

**TR 6:30-8:00**            **201B Reichardt Building**  
**Instructor:**            Thomas Clausen  
**Office:**                 188 Reichardt Building  
**Office Hours:**         By appointment (call or email me)  
**Telephone:**            474-5512 (Voice mail)  
**E-mail**                    [FFTPC@UAF.EDU](mailto:FFTPC@UAF.EDU)

**Required Materials:** Text: "Chemistry & Chemical Reactivity", 7<sup>th</sup> ed.; by Kotz, Treichel and Townsend

Lab Text: Experiments in General Chemistry; 105; A laboratory Manual; University of Alaska Fairbanks. This will be handed out in your first laboratory section.

"Preparing for your ACS Examination in General Chemistry; The Official Guide" available at the bookstore.

A non-programmable non-graphing scientific calculator is required for **each exam**. The Department of Chemistry and Biochemistry does not provide calculators in exams. You must provide your own. **Our advice is this: buy one now, learn how to use it, and then use it regularly to do chemistry homework. Do not wait until the day before the exam to obtain, and learn how to use, a non-programmable scientific calculator.** Its function keys should include logarithms (natural and base 10), exponents, and scientific notation and there is no need to spend more than \$10 on one.

OWL pin number available at the bookstore.

RI Response Card (clicker) for use in daily quizzes.

**Suggested Material:** Solution Manual for above text

**Prerequisites:** Placement in ENGL 111X or higher; placement in Math 107X or higher, or a B or better in CHEM 103X; or permission of instructor and department chair. Placement in Math 107X requires a minimum SAT math score of 540/800 or ACT math of 23 with subscores of 14 or better. Placement in ENGL 111X requires minimum SAT critical reading score of 430/800 or ACT English score of 17 or better. **Students not meeting these prerequisites may be removed from the course by the instructor.**

**Course Overview:** Chemistry 105/106 at UAF is a standard sequence of introductory chemistry for science and engineering majors and is accredited by the American Chemical Society (ACS). Successful completion of the sequence should be transferable to any university. Chem 105X satisfies UAF's Core Curriculum in science (that is what the "X" refers to).

In Chem 105X, we will cover chapters 1-11 of the Kotz text. The topics covered include 1) making scientific measurements, 2) atomic theory and atomic structure, 3)

stoichiometry, 4) aqueous chemistry, 5) thermodynamics, 6) valence bond theory and molecular orbital theory, 7) introduction to organic chemistry, 8) gas laws.

**Course Goals and Student Learning Outcomes:** As a result of the General Chemistry 105X experience, students will become familiar with and practice the scientific method and learn basic skill in laboratory practices, learn basic theory of atomic and molecular structures, basic laws involving gases and heat transformations, and be able to perform stoichiometric calculations.

**Honors Chemistry:** The lectures and labs for the Honors section are the same as those for all other sections. Honors students will be expected to study an approved topic and then to submit a written report within two weeks of the end of the semester that will describe the chemistry associated with the topic. See Dr. Clausen within the first two weeks of the semester if you wish to pursue this option.

**Instructor's Expectations:** Your attendance at lecture is expected. Please be respectful of other students. Arrive on time and conduct yourself in a business-like and professional manner. If you arrive late, please enter at the back of the auditorium. Have cell phones turned off unless you are expecting an emergency phone call.

**Supplemental Learning Opportunities. OPTIONAL recitation or question/answer sessions** will be given by professors, TAs, and/or personnel from the UAF Advising Center. Times and places to be announced. Other help can be obtained from (1) your professor's office hours, (2) your lab TA's office hours or extra time at the end of lab, and/or (3) you may be eligible for free tutoring at UAF's Student Support Service office (<http://www.uaf.edu/sssp/> )

**Chemistry and Department Policy on Cheating:** Any student caught cheating will be assigned a course grade of "F". The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course. Unauthorized "dry labs" and unauthorized collaborations during exams and quizzes are *examples* of cheating.

As a UAF student, you are subject to UAF's Honor Code:

*"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.*

*Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses, and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."*

**Grading:** Your final grade will be based on the following formula:

Total points (700) = Exam 1 (100) + Exam 2 (100) + Exam 3 (100) + Final exam (100) + Lab (100) + Homework (100) + Quizzes (100)

where the numbers in parenthesis corresponds to the number of possible points.

Obtaining an overall 90%, 80%, 70% and 60% of the total points will guarantee a final grade of A,B C or D respectively. I may make small changes to this scale at the very end of the semester but any changes will be to your favor. This section will not be using +/- grades.

**Extra Credit:** Up to 18 extra credit points may be added to your total earned points. Up to 8 of these extra credit points can be obtained from doing the extra credit Homework problems. There will also be a “post-test” given in the last laboratory section that can result up to 10 more extra credit points.

**Laboratory:** An important component of Chem 105 is the laboratory session. The purpose of the lab is to reinforce lecture concepts through hands-on investigation, and to gain skills in scientific reasoning and use of chemicals and laboratory apparatus. Teaching assistants who will have specific office hours conduct the labs. Your final lab grade will be based on the scores of the best ten (out of 11) lab reports. **You must complete at least eight laboratory reports and experiments in order to pass Chem 105.**

There are significant hazards in any chemistry laboratory. If you suspect you are pregnant or have other health concerns, you should contact your doctor. For most individuals, the most significant concern is eye safety. **You are required to continually wear approved eye protection while in the laboratory.** Having safety glasses pushed onto your forehead is not acceptable. **Being uncooperative in obeying our safety policies may result in a faculty initiated withdrawal from the course.**

To ensure enrollment in the course, it is important that you attend the first and secondary laboratory session. **If you do not attend these sessions, you may be dropped from the class roster to enable a wait-listed person to enroll.** You will take a placement exam during the first laboratory session that will focus on high school chemistry whose purpose will be advisory in nature and will not count toward your final grade. The second lab is a safety lab and will be graded.

It is also critical that you arrive to lab prepared and on time. **Students who arrive unprepared or late may be refused admittance into the lab.**

Other details of the laboratory will be provided by your TA.

**Exams:** Three exams are scheduled for the course along with a cumulative 2-hour final. All exams count toward your grade; **there are no dropped or make-up exams.** If you can anticipate an absence, talk to me before the exam to make arrangements. If the

absence is unexpected (illness, transportation problems, jail time...), contact me *ASAP* by phone or email to see if anything can be done. **Do not wait until the next class to speak with me about a missed exam.**

You are allowed to bring a non-programmable/ graphing calculator. Important constants will be itemized on the front page of each exam and a simple periodic table will be provided.

The final exam will be a standardized American Chemical Society exam that has 70 questions that will cover the entire Chem 105X course. The ACS official guideline book for taking general chemistry exam will provide details about the types of questions you will encounter and a strategy for approaching questions. It also has sample problems (with solutions) to practice with. The questions you will encounter are really no more difficult than those in the first three exams.

**The time (Mon, Dec. 18, 8-10 PM) and place (201 Reichardt) of the final exam have been set by the UAF Registrar, not your professor. No early or late exams can be scheduled. If you miss the scheduled exam due to travel, then the University policy on Incomplete (I) grades will be invoked.**

Practice is the best (actually only) way to ensure you will do well on the exams. Happily, there are numerous mechanisms to get this practice: worked problems in class (must be present to count), supplemental instruction, text problems, the ACS guide to taking the general chemistry exam, OWL homework, and frequent quizzes.

Note that exams will not have problems that involve simply placing numbers into an equation and solving for a numerical answer. Problems will either be conceptual (requiring little or no computation) or will require some chemical intuition (for instance arriving at a balanced chemical reaction) prior to performing a computation.

**OWL Homework:** Homework assignments will be administered via an interactive computer based program called OWL. Success in Chemistry 105 and 106 requires practice doing problems. Higher achievement in these courses and on exams is strongly correlated with time spent doing homework assignments in their entirety. *In a recent assessment, we found that students who failed the course invariably did not do out of class OWL problems on a regular basis and/or had large number of absences.*

OWL Tips:

1. Write out the problems and calculations on a sheet of scratch paper.
2. Work on campus where Internet connections are more reliable and very fast. Computers are available in the department (room 170) for OWL users during normal hours (8:00-5:00).
3. ***Don't wait until just before the due date to start your homework.***
4. If you get the wrong answer, look at the worked out solution before attempting the problem again. You are usually limited to five (5) attempts to complete a unit.
5. Use tables and rules from OWL and not other references (such as the text).

- 6. Approach OWL as an opportunity to better understand chemistry and not simply as a chore that needs to be done to earn more points.**
7. Be careful about how you enter your responses into the computer.
1. Spelling errors are serious. For instance nitrate and nitrite are very different species and while carbonate is an important anion, carbonite is unknown.
  2. Formatting is very important. For instance, OWL will accept  $\text{CO}_3^{2-}$  but not  $\text{CO}_3^{-2}$  for the formula of carbonate. Many questions will deal with acetic acid or acetate which need to be written as  $\text{CH}_3\text{COOH}$  or  $\text{CH}_3\text{COO}^-$  respectively
  3. Be aware of significant figures
  4. Don't give a compound when the question asks for an element. (i.e., be aware of exactly what the question asks for).
  5. Understand how to enter formulas and scientific notation.

OWL assignment due dates are listed at the OWL website. In *most* cases, OWL assignments associated with Tuesday lectures will be due on Friday while those associated with Thursday lectures will be due on the following Monday.

If you need an extension for any reason (*up to 5 times over the semester*), just send me an email requesting which assignment you need an extension for. You should expect a reply to your email within a day or two stating that the due date for your assignment was extended for 1 week. You may continue to work on your OWL homework while you are waiting for my reply since you will receive credit for work done once the extension is granted.

The OWL workload will be about 1 unit per day (or up to about 7 per week). Occasionally there will be additional units present that will be marked as "Extra Credit". Points earned from extra credit problems will be added to your final score according to the following equation (a total of 8 extra credit points is possible to be added to your final score):

$$\text{Final\#ExtraCreditPoints} = 8 \times \frac{\text{\#ExtraCreditOWLPoints}}{\text{Total\#PossibleExtraCreditPoints}}$$

**Quizzes:** Many lectures will incorporate a quiz that will cover recent material. These quizzes will be projected on the screen and your answers will be submitted via your response cards. You will receive two (2) points for each correct answer, one (1) point for each incorrect answer, and zero (0) points for no answer. **You will be allowed ten zero clicker scores without penalty, to take into account the (hopefully few) days you miss class due to travel on University business, sickness, or your clicker batteries ran down, or other legitimate causes. No "makeup clicker questions" will be given. No answers on paper can be accepted.**

**Register your clicker ID on the Blackboard website;** do not register your clicker using the OWL website. Look for **Tools** on the left panel, then find **TurningPoint**

**Registration Tool.** Your clicker ID is the 6 digit code (letters and/or numbers) located under the bar code on the back of the clicker. **Clicker IDs must be registered by Sunday, Sept. 14, 6:00 PM.**

Spare batteries for your card can usually be purchased for about \$1.50 in the chemistry office (room 194).

There are generally two ways to tell if your clicker is functioning. First, the green light should turn on when you submit an answer. A better (and more reliable) test, however, is by monitoring your personal number on the response table during any quiz. Please see me at the end of class if the response table does not respond to your clicker. Early in the semester we will have a mechanism for you to test your clicker before class by using the computer in the display case located across from the stairwell at the lower level of the Reichardt Building.

I advise you to save your receipt for your clicker. It may be warranted at the bookstore. You should also place your name and contact information on the clicker in the event that it is misplaced.

**Freshman Grade Reports:** I will primarily use a combination of your first exam grade (75%) and your quiz average (25%) to estimate your progress in the course for the freshman grade report.

**Faculty Initiated Withdrawals:** Students who 1) do very poorly on the first exam and 2) have a poor attendance records (based on quizzes), or poor OWL completion scores, or are not current with their laboratory work may, at my option, be removed from the course.

**Students with documented disabilities** who may need reasonable academic accommodations should discuss these with me during the first two weeks of class. You will need to provide documentation of your disability to Disability Services in the Center for Health and Counseling, 474-7043, TTY 474-7045.

## Tentative Schedule

Week	Date	Main Topics	Lab experiment
1	Sept 4	Introduction to Course and Chemistry	None
2	Sept 9 & 11	Chapter 1- Scientific Method/ Physical & Chemical Properties / Error, Significant Figures, Scientific Notation, Dimensional Analyses, graphing Atoms, elements, and molecules	Standardized Pretest (ungraded) <b>Attendance is Mandatory</b>
3	Sept 16 & 18	Chapter 2- Atomic structure (atomic #, atomic weight & isotopes), periodic Table, molecular & ionic compounds, charge of ions, Chemical Formulas, Nomenclature	Exp 1. Safety Lab <b>Attendance is Mandatory</b>
4	Sept 23 & 25	Chapter 3-Chemical Reactions, Balancing, aqueous reactions, precipitation/acid base/ gas forming/ redox classifications of reactions	Exp 2. Introduction to Lab
5	Sept 30	Review for first Exam	Exp 3. Identifying an unknown substance
	Oct 2	<b>Exam 1</b>	
6	Oct 7 & 9	Chapter 4- mole concept, stoichiometric calculation, concentrations (molarity & pH, titrations, Beer-Lambert law	Exp 4. Intro to Aq Reactions
7	Oct 14 & 16	Chapter 5- 1 <sup>st</sup> law of Thermodynamics, specific heat, calorimetry, Hess's Law Interchapter- Chemistry of fuels	Exp 5. Copper Cycle
8	Oct 21 & 23	Chapter 6- Quantized atom, Plank's equation, Bohr model, Wave model Orbitals, quantum numbers	Exp 6. Enthalpy of Neutralization
9	Oct 28	Review for second Exam	Exp 7. Intro to Spectroscopy
	Oct 30	<b>Exam 2</b>	
10	Nov 4 & 6	Chapter 7- Electron Configurations of atoms & ions, Pauli Exclusion Principle, Periodic trends (atomic & ion size, ionization energy, electron affinity, chemical Reactivity	Exp 8. Spectroscopy and Water Hardness
11	Nov 11 & 13	Chapter 8-Covalent chemical bonding (Lewis structures, octet rule, formal charges, resonance, VSEPR, polar bonds, bond order/ length & strength,)	Exp 9. Isotopes and GC-Mass Spectroscopy
12	Nov 18	Chapter 9- Valence Bond theory (hybridization, sigma vs. pi bonds, bond order..)	Exp 10. Computational Chemistry using <i>HyperChem</i>
	Nov 20	Molecular orbital theory and comparisons to VBT	
13	Nov 25	Review for third exam	Thanksgiving Week; No lab
	Nov 27	<b>Thanksgiving break- no class</b>	
14	Dec 2	<b>Exam 3</b>	Exp 11. Gas laws
	Dec 4	Chapter 10- hydrocarbons and drawing isomers, functional groups	
15	Dec 9	Chapter 11- Kinetic-Molecular theory of gases and ideal gas law.	Post-test (this is not a graded lab Up to 10 extra credit points can be Earned (based on exam score)
	Dec 11	Last day of class	
	Dec 16	<b>Review for Final Exam</b>	
	Dec 18	<b>Final exam on Thursday from 8-10 pm</b>	