

I. Course Description:

Bulletin Description: This is the first semester of the 1-year Chemistry 105/106 course sequence, which is specifically designed to meet the needs of science majors and preprofessional students. Topics covered include: atomic theory, atomic and electronic structure, chemical bonding, mole concept, stoichiometry, state of matter, formulas and equations, solutions and colloids.

Prerequisites: Credit for or concurrent enrollment in Math 104, or completion/placement of any higher math course. Recommended: A previous course in high school or college chemistry. This course fulfills a natural science requirement for the University's general education program.

As part of a liberal arts curriculum this course has a number of goals. The primary goal is to introduce students to the language and the elementary theories of chemistry, to provide training and practice in analytical reasoning and problem solving, and to serve as the basis for further studies in chemistry. 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.

This course fulfills the USP requirements for an Explore Course in the Nature category (XL). After taking this course you should be able to:

1. Describe the make-up of matter in terms of its sub-atomic, elemental, and molecular composition.
2. Extract useful chemical information from the periodic table.
3. Use the results of quantum mechanics and models of chemical bonding to predict the structure and some properties of substances.
4. Use the concepts of atomic mass, molecular mass and concentration to quantify the amount of a substance in a sample.
5. Use abstract representations of chemical reactions combined with mathematical concepts to make qualitative and quantitative predictions and conclusions about the outcome of chemical reactions.
6. Describe the difference between real and ideal gas behaviors and perform quantitative calculations for gases that behave ideally.
7. Combine abstract representations of chemical reactions with thermodynamic information to quantitatively track energy flow and spontaneity in chemical reactions.
8. Describe how intermolecular forces impact phase transitions, solubility and adhesion.
9. Work cooperatively with others to critically analyze abstract and physical (laboratory) problems, as well as accurately record observations and data.

II. Instructors and Contact Information

Name	E-Mail	Office	Telephone
Jonathan Gutow (Lecturer and Course Coordinator)	gutow@uwosh.edu	HS-412	424-1326
Greg Potratz (Lab 02L)	potratzg@uwosh.edu	HS-449	424-1488
Lauren Waters (Labs 01L & 03L)	watersl@uwosh.edu	HS-409	424-7099
James Paulson (Labs 04L & 05L)	paulson@uwosh.edu	HS-418	424-7100
Michael Foley (Lab 06L)	foleym@uwosh.edu	HS-440	424-1314

Office Hours: All instructors will have regularly scheduled times when they will be available for questions. This information will be provided by each instructor during your first meeting with them. Once all office hours are determined the information will be made available through D2L.

Course Registration and advising are managed by Chemistry's Academic Department Associate, David Miles. Office: HS-432. Phone: 424-1400. E-mail: chemistry@uwosh.edu

III. Required Course Materials

Textbook: *Read the following information carefully before you decide which textbook to download or buy. Consult your instructor if you have any questions.*

REQUIRED TEXT: OpenStax Chemistry: Atoms First

- This is the text the instructor will refer to in lectures.
- This text is available as a free PDF file download from <https://openstax.org/details/books/chemistry-atoms-first>.
- (Optional) Print copies are available at the Bookstore (\$65 new, \$39 used) or through the OpenStax website at the same cost.

ALTERNATIVE TEXT (Optional): General Chemistry: The Essential Concepts
Chang and Goldsby, 7th Edition, McGraw-Hill, © 2014.

- This book covers the topics in this course (Chem 105, General Chemistry 1), but with less detail and in a different order.
- The course schedule does list the appropriate reading in this text for each topic.
- This text is expected to be the required text for General Chemistry 2 (Chem 106) next Fall.

Online Homework: You need to buy access to ALEKS. There is a 14 day grace period before you have to pay/input a purchased access code (available from bookstore). The course ID for ALEKS and details of how to sign up will be provided in D2L and via e-mail.

- If you have technical problems or automatic scoring issues contact ALEKS support. ALEKS support is almost always faster and better able to resolve these types of issues than your instructor.
- To contact support from inside ALEKS follow the "ALEKS Help" link in the drop-down menu associated with your name. The direct link to help is <https://mhedu.force.com/aleks/s/>. There is a "Contact Support" quick link from which you can initiate chat, e-mail or phone contact.
- ALEKS support phone is: (800)258-2374

Course Manual: Available from the bookstore. This contains a copy of this syllabus and laboratory handouts.

Lab Notebook: It must be bound and have duplicate pages (carbonless copying). It may NOT be spiral bound. It can be used both for Chem 105 and Chem 106.

- Goggles: Indirect vented safety goggles (must bear the number Z87.1) are required. State law requires that goggles be worn at all times during the lab. They are available at the bookstore or from the UW Oshkosh Chemistry Club (sold at the Chemistry Stockroom HS-450). **No goggles? No lab!**
- Calculator: Any make with scientific notation, powers, roots, and logarithms. A graphing calculator is not necessary. You should bring it with you to all lectures and exams. You may wish to buy a very inexpensive calculator to take to lab with you. Cell phones and other internet-enabled devices will not be allowed as calculators on tests and quizzes. *You are not permitted to program any information into your calculator for an exam.*
- Clicker: You must purchase a Turning Technologies clicker from the University bookstore or buy one used from another student and pay to register it for the course.

IV. Course Components

Each week you will have at least five ways to learn chemistry. Success in this fast-paced and challenging course requires good attendance and a significant investment of time in addition to scheduled class hours. Learning later material depends on understanding earlier material, so it is important to keep up. You are encouraged to visit the instructors during office hours or make an appointment to clear up points of confusion or to explore topics beyond the scope of the textbook.

Homework: The ALEKS homework is due roughly twice a week. Each assignment is called an *objective* and consists of a number of *topics* to learn. Access to the next objective starts as soon as you complete the previous one. The material for each assignment is too difficult to learn in one large chunk the night the objective is due. You should plan to work on ALEKS homework most days of the week. Most students that pass the course spend 4 – 8 hours spread throughout each week working in ALEKS.

One-half (50%) of your homework grade is determined by the fraction of topics you learn by each objective deadline. One-half (50%) of your homework grade is determined by the fraction of all the topics you learn by the end of the semester. Therefore it is to your advantage to continue working on topics you have not learned even after the topic due date has passed.

Each week there will also be an *Open Pie* period (usually over the weekend), where you can work on any topic for which you have learned the prerequisite topics. This is a good time to go back and work on topics you have not learned or to work ahead.

ALEKS is an intelligent tutoring system. More details on what this means will be provided during the course. One consequence is that ALEKS will not make you work on topics you already know. When you start using ALEKS you will take an adaptive quiz called an *initial knowledge check*. Take this seriously so that you do not have to work on exercises for topics you have already mastered prior to this course.

In addition to the required ALEKS homework you may find the end-of-chapter problems in the text (answers in an appendix) useful additional practice for topics you want to work on more.

Reading/Studying: Research on successful students shows that they do more than just the required homework. You should spend additional time reading the text, reviewing and annotating your notes, getting additional help on topics you do not understand, learning vocabulary, etc. Two key things that will make your studying more effective are to read the textbook sections and start the homework before the material is covered in class. This will make class time more useful to you by helping you focus on which topics confuse you and allowing you to ask better questions.

Discussion: Discussion sections provide an opportunity to reinforce lecture material in a smaller group setting. Class time will be spent working in small groups on exercises provided by the instructor. Occasionally, new material will be presented, which will not be re-covered in lecture, but will be on the exams and homework. Credit for Discussion will be based on participation. Attendance and honest effort on the in-class exercises will earn a 100% for the day.

Lecture: Lectures meet Tuesdays and Thursdays in HS – 109 from 9:40 – 11:10 A. In lecture you will listen to descriptions of important concepts, take notes, ask questions and use your “Clicker” to participate in interactive exercises. Make sure to bring your calculator and clicker to each lecture.

Laboratory: “Hands-on” laboratory work is an essential part of chemistry. In the lab you will experience directly some of the relationships discussed in the lecture, learn experimental techniques, and solve chemical problems. You will learn to use scientific instruments, and make careful observations. Bring your lab manual, lab notebook, and calculator to the laboratory. The chemistry laboratory can be a dangerous place. A strict dress code and other safety regulations will be enforced. See the course manual for further details.

****Anyone who is pregnant or has a history of serious allergies MUST inform their laboratory instructor BEFORE entering the lab to do any work.**

Peer Educator Sessions (optional): A peer educator, a student who has successfully completed Chem 105 and 106, will offer optional weekly problem-solving sessions from 6:30-8:00 PM on Mondays and Wednesdays in Sage 2232.

Tutoring (optional): The UW Oshkosh Center for Academic Resources offers free, confidential tutoring to all UWO students. CAR is located in the Student Success Center, suite 102. Check their website www.uwosh.edu/car for more information or to contact a tutor. Many students have used this in the past and found it extremely helpful!

V. Grading

Attendance

Regular attendance is essential to successfully passing the course. An **unexcused** absence during a scheduled laboratory, discussion or exam will result in a zero-point score for that laboratory, discussion or exam. There are **no makeups for exams**.

The reason for any **excused** absence from an exam, discussion, or laboratory session must be presented to your instructor (in advance if possible) and substantiated **in writing** with the student’s signature. E-mailed excuses are NOT enough. Assignments and tests missed for a valid reason will not be counted against you, but you will be responsible for material covered in your absence.

Advance notice of a pending absence will often make it possible to arrange for an alternate time for an exam or attendance in another lab or discussion section. **If you miss more than one exam for any reason, you will receive an incomplete or a failing grade depending on the circumstances.**

Course Prerequisite

Credit for or concurrent enrollment in College Algebra (Math 104)

Grade Calculation

Exams (4 exams).....	52%
ALEKS Homework (50% timely completion of objectives, 50% overall mastery).....	15%
Discussion (participation).....	10%
Clicker Questions (1 pt ea up to 25 pts, ~50 pts available).....	3%
Laboratory.....	20%
	Total 100%

Grading Scale

The minimum percentage necessary for each grade range is listed below. These cutoffs will not be adjusted upward, but the instructor reserves the right to lower them.

Minimum %	91	88	83	79	74	70	66	62	58	54	52	0
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Grades will be posted on D2L as they become available, so you may check your current course grade at any time during the semester. It is your responsibility to verify that all scores are entered properly. Misgraded assignments or exams must be returned to your instructor for possible regrading no later than one week following their return. You are responsible for checking that your final score is correct. Save all work until the final course grade has been determined.

Laboratory Grade

Laboratory work is completed in small groups to assist students in gaining teamwork and leadership skills. Points are earned individually through pre-lab assignments (D2L quizzes due by 8A on day lab meets), accurate record-keeping, post-lab data analysis, and lab quizzes.

Attendance in laboratory is mandatory. Two unexcused absences from lab or unsuccessful completion of the laboratory component will result in a failing grade for this course, regardless of exam scores. If you miss a lab, you may attend another lab during the same week, if space allows. To attend another lab session you must verify the switch with both your normal lab instructor and the instructor of the lab you will attend. Do not expect laboratory experiences to directly correlate with lecture.

Online Homework (ALEKS) Grade

The overall ALEKS grade will be calculated as: 50% for fraction of mastery of topics (pie progress) at the end of the semester and 50% for fraction of topics completed by assigned deadlines.

Clicker Grade

You will receive one point for each clicker question answered correctly; up to a maximum of 25 (at least 50 will be asked over the course of the semester).

Exam Grading, Schedule and Policies

The exams are cumulative but not comprehensive. Later exams will not have questions of the same type asked on previous exams. However, you will need to use material tested on earlier exams to answer more sophisticated questions asked on later exams. Exams will be multiple choice with no partial credit.

Four 90-minute exams will be given. Bring your own calculator for the test. The exams will be held over two days. You will take the exam either during your scheduled class time or at the Testing Center in the basement of Polk Library. Note: for the last exam the Testing Center is only available on Friday, May 17, 2019. You will need your student ID in order to take the exam at the Testing Center.

Dates and times for the four 90-minute exams:

	Class Room during class time (9:40 – 11:10, HS-109)	Testing Center (90 minutes between 8 A and 4:30 P, Polk 2)
Exam 1	Tuesday, February 26, 2019	Monday, February 25 or Tuesday, February 26, 2019
Exam 2	Thursday, March 21, 2019	Thursday, March 21 or Friday, March 22, 2019
Exam 3	Tuesday, April 23, 2019	Monday, April 22 or Tuesday, April 23, 2019
Exam 4	Thursday, May 16, 2019	ONLY Friday, May 17, 2019

The computer scan sheets for multiple choice exams will not be returned to you. Make sure you record your answers on the exam as well as the scan sheet. You must check the posted answer keys to verify that your score was entered properly.

No radios, MP3 players, headsets or other recording or transmitting devices may be used during exams. Caps with bills must have bills turned to back of head.

Early exams will be offered for students who cannot attend the exam during the scheduled day. Students who need to take an early exam must sign up with the instructor the week before the exam.

Exams will be computer scored and the answer sheet will not be returned to you, but retained by the lecturer for a permanent record. Answer keys will be posted on D2L.

VI. Course Policies

Classroom Decorum: Be courteous to your fellow classmates. While pertinent questions are encouraged, talking and whispering during lecture are disruptive and annoying to nearby students trying to listen to the lecture.

Cell Phones must be turned off and put away. This means absolutely no “texting” during class.

Computers may be used to take notes, but do not use them for e-mail, videos, game playing, etc. during class as it is disruptive and annoying to nearby classmates trying to listen to the lecture.

E-mail etiquette: I will happily respond to your emails as fast as I can, but please be sure to include in the subject line “CHEM105:<replace with a description of the subject of the e-mail >” so that I know what the email is referring to. In the body include as much information as you can provide me about what you are asking, and your name. I will not respond to emails that include “text speak”.

Academic Dishonesty: The University of Wisconsin-Oshkosh is built upon a strong foundation of integrity, respect, and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated.

As college students (and adults) you are expected to observe high standards of integrity and honesty. Students caught cheating on exams, quizzes, or in the laboratory are subject to a grade of F for the course and a report being placed in their academic records. A second offense is likely to result in expulsion from the University.

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.

Last date to drop this course without a Late Add/Drop Request Form: Wednesday, March 20, 2019.

Students dropping the course must check out of lab before the drop is considered complete.

VII. General Advice and Additional University Resources

This course is a 5-credit course. This means that it should require almost twice the amount of work required in a 3-credit course. You should not be surprised if you spend more time on this course than some of your other courses.

Probably the most important thing you can do to improve your performance and grade in this course is to keep up with the assigned reading and homework problems. In general:

- Read the textbook sections before the lecture on that material.
- Attend lectures and take clear lecture notes.
- After lecture re-read the appropriate textbook pages and update/recopy your notes.
- Work the assigned problems promptly as the material is covered.
- Seek help if you do not understand the material or are unable to work a problem.
- Write summaries/make flashcards.
- Study for the exams by re-reading the textbook material, going over the lecture notes/summaries, and redoing the problem assignments many times.

Dean of Students Office: This is the office to contact (www.uwosh.edu/deanofstudents) if you have a serious issue that impacts your ability to meet your academic obligations. They can provide you with accurate advice on your options and serve as a single contact point so that you do not initially need to contact each instructor individually.

Writing Center: The Writing Center (uwosh.edu/writingcenter/) helps students of all ability levels improve their writing. Trained peer consultants help writers understand an assignment, envision possibilities for a draft, and improve their writing process. They even help writers learn to identify their own proofreading errors.

Reading Study Center: The Reading Study Center (www.uwosh.edu/readingstudycenter) is an all-university service whose mission is to facilitate the development of efficient college-level learning strategies in students of all abilities. The center offers strategies for improved textbook study, time management, note-taking, test preparation, and test-taking.

Students Right to Know Act: Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990: <https://uwosh.edu/financialaid/consumer-information/>.

TENTATIVE SCHEDULE

Chapters in OpenStax Chemistry: Atoms First, (Chapters in Chang text)

Week Beginning	Discussion (Monday)	Lectures (Tuesday)	Lectures (Thursday)	Lab (Days vary)
Mon. Feb. 4	Introduction Science, Chemistry, Phases, Matter Classes, Physical & Chemical Properties Worksheet 1.2 – 1.3 (1.3-1.4)	Syllabus Quiz Due by 8A in D2L Atoms, Isotopes, Atomic Mass, Mass Spectrometer, Chemical Formulas 1.1, 2.1 – 2.4 (1.1, 1.2, 2.1 – 2.4, 3.1, 3.2, 3.4)	Nuclear reactions, formation/transmutation of elements. Quantum intro, Electromagnetic radiation, Bohr model 20.2, 20.4, 3.1, 3.2 (21.1, 21.4, 7.1 – 7.3)	No Lab
Feb. 11	Atomic Structure (Shells) Worksheet	Quantum Theory, Electronic Configurations 3.3, 3.4 (7.4, 7.5, 7.7 – 7.9)	Electronic Configurations, Periodic Properties, 3.4, 3.5 (7.7 – 7.9, 8.2 – 8.5)	Check-in, Safety, Emission/Atomic Spectra
Feb. 18	Electronic Configurations & Periodic Properties Worksheet	Periodic Table, Molecular vs. Ionic Compounds, Metallic Bonding, Ionic Bonding, Covalent Bonding, Electronegativity 3.6, 3.7, 4.1, 4.2 (2.4 – 2.6)	Chemical Nomenclature, Exam review with nomenclature practice 4.3 (2.7)	Pre-lab due (by 8A day of lab) Periodic Properties
Feb. 25	EXAM 1 (testing center) Dimensional Analysis & Reactions and Balancing Worksheet 1.6, 7.1 (1.6, 3.7, 4.2)	EXAM 1 (during class or at testing center) (through 4.3, previous Thursday)	Formula & Molecular Mass, Molarity, Solutions, Reaction Classes: precipitation, acid base, redox (no balancing), 6.1, 6.3, 7.2 (3.3, 4.5, 4.2 – 4.4)	Pre-lab due Measurements/ Significant Figures/Density 1.4 – 1.6 (1.5 – 1.6)
Mar. 4	Limiting Reagent & % Yields Worksheet 7.3, 7.4 (3.8 – 3.10)	Stoichiometry, Limiting Reagents, % Yield 7.3, 7.4 (3.8 – 3.10)	Quantitative Methods: titrations & gravimetric analysis 7.4, 7.5 (4.6)	Pre-lab due Transformations of Copper 1
Mar. 11	Intro to Lewis Structures Worksheet 4.4	Lewis Structures, Octet Exceptions, Formal Charge 4.4, 4.5 (9.1, 9.2, 9.4 – 9.9)	Formal Charge, Resonance, Molecular Shapes 4.5, 4.6 (9.8, 9.9, 10.1)	Transformations of Copper 2 LAB QUIZ 1
Mar. 18	Molecular Shapes Worksheet 4.6	Molecular Shapes, Molecule Polarity/Dipole Moment, Multicenter Molecules, Review 4.6 (10.1, 10.2)	EXAM 2 (during class or at testing center; Friday only at testing center) (through 4.6)	Pre-lab due Acid Base Titration
Mar. 25	SPRING BREAK			
Apr. 1	Hybridization and Geometry Worksheet	Hybrid Orbitals, Sigma- & Pi- bonds 5.1 – 5.3 (10.3 – 10.5)	Gas Laws 8.1 – 8.2 (5.1 – 5.4)	Pre-lab due Gases
Apr. 8	Gas Laws Worksheet	Gas Stoichiometry, KM Theory, Real Gases 8.3, 8.5, 8.6 (5.4, 5.6, 5.7)	Energy, Heat, Calorimetry 9.1 – 9.2 (6.1, 6.2, 6.5)	Pre-lab due Thermo 1 (heat capacity)
Apr. 15	Heat calculations & Intro to Enthalpy Worksheet 9.3 (6.3, 6.4)	Enthalpy 9.3 (6.4)	Standard Enthalpies, Review 9.3 (6.6)	Pre-lab due Thermo 2 (enthalpies)
Apr. 22	EXAM 3 (testing center) Entropy and ΔG Worksheet 12.1 – 12.4 (18.1 – 18.5)	EXAM 3 (during class or at testing center) (through 9.3, previous Thursday)	Entropy, Spontaneity, ΔG (no equilibrium) 12.1 – 12.4 (18.1 – 18.5)	Pre-lab due Intermolecular Forces and Solubility
Apr. 29	Intermolecular Forces Worksheet SET	ΔG , Coupled Reactions/Biological Systems, SET 12.4 (18.5)	Intermolecular Forces, Liquids 10.1 – 10.2 (12.1 – 12.3)	Pre-lab due Dyes and Intermolecular Forces SET
May 6	Solids Worksheet	Phase Changes 10.3 – 10.4 (12.6)	Solids 10.5 – 10.6 (12.4, 12.5, 12.7)	Checkout LAB QUIZ 2
May 13	Review	Solids, Review	EXAM 4 (during class or on Friday in testing center)	No Lab