Lectures: 8 - 9:30 TTh (HS-109) Attendance strongly recommended (response clicker answers count for extra credit).

Labs: Attendance required (less than 50% in lab = F in course). All labs meet in HS-404 at various times (See LABORATORY SECTION below).

Discussions: Attendance strongly recommended (in class quizzes and activities count for grade). All discussions meet in HS-310 on Wednesdays at various times (See DISCUSSION SECTION below).

Instructors:

Name	Office	Phone	e-mail
Dr. J. Gutow*	HS-412	424-1326	gutow@uwosh.edu
Dr. B. Kedrowski§	HS-446	424-3488	kedrowsk@uwosh.edu
Dr. G. Olsen§	HS-444	424-2398	olsengp@uwosh.edu
Dr. S. Neuendorf‡	HS-415	424-7101	neuendor@uwosh.edu

*All administrative questions, scheduling, exam regrades, etc. should be directed to Dr. Gutow. §Discussion and Lab. ‡Lab and Workshop.

Required Materials:

Text: *General Chemistry: The Essential Concepts,* 5ed, by R. Chang. Try to look at each section before we begin discussing it in class. This will familiarize you with the vocabulary and concepts being discussed so that you can take notes more efficiently. This text was chosen because it has good explanations of how to solve problems, explains concepts clearly and succinctly, and is written so that topics do not need to be covered in the order they appear.

Laboratory Notebook: Must be bound and make copies of each page. The preferred carbonless notebook is sold at the University Bookstore.

Safety goggles with covered vents, available at the Bookstore or from the Chemistry Club ($4).

Calculator capable of handling scientific notation, square roots, powers and logs.

Subscription to e-mail discussion list: **All registered students will automatically be signed up. If you drop out of the class it is your responsibility to remove yourself from the list.** Instructions for accessing the list web site are in the RESOURCES SECTION.

Recommended Materials:

eInstruction response clicker: Class code and a registration coupon will be provided in class. *Not required, but highly recommended* because answering clicker questions in class counts for extra credit and provides useful feedback to the instructor during class.

Molecular model kit: HGS Student Organic Chemistry Set C. This is the kit used in organic chemistry (Chem 235 & 335), and will help you visualize shapes of molecules. If you are not planning to take organic chemistry you will be OK without the kit.

Optional Materials: *Problem Solving Workbook with Solutions for use with General Chemistry by Chang* and *Schaum's Outline of College Chemistry* may be ordered through bookstores. None of these are likely to be necessary. The text itself contains study summaries, example solved problems and practice problems. Answers to most end-of-chapter problems are in the back of the book.

Course Prerequisite: Credit or concurrent enrollment in Math 104, College Algebra.

Course Objectives/Overview: 105 is the first chemistry course for science majors. It also meets the requirements for pre-chiropracty/dental/medical/pharmacy/physical therapy/veterinary students. It is an introduction to the structure of matter, the composition of matter, chemical reactions, chemical equilibria and the energetics of chemical reactions.

As part of a liberal arts curriculum this course has a number of goals. The primary goal is to introduce you to the topics listed above. This fits well into the liberal arts curriculum because it teaches skills which are generally useful and specific models that are widely applicable. Learning to use these models is extremely good practice at solving unfamiliar problems as well as thinking analytically, critically and creatively. A few of the things these models are used for are understanding the chemical reactions involved in living, the shapes of biomolecules, environmental issues such as global warming, developing new drugs, and designing solid-state electronics. A secondary, but very important goal of the course, is to help you develop effective communication skills. You will work on written communication skills primarily in lab.

Each week you will have at least four places to learn chemistry. At home or in the library you will read the textbook, study the vocabulary, and do problems to test your understanding. In lecture you will listen to descriptions of the most important and/or confusing concepts,take notes and try some exercises. In discussion you will use data or models and calculations to build theories and practice techniques. In the laboratory you will do experiments to discover properties of matter. You are encouraged to visit the instructors during office hours to clear up points of confusion. An optional weekly workshop organized by Dr. Sandra Neuendorf provides more practice problems to do with a group, assisted by advanced chemistry students (see RESOURCES SECTION).

Lecture: Lectures are Tuesday and Thursday. Each 90 minute period will be devoted to several concepts, with the material corresponding to the textbook sections listed in the schedule below. Bring your calculator and clicker so that you will be able to do practice problems. You can earn up to **30 points extra credit** by answering the clicker questions correctly (there will be more than 30 clicker questions at 1 point each).

Exams: There will be four 90 minute exams administered in class. Although there is not a comprehensive final exam, the exams are cumulative in the sense that you will need to understand material from the earlier exams in order to master what is covered on the later exams.

Discussion: Discussion is a chance for you to work on chemistry in small groups and with more direct interaction with the instructor. Most discussions will consist of small group exercises directed by **worksheets** (9 points for doing each worksheet) designed to demonstrate properties of matter or help you learn necessary skills. For example you might analyze periodic trends in melting points. The lowest two worksheet score will be dropped. A **quiz** (25 points each) based on the homework will also be given at the beginning of most discussions. The lowest quiz score will be dropped.

There are six discussion sections meeting on Wednesdays in HS-310, each is associated with a lab section of the same number:

1&2) 1:50 - 2:50 3&4) 3:00 - 4:00 5&6) 4:10 - 5:10

Reading/Studying: Research into how successful students study shows that devotion of time each day to chemistry homework is the most efficient way to study for the class. College students are very busy; try this method to save time! Remember this is a 5 credit course, so should require almost two times as much effort as a 3 credit course.

Reading assignments for each section will be included on the homework sheet distributed on the class web site and through the e-mail discussion list. Skim the text before the first lecture on the material. Look at the introduction, the subtitles for sections, the pictures and their captions, and the chapter highlights listed at the end.

After each lecture review your notes and read the appropriate textbook sections. Work through the in-text examples and exercises as you go along. If anything is confusing ask one of your instructors about it.

Go to the review section at the end of the chapter and see which topics, skills and equations are clear to you. Mark any that you have trouble with so you can ask more questions, study it more and do more examples of related problems.

Homework: Homework is not graded. Answer keys will be provided to allow you to study for the quizzes and exams. Answers to even end of chapter problems may be found in the appendices beginning on page AP-1, after the glossary. Answers to assigned problems without answers in the back of the text will be available a few days after the problems are assigned. Answer keys will be posted on the Chemistry 105 web site, accessible through links on Dr. Gutow's home page (http://www.uwosh.edu/faculty_staff/gutow). You should do the homework in a timely manner since it will prepare you for the tests and quizzes.

Class Schedule

Week of Mon.	Lab*	Tues Lecture Topic	Wednesday Discussion Topic	Thursday Lecture Topic
Feb 4	**No Lab**	Introduction Atomic Structure 2.1- 2.2 Wave & light 7.1 photoelectric effect 7.2	Coulombs Law/Shell model of atom	Bohr Atom 7.3 Quantum Model of Atoms 7.4-7.9 Through electron configuration
Feb 11	Worksheets: 1)electronic configurations of atoms and ions 2) periodicity 2.4, 8.1-8.5	Mass spec 3.4 Isotopes 2.3, 3.1 nuclear reactions 21.1 fusion (intro to 21.6)	**Quiz**§ atomic mass, Avogadro's number, molar mass 3.1,3.2 nuclear reactions 21.1	band of stability/nuclear binding energy 21.2 neutron absorption Radioactivity 716-717(21.3) Biological effects 21.8
Feb 18	Check-in/Line Spectra & Sig-Figs.	Transmutation 21.4 Uses of isotopes 21.7	*review*	**EXAM I**
Feb 25	Periodic properties	Naming Compounds 2.6, 2.7 Molar Mass 3.3 Balancing reactions 3.7 Stoichiometry 3.8 factor label method 1.7	**Quiz** (radiochemistry) Naming compounds 2.7 Mole calculations 3.3 Balancing 3.7 Stoichiometry 3.8	%composition 3.5, 3.6 %yield 3.10
Mar 3	Pigment Synthesis & Limiting Reagents	Ionic bonds, formulas, covalent bonds, electronegativity 9.1, 9.2, 9.4, 9.5	**Quiz**§ limiting reagents 3.9	Lewis, formal charges, resonance 9.6-9.9
Mar 10	Pigment Synthesis & Limiting Reagents	Molecular Geometry and polarity 10.1 - 10.3	**Quiz**§ Lewis, geometry, polarity 10.1, 10.2	Hybrid orbitals 10.4, 10.5
Mar 17	Pigment (discussion) Photometry I	Intermolecular forces and trends in boiling and melting points 12.1, 12.2 (*on exam 3 not exam 2*)	*review*	**EXAM II**
Mar 24	SPRING BREAK			
Mar 31	finish Photometry I (if necessary) Photometry II	Dissolving, 13.1, 13.2 Dissolving electrolytes 4.1 % by mass 13.3 p429	**Quiz** (hybrid orbitals, intermolecular forces) molarity 4.5 net ionic equations	molarity 4.5 Energy, w & q 6.1-6.3
Apr 7	finish Photometry II plan photometry III	ΔH 6.4 Calorimetry 6.5	**Quiz**§ ΔH_c	Bond Energies 9.10 ΔH^o_f 6.6
Apr 14	Photometry III	ΔH^o_f6.6 Fuel Values Handout	*review*	**EXAM III**
Apr 21	Calorimetry I	S^o, ΔS, ΔG 18.4, 18.5	**Quiz** (ΔH) Reaction rates 14.1	RXN order from initial rates 14.1, 14.2 Energy diagrams & catalysis 14.4, 14.6
April 28	Calorimetry II	Equilibrium, Keq 15.1-15.3	**Quiz**§ le Chatelier 15.4	A/B, pH, strong A/B 16.1-16.4
May 5	Check Out	Weak A/B, pKa	**Quiz**§ A/B equilibria, pKa	Buffers 17.2
Mar 12		titrations (strong) 17.3	*review*	**EXAM IV**

*See Detailed Lab Schedule below for when assignments are due. §Unless otherwise stated the quiz will be primarily on the previous week's material.

Laboratory: In the laboratory you will learn to perform techniques, design experiments, use scientific instruments, make careful observations, and communicate your results to other scientists.

Safety is crucial in the laboratory. The dress code for chemistry laboratory includes safety goggles, long pants, and closed shoes. Safety rules will be reviewed during the first lab.

This laboratory is probably different from most that you have taken. There will not be a new lab project each week. Some of the labs will be extended projects. For these extended projects you will have to plan some parts of the experiment.

All procedures actually performed, observations and other data should be written in your laboratory notebook **in ink**. Refer to the items 5 and 6 in the *Line Spectra & Significant Digits* prelab, the *Laboratory Notebook Checklist* (available on the class web site and attached to the previously mentioned prelab), and the *InLab* section of the NSF funded LabWrite web resource (http://www.ncsu.edu/labwrite/il/il-selfguide.htm).

Your lab grade will depend on your prelab exercises, the quality of your laboratory notebook and lab work, your contribution to your group, and required written work. Assignments turned in a week or more late will get zero credit. Until that time late assignments will be marked down 10% per day.

You must receive **at least 50% in lab to pass the course**. Attendance in lab is mandatory. To have an absence excused you must bring a written excuse to your instructor. There will be no make up labs, unless you can attend another laboratory section while the experiment is still in progress.

Laboratory reports: You will only be writing experimental (often called methods in biology) and results sections of laboratory reports this semester. In future classes you will be required to write reports with all the sections that would be found in a published scientific paper: Abstract, Introduction, Experimental, Results, Discussion. The requirements for a report are outlined below.

What is expected in an outstanding laboratory report?

Grammar: Complete sentences are to be written. The tense (present or past) and voice (active or passive voice) should be consistent. Because you will have completed the experiment most of the report should be in past tense and the passive voice.

Spelling: No or few errors are found.

References: Web sites, books, articles and handouts used in preparation of the report are listed at the end of the report as a numbered list in the order the referenced material appears in the report. The numbers are used in the text of the report to show where the information from the reference was used.

Organization: The information is divided into the four standard sections, labeled with their titles.

Content of the Sections:

Introduction: (*will not be doing this semester)* Tells the reader why the report is worth reading. What may be learned from the experiment? What hypothesis is being tested? Does the experiment build on existing knowledge that has been presented in the text or lecture? If chemical reactions were performed, a balanced equation should be included. References to current work of others (published literature) can be in present tense as can statements of what is known. References to the work you did should be in past tense and passive voice.

Experimental: This is a concise chronological description in paragraph form (prose) of the laboratory procedure you used. This is not a recipe. It should be in past tense passive voice (e.g. "volumes *were* measured using a graduated cylinder" not "measure the volumes with a graduated cylinder" or "I measured the volumes with a graduated cylinder"). All reagents and equipment are described using correct terminology, including brand and model names for instruments. Names of chemicals are used rather than chemical formulas. Quantities of reagents and concentrations of solutions are given either here or in a table in the results section. The description of the procedures followed is complete enough that the experiment may be reproduced without consulting the lab manual or lab notebook. Standard methods (use of an analytical balance, preparation of a solution in a volumetric flask) are mentioned but not described. Diagrams are given for unusual apparatus. This section should be in past tense passive voice. Do not use command voice. For additional suggestions see the *methods* section of the *LabWrite* web site (http://www.ncsu.edu/labwrite/po/po-matandmeth-2.htm).

Results: Begins with a one or two sentence summary of the main findings of the experiment. Each figure, table

or set of observations is discussed in a paragraph pointing out what the reader should notice about the data. All qualitative and quantitative observations are described. Both directly measured and calculated quantities are included. Tables and graphs are used to display data whenever possible. Titles or captions describe the contents of the table or graph. For any type of calculation, an algebraic equation and sample calculation including units are given. If the calculation is done multiple times the rest of the raw data and results are presented in a table or figure. The rules for significant digits are followed. Within the text references to tables and figures that the reader is looking at may be in present tense. The rest of the description in this section should be in past tense passive voice. For more suggestions see the *results* section of the *LabWrite* web site (http://www.ncsu.edu/labwrite/po/po-results.htm)

Discussion: (will not be doing this semester) The significance of the experiment is discussed. What was learned? Did the results confirm or disprove the hypothesis? Can an alternative hypothesis be suggested from the data? Comparison is made to results of previous experiments from the chemical literature. Any known or suspected sources of error are mentioned and their possible impact on the results described. References to tables and figures that the reader is looking at may be in present tense. Except for suggested future experiments the rest of the discussion in this section should be in past tense passive voice.

Lab Schedule:

Week of	In Lab Activities*	Due in Lab**
Feb 4	**No Lab**	
Feb 11	Worksheets: 1)electronic configurations of atoms and ions 2) periodicity 2.4, 8.1-8.5	Group may not leave until worksheets are completed. If worksheets are not completed by end of lab you should complete them at home.
Feb 18	Check-in/Line Spectra & Sig-Figs.	Line Spectra Prelab, goggles & notebook
Feb 25	Periodic properties	Periodic Properties Prelab,
Mar 3	Pigment Synthesis & Limiting Reagents	Pigment Prelab Periodic Properties Results Section
Mar 10	Pigment Synthesis & Limiting Reagents	
Mar 17	Pigment (discussion) Photometry I	Draft Pigment Results Section Photometry Prelab I
Mar 24	SPRING BREAK	
Mar 31	finish Photometry I (if necessary) Photometry II	Pigment Results Section Photometry Prelab II
Apr 7	finish Photometry II plan photometry III	plan for Photometry III must be approved before you leave lab.
Apr 14	Photometry III	
Apr 21	Calorimetry I	Calorimetry Prelab I Photometry III Experimental Section.
April 28	Calorimetry II	Calorimetry Prelab II
May 5	Check Out	Calorimetry II Experimental Section.
Mar 12	**NO Lab**	

*Worksheets will be provided in lab. Lab Handouts (descriptions of experiments) will be e-mailed to you and posted on the class web site ahead of time so that you can do the prelabs.
**Notebooks must remain in the lab in the drawer or cabinet assigned to your section. Take the duplicate pages with you so that you may complete write-ups.

The six laboratory sections each associated with the discussion of the same number are (all meet in HS-404):

Section # and When	Instructor	Section # and When	Instructor
1) 3 - 5:10 Wednesday	Dr. S. Neuendorf	4) 11:30 - 1:10 Tuesdays	Dr. J. Gutow
2) 12:40 - 2:50 Mondays	Dr. J. Gutow	5) 3 - 5:10 Tuesdays	Dr. B. Kedrowski
3) 3 - 5:10 Mondays	Dr. J. Gutow	6) 12:40 - 2:50 Wednesdays	Dr. G. Olsen

Resources:

Chem 105 Web Site: Contains lots of useful information: copies of this syllabus, links to interesting and useful sites related to this course, interactive tutorials, information on tutors, homework assignments and answer keys. This site is constantly being revised so your suggestions of things to include would be appreciated. Most of the site is publicly accessible, however if you try to access homework information or answer keys you will be asked for a username and password. The username is "chem105S08". The password will be provided the first day of class.

E-mail Discussion Group: **You are automatically subscribed to this**. This is an unmoderated discussion. You are encouraged to send in your answers to questions. The address for sending questions or answers is Gutowchemclass@lists.uwosh.edu. The instructors will attempt to answer any questions that are not answered by your fellow students within 48 hours. You should check your e-mail daily to get the maximum benefit from this discussion group. The instructor will also send announcements and reminders to this discussion group. If you drop the course you may remove yourself from the list by following the link to the discussion list on the class web site.

Optional Workshop: In workshop you will do practice problems in a group, assisted by advanced chemistry students. If you believe your math skills or chemistry background are weak you are strongly encouraged to attend this weekly workshop. There are two workshop meeting times: Monday 5:30-7:30 in HS-305 and Friday 9:00-11:00 am in HS-305. To enroll go to the first meeting of workshop. Dr. Neuendorf organizes these workshops.

Grading

Exams:	4 @ 200 points each	800 (57.6 %)
Worksheets	10 @ 9 points each (2 dropped for absence)	90 (6.5 %)
Quizzes:	best 8 @ 25 points each	200 (14.4 %)
Laboratory: Attendance required. You must receive at least 50% in lab to pass the course.	Prelabs (7 @ 8 pts = 56) Lab work/participation (9 @ 6 pts = 54) Notebook (9 @ 10 pts = 90) Answers to questions (6 @ 10 pts = 60) Report sections (4 @ 10 = 40)	300 (21.6 %)*
Total:		1390 (100.0 %)

The percentages necessary to receive a particular grade are listed below. The instructor reserves the right to adjust these downward.

A: >93% AB: >87% B: >81% BC: >75% C: >67% CD: >58% D: >50%

Course Policies:

Absences: The reason for any excused absences must be reported to your instructor (before the absence, if possible), and *substantiated in writing* by the appropriate person (i.e. doctor, parent, etc.). Assignments and tests missed because of an excused absence will not count against your record, but you will be held responsible for material covered during your absence. Please see your Student Handbook under "Class Attendance" for details of the University policy concerning excused absences.

Grading Errors: To be considered for possible regrading any mistakes must be brought to the attention of your instructor within one week of the time the exam, quiz or project is returned to you.

Final Grade Check: You are responsible for checking that your final score is correct. Save all papers, exams and quizzes until the final course grade has been determined.

A WORD TO THE WISE: The most common reason for a poor grade in this course is the failure to keep up with the work on a daily and weekly basis. In general, if you attend all parts of the course, read the text, complete and understand the problem assignments and lab experiments, you will pass the course. If you study in addition to that, you should do better. If you experience difficulty with any part of the course, seek help immediately. If you let it slide, it becomes more difficult to catch up because the subject matter tends to be cumulative.