

**Course Description** (from the Bulletin): 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, states of matter, formulas and equations, solutions and colloids.

**Prerequisites:** Credit for or concurrent enrollment in Math 104, completion of, or placement in any higher math course.

**Class meetings** (weekly): 3 hr lecture (A09C meets T Th 9:40-11:10 am, B09C meets T Th 1:20-4:30 pm); 1 hr discussion ([schedule on page 8](#)); 2 hr 10 min lab ([schedule on page 9](#)); 5 credits total.

**Contact information for Lecture Instructors/Course Coordinators:**

Section	Instructor	Office	Phone #	Email Address
A (A09C)	Dr. Sheri Lense	Halsey 414	920-424-3476	<a href="mailto:lenses@uwosh.edu">lenses@uwosh.edu</a>
B (B09C)	Dr. Jennifer Mihalick	Halsey 439	920-424-7095	<a href="mailto:mihalick@uwosh.edu">mihalick@uwosh.edu</a>

**Contact information for additional Discussion and Lab instructors:**

A03L, A04D, B08L	Dr. Jonathan Gutow	Halsey 412	920-424-1326	<a href="mailto:gutow@uwosh.edu">gutow@uwosh.edu</a>
B07D	Dr. Michael Foley	Halsey 440	920-424-1314	<a href="mailto:foleym@uwosh.edu">foleym@uwosh.edu</a>

**Drop-in question times** (office hours): Any of the instructors in this course are happy to meet with you to answer questions related to the course, discuss study strategies, academics, your goals or life in general. All have regularly scheduled ‘drop-in’ office hours that will be posted in the course Canvas site. If you cannot make scheduled office hours, you can arrange an appointment by contacting the instructor you wish to meet.

**Required course materials:**

- **Textbook:** Chemistry: Atoms First 2e, Flowers et al. OpenStax. This textbook can be read [online or downloaded as a pdf](#) for free, or purchased as a printed copy from the bookstore.
- **Lab Manual:** Chemistry 105 Lab Manual F25, Lense & Mihalick. Available from the bookstore.
- **Online Homework:** ALEKS for general chemistry, McGraw-Hill, 1 semester access required. Detailed instructions for registration provided separately.
- **Response System:** Subscription with the PointSolutions (aka Turning and Echo 360) system. You can use a smartphone or purchase a response clicker. Detailed instructions for registration provided separately.
- **Goggles:** Indirect vented safety goggles (must bear the number Z87.1) are required. Free goggles donated by Kimberly-Clark will be distributed in lab. **No goggles? No lab!**
- **Calculator:** Any make with scientific notation, powers, roots, and logarithms. A graphing calculator is not necessary. Cell phones and other internet-enabled devices will not be allowed as calculators on tests and quizzes.

**Course objectives and learning outcomes:** CHEM 105 General Chemistry I is an Explore/Nature course (XL) in the University Studies Program. The course meets chemistry requirements for students majoring in science or engineering, or in secondary education with a natural science emphasis, as well as for students preparing for healthcare programs including chiropractic, dentistry, medicine, nursing, pharmacy, physical therapy, and veterinary medicine.

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 the sciences. 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 for 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 climate change, developing new drugs, and designing solid-state electronics.

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.

**Course components:** Each week you will have at least five ways to learn chemistry. Remember that this is a 5 credit course, so will require almost twice as much work as a 3 credit course. Success in this fast-paced and challenging course requires good attendance and a significant investment of time in addition to scheduled class hours. Since your ability to learn the later topics will depend on understanding earlier material, it is important to keep up with the schedule. Please visit the instructors during their posted office hours, or make an appointment for a different time, to clear up points of confusion or to explore topics beyond the scope of the class or textbook.

**Lecture:**

In lecture you will listen to descriptions of important concepts, observe methods for solving problems, take notes, ask questions, and use the response system to participate in interactive exercises (worth 1 point each, up to a maximum of 60 points). Please bring your calculator and smartphone/clicker to each lecture.

Discussion:

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. To allow for illness and emergency you only need credit for 11 of the 14 discussions.

Homework:

Outside of class time you will read the textbook, following the [schedule on page 9](#), and practice solving problems using the ALEKS online homework system. ALEKS is an intelligent tutoring system that will help you efficiently practice chemistry problem solving. ALEKS allows you to skip topics you already know, and directs you to practice the unfamiliar topics until you can reliably solve related problems.

When you start using ALEKS you will take an adaptive quiz called an *Initial Knowledge Check* to determine what you already know/understand. Take this Initial Knowledge Check seriously so that you do not have to work on exercises for topics you have already mastered prior to this course. Based on your performance, ALEKS will create a *Prerequisite Review* assignment with math exercises, so you will be ready to do chemistry problems.

While it is best to do some problems every day, progress on ALEKS assignments will be checked twice a week. Each assignment is called a *Module* and consists of a number of topics to learn. Access to the next module starts as soon as you complete the previous one. The material for each module is too difficult to learn in one long session the night the module is due. Most students that pass general chemistry spend 4 – 8 hours spread throughout each week working in ALEKS. This work is often broken up into 20 – 40 minute blocks depending on available time and stamina.

Some modules will be followed by *Knowledge Checks*. These quiz you on topics you have already learned. Topics you remember are added to your list of *mastered* topics. Knowledge checks help you review for exams by adding topics you have forgotten back into your learning path.

*Open Pie* periods allow you to work on any topic for which you have learned the prerequisite topics. Open Pie is a good time to go back to old topics you have not completed, or to work ahead. There is also a review option that lets you practice topics you have mastered.

- 50% of your ALEKS grade is determined by the fraction of topics you learn by each module due date.
- 30% of your ALEKS grade is determined by the fraction of all the topics you learn (in your “pie”) by the end of the semester.
- 20% of your ALEKS grade is determined by the fraction of all the topics you master by the end of the semester.

Therefore, it is to your advantage to take all Knowledge Checks, and to continue working on topics you have not learned, even after the topic due date has passed.

Additional Study:

Research on successful students shows that they do more than just the required homework. You should spend additional time reading the textbook, reviewing/annotating your notes, learning vocabulary, and getting additional help on topics you do not understand. The end-of-chapter problems in the text offer useful additional practice for topics you want to work on more. Answers are provided in an appendix of the text so you can check your work. Specific problems will be suggested in the course Canvas site.

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 identify which topics confuse you, and allowing you to ask better questions. Additional study suggestions will be provided in class and on the course Canvas site.

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, to make careful observations, and to communicate your findings in written reports. Laboratory work is completed in small groups to assist students in gaining teamwork and leadership skills. Bring your lab manual, goggles, and calculator to the laboratory.

The chemistry laboratory can be a dangerous place. To minimize the chance of an accident, students must read the procedures in the lab manual and complete a prelab quiz in Canvas before coming to lab each week. A strict dress code and other safety regulations listed in the laboratory manual will be enforced. Also, anyone who is pregnant or has a history of serious allergies MUST inform their laboratory instructor, to discuss safety precautions BEFORE entering the lab to do any work.

Attendance in laboratory is mandatory. Students who must be absent due to illness or family emergency must email their instructor that they will be absent. If you miss a lab, you may attend a different lab section during the same week, if space allows. To get permission to attend another lab section, emailing both your normal lab instructor and the instructor of the lab you will attend. Two unexcused absences from lab, or a score of less than 50% in the laboratory component, will result in a failing grade for this course, regardless of exam scores.

Supplemental Instruction Sessions (optional): A student who has successfully completed Chem 105 and 106 will offer problem-solving sessions on Mondays and Wednesdays from 6:30-8:00 pm in Clow S104.

Tutoring (optional): The UW Oshkosh Center for Academic Resources offers free, confidential tutoring to all UWO students in the Student Success Center, suite 102. Check their website [www.uwosh.edu/car](http://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!

**Quizzes:** There will be two chemical naming (nomenclature) quizzes, during the weeks of 9/29 and 10/20.

**Exams:** Five multiple choice exams will be given during class time. Each exam will contain questions on material covered in the weeks preceding the exam. Much of the material in the class is cumulative, and you will need to use material tested on earlier exams to answer more sophisticated questions asked on later exams. Additionally, **core topics** from earlier exams will be reviewed on later exams. More information on the core topics can be found on page 7 of this syllabus.

	in Classroom during Lecture	Number of Questions
Exam 1	Thursday, Sept. 25	30 (all new material)
Exam 2	Thursday, Oct. 16	35 (30 new material + 5 <u>core topic</u> review)
Exam 3	Thursday, Nov. 13	35 (30 new material + 5 <u>core topic</u> review)
Exam 4	Thursday, Dec. 11	25 (all new material)
Exam 5	in Lab week of December 8	20 (all <u>core topic</u> review)

Do bring your calculator, pencil and eraser. No cell phones, 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.

The computer scan sheets will not be returned to you. Make sure that 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.

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

**Accommodations:** The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements. Reasonable accommodations for students with disabilities is a shared instructor and student responsibility. Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan developed with the Center for Accessibility and Disability Resources, which is located in Clow N201. For more information, email [accessibilitycenter@uwosh.edu](mailto:accessibilitycenter@uwosh.edu) and/or [projectsucces@uwosh.edu](mailto:projectsucces@uwosh.edu), call 920-424-1033, or visit the [Accessibility Center Website](#).

**Attendance Policy:** Regular attendance is essential to success in this course. Students are expected to attend every scheduled class but will be excused for illness, family emergencies, and required University sanctioned activities. Assignments and exams missed for a valid reason will not be counted against you, but you will be responsible for material covered in your absence. If you need to miss a lab or exam, send an email message to your instructor. 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. Due to the administrative complexity of this large course, there are no makeups for exams. If you miss more than one exam, for any reason, you will receive an incomplete or a failing grade, depending on the circumstances.

### **Grading**

Grades will be determined by the weighted points earned in course activities, except that students earning less than 50% of the lab points will receive only F or Incomplete. The relative weightings of assignments are

Exams (5) and quizzes .....	52%	Laboratory score components:	
Laboratory .....	20%	prelabs .....	24%
ALEKS Homework .....	15%	notebooks .....	65%
Discussion .....	8%	lab quizzes.....	11%
Lecture Response Questions .....	5%		
Total.....	100%		

### *Grading Scale*

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

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

Grades will be posted in Canvas 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 to you. You are responsible for checking that your final score is correct. Save all work until the final course grade has been determined.

*Early Alert* progress reports will be sent via email September 24 – 30 if poor attendance is causing problems, and/or if your grade is below a C. If you have any concerns about your performance in the course at any time, please contact your instructor to discuss possible ways to improve the situation.

### **Additional 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 silenced and put away except when using them to respond to in-class questions. 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:*

Your instructors will happily respond to your emails as fast as they can. Please be sure to include “CHEM105:” at the beginning of your subject line, so that we know what the email is referring to. In the body include as much information as you can provide about what you are asking, and your name. Instructors will try to answer emails within 1 business day. If an instructor does not reply within 1 business day, there is a chance that they missed your email, so please forward the email again. We do not respond to emails that include “text speak”.

#### *Academic Misconduct:*

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. Representing the work of another as your own is considered academic misconduct. Any assignment (exams) which you are required to do individually should contain only your own work. Students caught cheating on exams, quizzes, or in the laboratory are subject to a grade of F for the assignment and a report being placed in their academic records. A second offense is likely to result in expulsion from the University. For more details see the [information on the Dean of Students Office website and the portions of Wisconsin State Law referenced there.](#)

### **Other Useful Information**

**RESPECTING THE DIVERSITY OF OUR COMMUNITY:** Diversity drives innovation, creativity, and progress. At the University of Wisconsin Oshkosh, the culture, identities, life experiences, unique abilities, and talents of every individual contribute to the foundation of our success. Creating and maintaining an inclusive and equitable environment is of paramount importance to us. This pursuit prepares all of us to be global citizens who will contribute to the betterment of the world. We are committed to a university culture that provides everyone with the opportunity to thrive. Therefore, all members of our community are expected to treat each other with respect and apply intellectually rigorous critical analysis to all their interactions with others (e.g. activities, discussions, arguments, etc...).

**STUDENTS RIGHT TO KNOW ACT OF 1990:** 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/>.

**THERE ARE LOTS OF SUPPORT SERVICES ON CAMPUS:** If you have an emergency, mental health issue, suffer harassment, have food insecurity, . . . , see the campus resources information in the class Canvas site.

### **Core Topics**

The topics and skills listed below are fundamental to being able to use the material in this class in courses for which it is a prerequisite, in related areas such as biology and healthcare, and understanding how the physical world around you behaves. This is not a complete list of all the material you will learn about in this course. However, because they are important scaffolding for this and future courses, you will be tested on them repeatedly throughout this course.

Exams 2, 3 and 5 will contain questions reviewing core topics that were learned for previous exams. This will allow you to get credit for learning the topic later than the exam for which it was covered in class. Exam 5 will have questions related to all the topics on this list, allowing you to earn credit for learning any core topics you missed earlier in the class.

#### *Covered before Exam 1:*

1. Use the periodic table to find information about an element's atomic structure and number of valence electrons.
2. Based on chemical formula, determine if a compound is ionic or covalent.
3. Starting with formula, determine charges in ionic compound.
4. Know the formulas and charges of common polyatomic ions. Recognize these in chemical compounds.
5. Know the formulas and names of common strong acids and bases.

#### *Covered before Exam 2:*

6. Know metric prefixes (mega, kilo, centi, milli, micro, nano) and calculate metric conversions (ex: milligram to kilogram).
7. Identify the number of significant figures/digits in a measurement and propagate significant figures/digits through calculations involving +, -,  $\times$  and  $\div$ .
8. Calculate molar mass based on chemical formula.
9. Interconvert mass and moles, labelling units correctly in calculation.
10. Interconvert Molarity and moles, labelling units correctly in calculation.
11. Dilution calculation (new concentration, final volume or solvent to add).
12. Write equations for acid-base and dissolution reactions.
13. Use the periodic table and oxidation number rules to assign oxidation numbers to atomic ions and elements in a compound. Note: for atomic ions the oxidation number and ionic charge are the same.
14. Balance a chemical reaction.
15. Use a chemical reaction to relate moles of reactants and products.
16. % yield calculations/limiting reagents.

#### *Covered before Exam 3:*

17. Starting with chemical formula, draw Lewis structure.
18. Determine chemical formula from a skeletal structure.
19. Determine the hybridization and VSEPR shape from a Lewis structure.
20. Identify  $\pi$  and  $\sigma$  bonds. Groups connected by only  $\sigma$  bonds can rotate relative to each other.

**LECTURE, DISCUSSION, AND HOMEWORK CALENDAR**

*Numbers in bold face are the sections to read in the OpenStax text before class.*

Week of	ALEKS (Monday)	Lectures (Tuesday) Halsey 109	Discussion (Wednesday)	Lectures (Thursday) Halsey 109	ALEKS (Thursday)	(Friday)	Lab (Mon-Thu)
9/1	--	--	<b>1.2 – 1.3</b>	<b>1.1, 2.1 – 2.3</b>	Initial Knowledge Check		<b>no lab</b>
9/8	Prerequisite Review	<b>2.4, 3.1, 3.2</b>	<b>3.2, 3.3</b>	<b>3.3, 3.4</b>	Module 1		1
9/15	Module 2	<b>3.4, 3.5</b>	<b>3.4, 3.5</b>	<b>3.6, 3.7, 4.1, 4.2</b>	Module 3 open pie starts	Knowledge Check	2
9/22	Module 4	<b>4.3 review</b>	<b>1.6, 7.1</b>	<b>EXAM 1 (through 4.2)</b>	Module 5 open pie starts		3
9/29	Module 6	<b>2.4, 6.1, 6.3</b>	<b>Naming Quiz 6.3</b>	<b>7.1 – 7.3</b>	Module 7 open pie starts	Early Alert	4
10/6	Module 8	<b>7.4, 7.5</b>	<b>7.4</b>	<b>8.1 – 8.3</b>	Module 9 open pie starts	Knowledge Check	5
10/13	Module 10	<b>8.3, 8.5, 8.6</b>	<i>review</i>	<b>EXAM 2</b>	Module 11 open pie starts	last day to drop*	6
10/20		<b>4.4</b>	<b>4.4</b>	<b>4.5</b>	Module 12 open pie starts		<b>6, Quiz</b>
10/27	Module 13	<b>4.6</b>	<b>4.6</b>	<b>5.1 – 5.3</b>	Module 14 open pie starts		7
11/3	Module 15	<b>21.1, 9.1</b>	<b>5.2, 21</b>	<b>9.1 – 9.3</b>	Module 16 open pie starts	Knowledge Check	8
11/10	Module 17	<b>9.3</b>	<i>review</i>	<b>EXAM 3</b>	Module 18 open pie starts		9
11/17		<b>9.4, 10.1</b>	<b>10.4</b>	<b>10.2, 10.3</b>	Module 19 open pie starts	Knowledge Check	10
11/24	Module 20 open pie starts	<b>10.5 – 10.6</b>	<b>Thanksgiving break</b>				<b>no lab</b>
12/1	Module 21	<b>12.1 – 12.3</b>	<b>12.1 – 12.4</b>	<b>12.4</b>	Module 22 open pie starts		<b>Checkout, Quiz</b>
12/8	Module 23	<b>12.4, Review Knowledge Check</b>	<i>Review</i>	<b>EXAM 4</b>	open pie through Dec. 14		<b>EXAM 5</b>

\* Last date to drop this course without a Late Add/Drop Request Form: Friday, October 17, 2025.

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

**Discussion meeting times:**

section	Instructor	Location	Wednesdays	section	Instructor	Location	Wednesdays
A02D	Dr. Lense	Halsey 237	8:00-9:00	B07D	Dr. Foley	Halsey 237	12:40-1:40
A01D	Dr. Lense	Halsey 456	9:10-10:10	B08D	Dr. Mihalick	Halsey 237	1:50-2:50
A03D	Dr. Lense	Halsey 456	10:20-11:20	B05D	Dr. Mihalick	Halsey 237	3:00-4:00
A04D	Dr. Gutow	Halsey 237	11:30-12:30	B06D	Dr. Mihalick	Halsey 237	4:10-5:10

**LAB SCHEDULE**

<b>Week Beginning</b>	<b>Prelab due 8am on lab day</b>	<b>Lab Assignment</b>
Sep. 1		<i>no lab meetings</i>
Sep. 8	Prelab due	1. Check-in, Safety, Atomic Emission
Sep. 15	Prelab due	2. Periodic Properties
Sep. 22	Prelab due	3. Measurements, Significant Figures & Density
Sep. 29	Prelab due	4. Acid Base Titration
Oct. 6	Prelab due	5. Properties of Gases
Oct. 13	Prelab due	6. Transformations of Copper 1
Oct. 20		6. Transformations of Copper 2; <a href="#">Naming Quiz 2, Lab Quiz 1</a>
Oct. 27	Prelab due	7. Absorption of Light
Nov. 3	Prelab due	8. Thermochemistry 1
Nov. 10	Prelab due	9. Thermochemistry 2
Nov. 17	Prelab due	10. Dyes and Fibers
Nov. 24		<i>no lab meetings (Thanksgiving break)</i>
Dec. 1		Checkout, <a href="#">Lab Quiz 2</a>
Dec. 8		<a href="#">EXAM 5</a>

**Lab meeting times (all meet in Halsey 404):**

Monday	Tuesday	Wednesday	Thursday
9:10–11:20 AM A01L, Dr. Lense	8:00–10:10 AM B06L, Dr. Mihalick		9:40–11:50 AM B07L, Dr. Mihalick
11:30 AM –1:40 PM A04L, Dr. Lense	12:40–2:50 PM A02L, Dr. Lense		1:20–3:30 PM A03L, Dr. Gutow
1:50 – 4:00 PM B05L, Dr. Mihalick		3:00–5:10 PM B08L, Dr. Gutow	