material and concepts to help you focus your study time.

ARIS Online resources from the publisher – Register for access to the site at <http://www.mharis.com/>. You will need a registration code (can get it on line or from the book store) and the Section Enrollment code - BBE-D8-F4A. You will access the on-line homework assignments on this site.

Computer Assisted Instruction

Three Excel spreadsheets, *Name Worksheet.xls*, *Balance Worksheet.xls*, and *Complete and Balance.xls*, are available to give you practice in nomenclature and balancing reactions. Worksheets within each file are generated from a small database, so each printed worksheet is different. These files use macros, so you need to make sure Excel will allow macro use (the default is to BLOCK macros).

Directions for access and use:

- Load Excel
- Make sure **Data Analysis** is available in the **Tools** menu. If not, add it - **Tools/Add-ins/Analysis Toolpak**.
- Make sure **Security** is set to medium (or low) - **Tools/Options/Security (tab)/Macro Security/** select medium.
- Open the spreadsheet: **File/Open**, navigate to S:\Chemistry (Shared on Tucker), and select the worksheet file you want to run. When prompted, select **enable macros**. Then click on the **Print ... Worksheet** button. The screen will flash as the spreadsheet builds the worksheet and then it will print to the default printer. Each time you click the **Print ... Worksheet** button, it will print a new worksheet. Close Excel; don't save changes.
 - NAME - practice in naming and writing formulas.
 - BALANCE - practice in writing formulas and balancing reactions.
 - COMPLETE AND BALANCE - practice in writing formulas, predicting products of reactions, and balancing.

ACCOMPLISHING THE GENERAL GOALS AND EXPECTATIONS: GUIDELINES AND EVALUATION

General Guideline for All Work Submitted

- Give **evidence** of your thinking process on all work:
 - **show calculations in logical steps** that someone else can easily follow.
 - **explain your reasoning** on all questions.

NO WORK, NO CREDIT!!!

- Strive for explanations and thinking that relates the observable to the characteristics and behavior of atoms and molecules, i.e. relate the macroscopic to the microscopic.
- Show the labels (units) on all numbers.
- When expressing decimal numbers that are less than one, include a zero before the decimal point (0.315 cm, not .315 cm or 0.315 with no label)
- Don't round off until the last step.
- Express answers to the correct number of significant digits.
- Show charges on all ions.

Homework

Chemistry is not a "spectator sport." You need to work problems on your own or in groups to truly master the material. You are provided two specific ways to do this in this course: On-line Homework and Recommended Problems. There will be

approximately 15 weekly **on-line homework** assignments with points determined by the fraction of assignments you complete successfully times 125. (Successful completion is attaining at least 55% on the assignment). You need to register for access to the ARIS site at <http://www.mharris.com/>; which requires your registration code (can get it on line or from the book store) and the Section Enrollment code - BBE-D8-F4A. The Study Guide lists **Recommended Problems** from the end of each chapter in the text.

Hour Exams

4 hour exams (100 pts each) will be given as scheduled (see lecture schedule below) during the regular lecture period. If you have to miss an exam, please notify the instructor, preferably before the absence. If you have an acceptable excuse for missing an exam and the exam cannot be rescheduled conveniently before the exam is returned to the class, more weight will be placed on your final exam to cover the missed exam. **No phones or programmable (graphing or alphanumeric) calculators are allowed during exams.**

Hour exams offer a periodic opportunity for you to demonstrate your understanding of the material. Consistent with the nature of chemistry, each exam will be somewhat comprehensive, with material taken from what has been covered to date, as well as lab and safety material. A **Study Guide** for each chapter is provided on Moodle and the class website. Before each hour exam, we will review the outline of the chapters to be covered on the exam so you can plan and focus your study time. In addition, examples of past exams are available on the class web site. The tables of *Relavant Formulas and Constants* in the *Study Guide* highlight what you should know for exams. Values of constants will be supplied on exams, but the formulas will not.

Final Exam

The **final exam** (200 pts) is one last opportunity for you to demonstrate that you have mastered the material presented in this class. An ACS General Chemistry exam (standardized exam) will be given during the final exam period. In addition you will have the opportunity to take a different edition of the ACS Exam during the last lab period. Your **best** ACS Exam score will become your score of record for the Final Exam. An ACS publication *Preparing for Your ACS Examination in General Chemistry - The Official Guide* will be helpful in preparing for this type of exam. You may purchase a personal copy from the Marlys (GSC Division Secretary) or use one of the copies on reserve in Mikkelsen Library. *The Study Guide is copyrighted material, so making a xerox copy of those on reserve is **not** an appropriate strategy.*

Since the final represents a recap of the entire semester, it may also be used to **improve the score on your lowest hour exam**. It works like this: if you score a higher percentage on the final than on a previous exam, or if you missed an exam, then the final exam score will replace that exam score.

Each ACS exam has a multiple choice format, a 110 minute time limit, and 70 questions. ACS Exams provide a list of constants similar to the list provided on other exams. Points for the ACS Exams are scaled to the national norms.

Why use a standardized exam?

Grades are used for a variety of purposes, most of which extend well beyond Augustana. To facilitate these ends, students' grades should give some reflection of their abilities and mastery of the subject compared to similar students across the nation. In this course the final exam in the form of a standardized exam prepared by the American Chemical Society (ACS) is used to provide that context. The rationale for using a standardized exam includes several aspects:

- Assessment tool for the Chemistry Department as it evaluates its curriculum.
- Comparison tool for you and the Chemistry Department to see how you and the class as a whole "stack up" against your counterparts across the nation.
- National norms provide a yardstick for determining a consistent grading scale.
- True mastery of a concept implies an ability to apply it in new situations. Exams prepared by someone other than the instructors provide new contexts and formats to test this ability. Or as John W. Moore wrote in an editorial in *The Journal of Chemical Education* **1998**, 75(2), 135: "*In a world in which change is the norm, only an educated student has been properly equipped to prosper. This means that students need to be able to identify and define problems, to solve them imaginatively, and to apply the chemistry they learn in a variety of contexts in other disciplines.*"
- Students gain experience/practice in taking standardized, multiple-choice exams often used as a "hurdle" for many post-college endeavors (e.g. MCAT for medical school, OAT for optometry school, DAT for dental school, GRE for graduate schools, Nursing Boards, Bar Exam, CPA certification, etc.)

Nature of Standardized Exams: General Chemistry encompasses a wide range of topics, so wide that it is impossible to cover all of them in any detail in one course. Each instructor of a General Chemistry course will select a subset of the topics that match the background and career interests of the students and the instructor's personal biases of what is most important.

Comparing students in such courses on a nationwide basis with a single exam becomes a daunting task. The ACS (and many other testing agencies) approach the task by designing an exam that covers the entire range of topics in the discipline. That means that virtually all students will encounter questions over material they *have not* seen in class, but also they will surely encounter some questions over the material they *have* seen. The goal of the exam designers is to have an exam where the average student will get about half of the questions correct. However, the actual value of this raw score is not important. What is important is how it compares with the scores of other students taking the exam. The percentile, derived from the distribution and ranking of raw scores, provides this comparison information - it tells you specifically what percentage of students from the sampling pool scored lower than you on the exam.

Strategies for Preparation: A common myth propagated among students is that studying for standardized exams is a fruitless endeavor. **THIS IS ABSOLUTELY NOT TRUE.** If you have a firm understanding of the material covered in class, you can score quite well on these exams. So, **PREPARE** by focusing on the material we have covered in class. Also make use of the guidebook *Preparing for Your ACS Examination in General Chemistry - The Official Guide* (ACS publication). Multiple opportunities to take these exams allow you to identify and then study for problem types that are giving you difficulty.

Laboratory

Lab provides the opportunity for you to gain hands-on experience with the concepts encountered in class, and to learn proper and **SAFE** lab techniques. **LAB WORK** is permitted only during the scheduled lab periods. The schedule of experiments is found on the last page of this syllabus. If you must miss a lab, see the instructor promptly (preferably before the absence). In general, only students with **EXCUSED** absences (mainly illness or family emergency) will be allowed to make up missed labs.

You will work in groups of two on each lab. Share duties in the lab so both are involved in the experiment and in writing the report: learn by doing, not by watching.

Details for recording data in lab and writing the lab report are given on pages 6-7 of the lab manual. Each **STUDENT** submits a safety and reactions report due at the beginning of the period the experiment is conducted. Each **GROUP** submits a single lab report at the beginning of following lab period. Each member of the group should sign the report as an indication that you were a full participant in the effort. If full participation is not possible, group members should submit separate reports - be sure to include an explanation of why you couldn't submit a group report. Labs are worth 25 points each; late lab reports will be penalized 20%. No lab reports will be accepted after 5 pm on the last day of classes. **YOU CANNOT PASS THE COURSE UNLESS YOU PASS THE LAB, AND YOU ONLY GET POINTS FOR LAB REPORTS TURNED IN.**

Lab Safety

Safety is a primary concern in the laboratory; we must work together to ensure a safe working environment in the lab. Start by reading pages 1-5 in the lab manual and pay particular attention to the sections on **LABORATORY SAFETY AND PRECAUTIONS** and **STANDARD LAB PRACTICES AND TECHNIQUES**. Abide by these guidelines and safety rules while you are in the laboratory. During the check-in laboratory, we will spend time on general lab safety and the safety equipment in the lab will be pointed out.

Safety must also be intentional so we will ask each of you to signify your willingness to join your instructor, assistants, and fellow students in following these rules and developing safe habits in the lab. You will be asked to sign this statement and abide by that commitment.

I have read and understand the **LABORATORY SAFETY AND PRECAUTIONS** and the **EMERGENCY PROCEDURES** sections of the Chem 120 lab manual. They have also been discussed in lab and/or lecture. I agree to abide by them and to work cooperatively with my instructor, assistants, and fellow students to ensure this lab is a safe place to work and learn.

Name _____

Date _____

Chem 120 - Tentative Lecture Schedule		
Date	Chapter	Topic
Feb 5, 8	1	Introduction, Chemistry: The Central Science
10, 12	2	Atoms, Molecules, and Ions
15, 17, 19	3	Stoichiometry: Ratios of Combination
22	6	Quantum Theory and the Electronic Structure of Atoms
Feb 24 (W)		Exam 1
26	7	Electronic Configuration and the Periodic Table
Mar 1, 3	8	Chemical Bonding I-Basic Concepts
5, 8	9	Chemical Bonding II: Molecular Geometry and Bonding Theories
10, 12, 22	4	Reactions in Aqueous Solution
15-19	-	No class – Spring Break
Mar 24 (W)		Exam 2
26	4 (cont)	Reactions in Aqueous Solution
29, 31, Apr 7	5 (18)	Thermochemistry Entropy, Free Energy, and Equilibrium
Apr 2-5		No class – Easter Break
9, 12	11	Gases
14	12	Intermolecular Forces and the Physical Properties of Liquids and Solids
Apr 16 (F)		Exam 3
19, 21	13	Physical Properties of Solutions
23, 26	15	Chemical Equilibrium
28, 30, May 3	16	Acids and Bases
	17	Acid-Base Equilibria and Solubility Equilibria
May 5 (W)		Exam 4
7, 10	14	Chemical Kinetics
12, 14	(20)	Nuclear Chemistry
May 11 (T) & 12 (W)		Last lab period – First ACS exam
May 18 (T)		Second ACS exam (1 PM)
No assignments accepted after 5 pm on the last day of classes. Last day to drop or change to S/U is Friday, April 9.		

LAB SCHEDULE			
Date	Lab	Title	Chap
T W			
Feb 9, 10	Intro	Check in and Burner	1
16, 17	1	Scientific Measurements	1
23, 24	12	Measuring Atomic Mass	2
Mar 2, 3	20	Library Exercise	
9, 10	6C	Molecular Models	8, 9
16, 18		Spring Break	
23, 24	11	Organic Acid Content	2, 3, 4
30, 31	4	Inorganic Synthesis	3, 4
Apr 6, 7	5 ACDE	Calorimetry	5, 18
13, 14	7 AC	Gas Laws	11
20, 21	9	LeChatelier's Principle	15
27, 28	10	Acids, Bases, & Buffers	4, 16, 17
May 4, 5		Makeup, Checkout	
11, 12		First ACS Exam	
Safety and Reactions reports are due at the beginning of the lab period. Lab Reports are due at the beginning of the following lab period.			

Handouts available on Moodle and the class website:

- Study Guide for Burdge
- Ions, Charges, and Naming Rules
- Using Excel 2007 in Chem 120
- Solubility Rules