Course Description (from catalog):  
CHEM F105X-F106X, together, constitute the standard one-year engineering and science-major general chemistry course with laboratory. Major subjects include measurements, calculations, atomic and molecular structure, gas laws, stoichiometry, an introduction to organic chemistry, chemical reactions and related energy changes. Special fees apply. Prerequisites: Placement in ENGL F111X or higher; placement in MATH F107X or higher; or a B or better in CHEM F103X; or permission of instructor and department chair. Co-requisite: CHEM F105L. Students must be enrolled in both CHEM F105X and CHEM F105L to receive full credit. (3+3)

Course Goal:  
Chemistry 105 is the first semester of a two-semester series in college-level general chemistry for science and engineering majors. Our goal is to learn the language of chemistry, basic principles of chemistry, and apply these principles to solve chemical problems relevant to science and engineering disciplines such as chemistry, biology, biochemistry, geology, physics, and engineering.

Learning Outcomes:  
The intended learning outcomes for this course are to be able to apply the following chemical principles to solve problems in science and engineering:

- **Language of Chemistry** -- What words do those who use chemistry (e.g. Chemists, Biochemists, Biologists, Geologists, Engineers, Physicists, etc.) use and what do they mean? Subtopics -- Naming, classes of reactions, specific terms, endings of words
- **Quantification** -- How much of some substance is in a mixture, how to measure it, accuracy and precision of measurement. Subtopics -- Concentrations, spectroscopy, units, significant figures, dimensional analysis
- **States of Matter** -- What are the properties and underlying molecular dynamics of solids, liquids, and gases? Subtopics -- Gases (ideal/real), solution state, concentrations, crystalline lattice, solubility
- **Stoichiometry** -- How much X is needed to react with Y and how much product is made? Subtopics -- Balancing chemical reactions, limiting reagents, % yield
- **Thermochemistry** -- How much energy is held in molecules that is released during reactions? Subtopics -- Calorimetry, heat of reaction, heat of formation, enthalpy, bond strength
- **Periodic Trends** -- How can we classify chemicals into groups that help us to understand their reactivity, and what theory underlies periodic behavior? Subtopics -- Quantum mechanics, atomic orbital shapes, quantum numbers, counting subatomic particles, valence electrons, oxidation state
- **Molecular Shapes** -- What shapes are molecules, and how does shape lead to which properties? Subtopics -- Lewis electron dot structures, resonance, hybridization, single/double bonds, isomers, organic molecules and functional groups

Required Materials:  
You will need three things for General Chemistry I -- the textbook, online homework access (OWL), and an instant-response system, a clicker. The first two (textbook and online homework system) are generally bundled together. For more details on the options, see the page: [http://www.uaf.edu/chem/chemfaq/chem105textbook/](http://www.uaf.edu/chem/chemfaq/chem105textbook/)

Course structure:  
The course follows your textbook in the order described on the attached schedule of topics. On each class day, I will lecture on topics and then give “clicker quizzes” to check student understanding of the topic discussed. Depending upon the result of the clicker quiz, I may move forward to the next topic or review. Class time will also prepare students for
laboratory and reinforce laboratory concepts. **Reading the book before the lectures will be important for following and understanding the lectures.** Some clicker quizzes will check reading and understanding of reading.

To aid students in staying on track and to give me feedback on how the class is progressing, we will have online homework through the Online Web-based Learning (OWL) system followed by a weekly “OWL quiz”, which is a part of the grade. I will examine results of OWL quizzes to determine if concepts need to be revisited and may adjust the week’s material in response. These weekly quizzes are a very important part of the course as they will help you to stay current with and to understand the material of the course. The course also has a laboratory section to give physical examples of the concepts you learn in class. The laboratory experiments are chosen to reinforce class learning and to enhance that integration, students will do Small Group Learning exercises in laboratory that connect lecture and laboratory and also provide students a chance to work on problems like examinations and the final examination.

**Grading Structure (points):**

Your course grade will be based on the total points of the hour exams, the final exam, OWL quiz scores, clicker quizzes, small group learning exercises, and laboratory (see below). Material assigned in readings, in lecture, in laboratory, or in homework problems may appear on an exam. The maximum number of points for each is given below. Some small number of points for extra credit may be assigned throughout the class and will be documented on the class Blackboard site for all students.

**Exercise Points**

- Pretest (for taking it) 20
- Four hour exams, 75 pts each (300 total)
- Final exam 100
- OWL Quizzes 75
- In-class clicker quizzes 35
- Laboratory with small group learning 120

**Total** 650

**Detail on graded elements:**

- **Pretest:** The pretest assists you in determining if CHEM F105X is the right start for your chemistry studies. Details on the pretest are given on the web at: [http://www.uaf.edu/chem/genchempretest/](http://www.uaf.edu/chem/genchempretest/). If you take the pretest by 11:59PM on Wednesday 23 Jan., you will be given 20 points, independent of your actual score on the test. If you take the test by 11:59PM on Friday 25 Jan., you will be given 10 points, and if you either don’t take it or take it later than either deadline, you will be given 0 points.

- **Four hour exams:** The exams will be given during class, and will be one hour in length. You are permitted to use a non-programmable calculator. Scratch paper and a periodic table / constants sheet will be provided with the examination. **During hour and final exams programmable and/or graphing calculators, cell phones, beepers, PDAs, and electronic translation devices are NOT allowed on your person. Power-off any such item, and place it inside your closed briefcase, purse, or pack at the back of the room, or on the floor.**

- **Final exam:** The final examination is 2 hours in length and is the American Chemical Society (ACS) standard examination for first-semester General Chemistry. Giving this standard examination allows us to compare our students to national norms and to check completeness of topical coverage. The topics listed under intended learning outcomes above are all tested on the examination. Because the examination doesn’t precisely match the topical coverage of our book, the raw score from the examination may be adjusted in the favor of the student for entry into the course grade calculation.

- **OWL quizzes:** On weeks during which there is no examination, there will be an OWL quiz that tests knowledge on that week’s material. Ungraded practice homework problems will also be assigned to help students prepare for the OWL quiz, also through the OWL system. When a student fails to get the correct answer on an OWL homework problem, the system gives a tutorial instantly, assisting the student in learning the concept on which they had difficulties. For the ungraded homework, an infinite number of attempts is available for each problem. Approximately 50% of the OWL quiz will be taken directly from assigned homework problem types, so there is a strong incentive to become proficient on the homework. The OWL quiz will be a timed activity, and will have a limited number of attempts (two attempts) on the problems. Only the OWL quiz scores will enter into your grade. The OWL quizzes will all be due on Sunday night at 11:59PM. Your score on this component will be calculated by taking your total OWL quiz points plus a 20% allowance for absences, sickness, travel, etc. divided by the number of possible OWL quiz problems. This fractional OWL score will then be capped at 100% and scaled to 75 course points. **No extensions on OWL due dates will be made for any reason.** The allowance of 20% extra points should take care of most instances of computer problems, sickness, university or business travel, etc that otherwise would unfairly impact your grade.

- **In-class clicker quizzes:** During each class, we will use clickers to determine if we have mastered a topic or if it needs to be reviewed. On each day, about 2-3 clicker quizzes will be given. If you get any clicker question correct on a given day, you will get one clicker point for that day. These daily clicker points will be summed and then capped at 35 points and entered into the gradebook. Because there are about 45 classes, you can miss some
days with no loss of clicker points. It is the student’s responsibility to bring the clicker to each class, replace it if lost, verify that it is registered correctly on the instructor’s database, and keep it supplied with fresh batteries. Either the “LCD” version of the clicker or the smartphone application give feedback that the response was registered and thus help students to know their result was counted. Clicking your absent roommate’s clicker is cheating – **Click only your own clicker!** Register your clicker ID on the Blackboard site. Go to “Register Clicker” on the left hand panel. **Clicker IDs must be registered by SUNDAY, 20 Jan., 11:59 PM**

- Laboratory grade: Laboratory grading and small group learning activities will be discussed during the first laboratory period. The purpose of the lab is to do hands-on investigation. We expect you to gain skills in scientific reasoning, experimental design, and use of chemicals and laboratory apparatus. The labs are conducted by graduate and upper division undergraduate teaching assistants. Lab reports will be handed in each week, to be graded and returned by the teaching assistant. Eleven experiments are scheduled for the semester. The laboratory portion of your grade (100 points) will be based upon the **average of your best 10 lab grades.** You can miss one lab with no impact on your lab grade. If you miss 2 or 3 labs, then 1 or 2 zeros respectively will be included in the average. **Do not miss 4 labs: this results in a COURSE F!** Because lecture and laboratory are complementary and integrated, all students enrolled in Chem105 (even those who have taken the course before) must attend laboratory. **Students must hand in 8 or more reports to earn a passing grade in this course.** In other words, if you hand in only 7 (or fewer) lab reports, an F grade in the course is assigned, even if all your other grades are passing. This stiff requirement is based on the American Chemical Society stipulation that students must spend a certain number of hours in lab for courses such as Chem 105X (and of course you must attend lab in order to write a lab report!). There are no make-up labs scheduled during the semester. If you have special scheduling problems or if you miss more than one lab for an acceptable reason, please discuss alternative plans with Emily Reiter, Laboratory Director. Laboratory reports are due one week after a lab is completed. Late reports will be accepted, but the score will be reduced significantly. The last report of the semester cannot be accepted late. The first lab of the semester includes a safety review. **Students must attend the safety review in order to continue in the course.**

Homework, quiz, and exam solutions will be posted on the web in the Blackboard system.

**Grading Scale:**
The grades will be calculated as percentages of the total with cutoffs below. I will not be using +/- grading.

- **Grade Percentage**
  - A 100% to 88%
  - B <88% to 77%
  - C <77% to 66%
  - D <66% to 55%
  - F <55%

I may chose to lower the grade boundaries between letter grades in the favor of the student, but will not raise them. Thus, if you get 88%, you will have an A, which is excellent!

**Cheating:**
Chemistry Department regulations require that any student caught cheating on graded work will be assigned a course grade of F. Course drop forms will not be signed in these cases.

**Make up exams:**
Make-up exams will be allowed if you have a good reason. If you anticipate an absence (work commitments, intercollegiate sports), talk to me before the exam to make arrangements. If the absence is unexpected (illness, family or personal difficulties), **talk with me at the earliest possible opportunity.** Examinations will be given by UAF testing services.

**Support Services:**
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

**Instructor-Initiated Withdrawals:**
Any time up to and including Friday, 1 Feb., the professor has the right to withdraw a student from Chem 105 for any of the following reasons: (1) Exam I or II is missed without an excused absence, or (2) two or more labs are missed, or (3) the student shows poor class attendance, or (4) is missing a lot of OWL quizzes. This is our definition of “...has not participated substantially in the course.”
Reading Assignments:
I will assign the reading (on the order of 10 pages) for the next class through the blackboard web system within a couple hours of completion of a class. Doing this reading as preparation for the class is critical to being able to follow the material in the class, and allows the lecture to reinforce your reading. Following the lecture, the OWL homework then furthers the learning, and the weekly quiz provides frequent checks. At most classes, I will start the class with a clicker quiz question on the reading that you completed in preparation for the class.

Working in groups:
While working on your homework and/or preparation for Friday quizzes, you may work in groups. In fact, working in groups usually results in faster and deeper learning. Whether you work in a group or alone, you must take the exams and quizzes alone. Copying the solution of another student is not working in a group and will lead to a hole in your understanding that will appear in your exam and quiz performance. My advice is to work the homework and study in groups but don’t cheat yourself. The Chemistry Learning Center-supported Supplemental Instruction (SI) program is a great way to get started with working in groups.

Chemistry Learning Center and other support.
Help can be obtained from (1) The Chemistry Learning Center (http://www.uaf.edu/chem/clc). (2) Your professor’s office hours, (3) any 105 TA office hours, or extra time at the end of lab, or (4) you may be eligible for free tutoring at UAF’s Student Support Service office. Please take advantage of these free opportunities. The CLC also essentially facilitates study groups through supplemental instruction (SI) sessions.

Meeting your professor outside office hours:
I am happy to meet you at other times than the office hours. If it is very brief (minutes), please just stop by; if it is longer, please make an appointment. In order to make an appointment, you need to send an email to me with the following information: 1) What topic you want to discuss, 2) Is it private or public (e.g. can others hear what is discussed or multiple students sit in) 3) What times you (the student) can meet. In this way there is a one-email exchange solution to scheduling the meeting.

Important dates:
Last day for 100% of tuition and fee refund .................................................................Friday, 1 Feb
Last day for drops (course does not appear on record), .................................................. Friday, 1 Feb
Last day for withdrawals (W appears on academic record) ..................................................Friday, 22 Mar
Spring Break (no class) ............................................................................................... Monday- Friday, 11-15 Mar
Spring Fest (no class). ................................................................................................. Friday, 26 April
Final Exams .............................................................................................................. Friday, 26 April

Summary of Resources:
Faculty—Lori K. Bogren, lkbogren@alaska.edu
Chem105 home page: log into the blackboard system: http://classes.uaf.edu/ —syllabus, sample exams and solutions, solutions to quizzes, homework solutions, email to faculty, links to other sites.
Chemistry Learning Center (http://www.uaf.edu/chem/clc).