

**Course Description and Prerequisites** (from the Bulletin): This is the second 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 in Chemistry 106 include: molecular structure, chemistry of metals and selected nonmetals, intermolecular forces, chemical equilibrium. Prerequisites: Chemistry 105 with a grade of (C) or better and either completion of Math 104 with a grade of C or better, completion/placement of any higher math course. (4+3) (Fall-Spring) Special fees may apply.

**Class Meetings** (weekly): 3 hr lecture; 1 hr discussion; 3 hr 10 min/20 min lab (5 credits total). Meeting times depend upon your section. See the course schedule on pages 7-8).

**Attendance Policy:** Regular attendance in all parts of the course is essential to achieve the course objectives with the highest grades. An unexcused absence during a scheduled exam, activity, or assignment will result in a zero-point score for that exam, activity, or assignment. If you need to miss lecture, laboratory, or discussion due to an excused reason, including illness, quarantine, childcare issues, or university-sanctioned activities, contact the instructor as soon as possible to discuss accommodations. 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. Make-ups for excused absences will be at the discretion of your instructor. If you miss all or a portion of a class, then you are solely responsible for obtaining missed class material from fellow students. 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 section. If you must come to class late or leave early, please do so as unobtrusively as possible.

**Course Instructors:**

Instructor	Section(s)	Email Address	Office
Dr. Sheri Lense*	A09C, A03D, A04D, A05D, A03L, A08L	lenses@uwosh.edu	HS-414
Dr. William Wacholtz	A07L	wacholtz@uwosh.edu	HS-441
Dr. Jonathan Gutow	A04L, A06L	gutow@uwosh.edu	HS-412
Dr. Jennifer Mihalick	A06D, A07D, A08D	mihalick@uwosh.edu	HS-439
Dr. Mike Foley	A05L	foleym@uwosh.edu	HS-440

\*Dr. Lense is the lecture instructor and course coordinator.

**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 on 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:**

Text	<p><i>OpenStax Chemistry Atoms First 2e.</i></p> <ul style="list-style-type: none"> <li>• This is the text the instructor will refer to in lectures.</li> <li>• This text is available as a free PDF file download from <a href="https://openstax.org/details/books/chemistry-atoms-first-2e">https://openstax.org/details/books/chemistry-atoms-first-2e</a>.</li> </ul>
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	<ul style="list-style-type: none"> <li>• If you prefer a print copy, they are available through the OpenStax website.</li> <li>• If you already have a copy of the non-Atoms First version that you would prefer to use, equivalent chapter numbers are on the course Canvas site.</li> </ul>
Laboratory	General Chemistry Laboratory Manual for CHEM 106 (available on CANVAS).
Calculator	Any make with scientific (or exponential) notation, power functions, square root, and logarithmic functions.
Goggles	Indirect vented safety goggles are required for admission to the first laboratory experience. State law requires that goggles be worn at all times when in the laboratory. Obtaining goggles is a responsibility left to the student; however, the Chemistry Club will sell goggles at the beginning of the semester through the stockroom window.
Clicker	Turning Technologies

**Course Objectives and Learning Outcomes:** CHEM 106 (General Chemistry II) 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.

After taking this five-credit course, you should have achieved the following learning outcomes:

- To continue learning the fundamental theories, laws, and principles of general chemistry.
- To continue learning the general physical and chemical properties of substances.
- To expand on the already learned chemist's vocabulary, including definitions of key terms, chemical nomenclature, chemical reactions, classification, etc.
- To continue enhancing problem-solving skills and apply them to chemical problems.
- To continue developing basic laboratory skills and techniques.
- To synthesize or evaluate information and ideas (i.e., evidence, statements, graphics, and questions).
- To use evidence and scientific knowledge to refute bias, if present.
- To draw conclusions and examine implications.
- To use knowledge of general chemistry principles and concepts to predict and explain real world observations and phenomenon.
- To 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. Success in this fast-paced and challenging course requires good attendance and a significant investment of time outside of class. This is a 5-credit course, so it requires almost twice as much work as a 3-credit course. Learning later material depends on understanding earlier material, so it is important to keep up. You are encouraged to meet with instructors to clear up points of confusion or to explore topics beyond the scope of the class or textbook.

*1. Homework and Online Homework Quizzes:* **Practice in solving the problems encountered in General Chemistry II is essential to mastery of the subject matter.** There are weekly homework assignments and related homework quizzes on Canvas to help you practice the

concepts and skills being covered in the course. It is strongly recommended that you complete and understand each homework assignment question to prepare for the online homework quizzes and exams. Answer keys are provided on Canvas so you can check your work. We may not have time to work through every type of problem in lecture. If not, similar problems can be found in the textbook. Questions that do not appear on the weekly quiz may still appear on exams.

**To do well on exams, you should be able to solve each of the homework problems using only the formulas and constants on the relevant formula sheet.** There are many multi-step problems encountered in CHEM 106, and it is important to practice thinking through and solving these problems using only a calculator and the formulas and constants that you will receive on the exam. Don't worry if you cannot do this on your first attempt through the homework! I encourage you to work on these problems with your classmates, consult your lecture notes and textbook, and ask instructors for help when you get stuck. However, once you have learned how to do the problems you should try to work through them independently. Mistakes made on the homework are learning opportunities. Take note of mistakes on the homework so you can correct them before the exam.

The online homework quizzes have a 60-minute time limit, are open book, and consist of problems that are similar to selected problems from that week's homework assignment. You have the option to do each quiz two times and your final score will be the better of your two attempts. If you have accommodations for extra time, email me and I will adjust the time limit accordingly. If you encounter any technical problems or believe there was a grading error, email me and I will try to help you solve the problem as soon as possible.

**If you are struggling with the homework and/or do poorly on the homework quizzes, this is a sign that you are struggling with the material and will do poorly on the exam. If you have any questions or concerns about the homework or homework quizzes, please contact me immediately so we can figure out the problem.** Much of the course material is cumulative in nature, so it is better to address any confusion or problems sooner rather than later.

*2. Reading and 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.

*3. Discussion:* Discussion reinforces the course material in a small group setting. It is an opportunity to ask questions about material from lecture, homework, and lab. We will also do activities designed to reinforce and practice the material covered in class. **New material may be introduced during discussion that will be covered on exams.** You are expected to attend the section for which you are registered but if you occasionally cannot make it to your section, you may attend a different section with approval of the instructor for that particular section. Any long-range schedule conflict must be resolved with the course coordinator.

*4. Lecture:* Lectures meet Tuesdays and Thursdays in HS-106 from 8 – 9:30 AM. In lecture you will listen to descriptions of important concepts, take notes, ask questions and use the response system to participate in interactive exercises. Make sure to bring your calculator and phone/clicker to each lecture.

5. *Laboratory*: The laboratory component of the course is intended to give you opportunities to experience tangible and hands-on illustrations of the concepts covered in the course and learn and practice laboratory skills and techniques. Attendance in lab is mandatory. Only those individuals with approved absences (i.e. illness, an absence due to University business, etc.) will be allowed to make up a missed laboratory assignment. **Whenever possible, students who miss a laboratory due to an excused absence should make up the laboratory by attending a different section that week.** Before attending, email the laboratory instructor for that section to ensure there will be room. Each of the labs is only run for a one-week period, so you cannot make up the lab after that week has ended. If it is not possible to make up a lab by attending a different section, contact the instructor immediately to discuss other accommodations. **More than three absences from scheduled labs may justify assignment of an “incomplete grade”.** Circumstances permitting, scheduled labs are in-person. **Two unexcused absences from lab will result in a failing grade.**

The laboratory points are divided among pre-lab assignments, in-lab performance (including your electronic notebook), and post-lab data analysis. Pre-lab assignments are available on Canvas and are due at 11:59 PM the night before your lab. However, it is strongly recommended that you start the pre-lab assignment earlier in case you have questions. While instructors will try to answer questions as quickly as possible, allow at least one full workday for any questions. In-lab performance includes being present at the beginning of lab, contributing to your team, working safely, and properly recording data and observations in your electronic lab notebook. Post-lab data analysis includes interpretation of lab results, such as graphs, and written summaries on post-lab assignments. Lab points are only assigned by your laboratory instructor.

6. *Peer Educator Sessions* (optional): A peer educator, a student who has successfully completed Chem 105 and 106, will offer optional problem-solving sessions. Times will be announced in class and provided in the course Canvas site.

7. *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](http://www.uwosh.edu/car) for more information or to contact a tutor.

## Grading

### Grade Distribution

Item	Points	Percentage
Exams (4 @ 120 points each)	480	55.2%
Homework Quizzes (best 10 @ 10 pts each)	100	11.5%
Laboratory (Total)	200	23.0%
Clicker Questions (1 pt each, up to 40 pts)	40	4.6%
Discussion Participation (best 10 @ 5 pts each)	50	5.7%

### Grading Scale

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

These cut-offs will not be adjusted upwards, but the instructor may lower them slightly depending on the class grade distribution. Unsuccessful completion of the laboratory component

(less than 110 points) will result in a failing grade for this course regardless of your overall point total. A C or better is required to continue onto other courses with this course as a prerequisite.

*Exams:* Four 90-minute exams will be given. Please bring your own calculator for the tests. The exams will be held during regular lecture hours and at designated times in the Testing Center. 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. 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 in Canvas.

An **unexcused** absence during an exam in any part of the course will result in a zero-point score for that exam. Students who cannot attend the exam during the scheduled day due to a foreseeable excused absence (e.g, an university-sanctioned activity) must take an early exam. Contact the instructor at least a week before the exam to schedule a time. Students who cannot attend the exam during the scheduled day due to an unforeseeable reason (e.g. illness or quarantine) should contact the instructor immediately to discuss accommodations. **If you miss more than one exam for any reason, you will receive an incomplete or a failing grade depending on the circumstances.**

*Homework quizzes:* The best 10 out of 11 homework quiz scores will be counted. See the section on homework on p. 3 for more information on the homework and homework quizzes.

*Turning Point Response (clicker) questions:* The response (clicker) system helps make the lecture more interactive and more beneficial to you as a student. In order for me to “see” your clicker responses during lecture, you need to register your clicker through the course Canvas page. Most lectures, there will be 1-4 opportunities to earn clicker points. Each correct answer to a clicker question is worth one point, and a maximum of 40 clicker points can be earned. The intention is that you attend lecture regularly and participate, you will easily receive all 40 points for the semester. There are many opportunities to earn these 40 points, so if you must occasionally miss a lecture due to illness or a university-excused absence, your grade will not be compromised.

*Discussion:* Participation points will be awarded for each discussion meeting. You can miss up to two discussions without penalty.

*Late Policy:* Late work will be accepted at 10% off each day it is late. The late policy goes into effect immediately after the time the assignment is due. For example, if an assignment is due at 11:59 PM on Monday, 10% will be deducted if the assignment is turned in at 12:01 PM on Tuesday. Extenuating circumstances will be dealt with on a case-by-case basis.

*Grading Errors and Changes:* Incorrectly graded assignments or exams must be returned to your instructor for possible re-grading no later than one week following their return. You should save all tests, assignments, and lab reports so that you will have them available for review, and so that any chance of clerical error may be avoided. It is your responsibility to check the exam score, quiz score, and homework score to determine that your score was entered properly. Any error must be reported within a week of the posting date of the grade for it to be considered. 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.

**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](#).

**Accommodations for Students with Disabilities:** 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. Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, [Project Success](#), or both. Reasonable accommodations for students with disabilities is a shared instructor and student responsibility. The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information, email [accessibilitycenter@uwosh.edu](mailto:accessibilitycenter@uwosh.edu), call 920-424-3100, or visit the [Accessibility Center Website](#).

**Email Correspondence:** Please put "Chem 106" and your section number in the subject line of your emails. 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 resend it.

**University Studies Program (USP):** Starting Fall 2013, all UW Oshkosh first year students were placed in a carefully crafted and unique general education program called **University Studies**. I **strongly** urge you to go online and read in detail about the program and you can find it at <http://www.uwosh.edu/usp>. One part of the USP program is Early Alert, which helps identify students (after a few graded assignments) that may be in an at-risk position early enough to find resources to help them avoid an unsatisfactory outcome in their education. If you are contacted as being at risk of failing the course, please come to office hours or send me an email as soon as possible to discuss how to improve your course performance.

**Statement on Equity, Inclusion, and Diversity in the Classroom:** I strive for this class to be inclusive of all students. When striving for inclusion, I find it important to recognize that some communities have been historically and structurally excluded from education. Thus, I want to affirm that I identify as an ally to LGBTQ+ students; Native, Latinx and Hispanic, Asian, Black, and African American students; first generation college students; students with disabilities; women students; students of diverse religious backgrounds; and students facing financial challenges in affording college.

I am committed to creating an anti-discriminatory classroom climate in which all students feel safe, supported, and affirmed. I ask that everyone in the class join me in committing to the

creation of a welcoming space free of discrimination, bullying, and harassment in which each student can find a sense of belonging.

I value all my students and want to assist you in finding the support and guidance that you need. So, if any of you face challenges this semester, whether academic or outside of academics, I can help connect you with resources on campus to assist you in addressing these challenges. My goal is to help you to be successful and to ensure that both our classroom and our campus are safe and equitable. Please see the course Canvas site for additional campus resources and statement on inclusion for parents and other caregivers.

**Other notes:** 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/resources/consumer-information/>. If any substantive changes are made in the course syllabus, such as changes in schedule or assignments, notification will be provided in a timely manner and a revised syllabus made available. It is expected that the grading criteria, as distributed to the students, will be adhered to throughout the term.

### ***Class Meeting Times and Schedules***

Lecture: T & Th 8-9:30 AM, HS-106 (Instructor: Dr. Lense)

Discussion & laboratory meeting times:

Section	Discussion			Laboratory		
	Time	Instructor	Room	Time	Instructor	Room
<b>A03</b>	W 10:20-11:20	S. Lense	HS-456	T 9:40-1:00	S. Lense	HS-402
<b>A04</b>	W 11:30-12:30	S. Lense	HS-456	R 9:40-1:00	J. Gutow	HS-402
<b>A05</b>	W 12:40-1:40	S. Lense	HS-456	W 1:50-5:10	M. Foley	HS-402
<b>A06</b>	W 1:50-2:50	J. Mihalick	HS 456	T 1:20-4:30	J. Gutow	HS-402
<b>A07</b>	W 3:00-4:00	J. Mihalick	HS 456	M 1:50-5:10	W. Wacholtz	HS-402
<b>A08</b>	W 1:50-5:10	J. Mihalick	HS 456	R 1:20-4:30	S. Lense	HS-402

**Class schedule: Textbook chapters are given in parentheses.**

Begins	Tue Lecture	Discussion	Thurs Lecture	Lab	HW Quiz
Relevant review topics: 3.4-3.6, 4.4-4.6, 10.1					
1/30	Intro/Solutions (11.1)	Solutions (11.1)	Solutions (11.1-11.3)	No Lab	HW 1 (2/6)
2/6	Solutions (11.4)	Solutions (11.4)	Solutions (11.4-5)	Intro Lab	HW 2 (2/13)
2/13	Kinetics (17.1-17.3)	Kinetics (17.3-17.4)	Kinetics (17.4)	Colligative Properties	HW 3 (2/20)
2/20	Kinetics (17.5)	Kinetics (17.5)	Kinetics (17.6-17.7 <sup>‡</sup> )	Kinetics I	HW 4 (2/27) <sup>€</sup>
2/27	Exam 1 (11 & 17)	Intro to Equilibrium	Chemical Equil (13.1-13.2 <sup>¥</sup> )	Kinetics II	None
3/6	Chemical Equil (13.3-13.4)	Chemical Equil (13.3-13.4)	Chemical Equil. (13.4) & Acid-Base Equil (14.1)	Kinetics III	HW 5 (3/13)
3/13	Acid-Base Equil (14.2-14.3)	Acid-Base Equil (14.1-14.3)	Acid-Base Equil (14.4)	Le Chatelier's Principle	HW 6 (3/20)
3/20	Spring Break	Spring Break	Spring Break	Spring Break	Spring Break
3/27	Acid-Base Equil (14.3-14.4)	Acid-Base Equil (14.3-14.4)	Acid-Base Equil (14.5-14.6)	Equil Constant Determination	HW 7 (4/3 <sup>€</sup> )
4/3	Exam II (13, 14.1-14.4)	Acid-Base Equil (14.6-14.7)	Equil - other (15.1)	Diprotic Acids	None
4/10	Equil - other (15.1-15.2)	Equil - other (15.1-15.2)	Electrochemistry (16.1)	Solubility Equilibria	HW 8 (4/17)
4/17	Electrochemistry (16.2-16.3)	Electrochemistry (16.1-16.3)	Electrochemistry (16.7)	Electrochemistry (Activity Series)	HW 9 (4/24)
4/24	Electrochemistry (16.4-16.6)	Electrochemistry (16.4-16.6)	Trans Metals & Coord Chem (3.4, 19.2)*	Electroplating	HW 10 (5/1)
5/1	Exam III (14.5-14.7, 15, 16)	Coordination Chemistry (19.2)	Coordination Chemistry (19.3)	Spectrochemical Series	HW 11 (5/10)
5/8	Coordination Chemistry (19.3)	19.3 & Review for Exam 4	Exam 4 (19, cumulative)	No Lab	None

Lecture may deviate slightly from this schedule, but exams will be given as scheduled except for an emergency.

<sup>‡</sup>In section 17.7, equilibrium will be covered later in the course.

<sup>€</sup>In preparation for the exam, completing this HW assignment before the due date is strongly recommended.

<sup>¥</sup> $K_P$  values and expressions will not be covered.

\*Naming of complexes will not be covered.



**Success in CHEM 106:** CHEM 106 is an enlightening course that illuminates many fascinating chemical and physical phenomenon. The class can be challenging since it draws concepts and skills learned in algebra and general chemistry I and involves many complex, multi-step problems. In this class, instructors and students are partners in learning. Please come to the course instructors when you have questions and when you are struggling with the material. That is why we are here! On your end, there are several course activities that are crucial for success. Becoming proficient in the subject matter requires time and effort. **Be prepared to spend at least 10 hours outside of class each week working on CHEM 106 materials.** Students are more successful when they work on the course material at least 5 days a week for 1-2 hours, rather than trying to cram for several hours at one before an exam. In other words, **you should practice solving chemistry problems at least 5 days/week.** Ask questions as soon as you have them, since a lot of the material is cumulative in nature and it is best to address struggles and misconceptions right away. Here is what you should do outside of class each week to prepare for the class and practice the class material:

**Before each lecture:** Read the relevant sections of the textbook. Write down important terms and ideas. Write down any questions you have. If your question is not answered during lecture, please ask me about it! Try working through the in-chapter example problems. If there are problems that still cannot solve after the lecture, ask an instructor to help explain it in a different way.

**After each lecture:**

1. Attempt all homework problems on material covered during that lecture. On your first attempt, you will likely need to consult the lecture notes or textbook and you may want to work with other students to complete the problems. If you get stuck on a problem, ask an instructor for help during your discussion section or during office hours. After you figure out how to solve the problems the first time, you should work through them again independently using only your calculator and the relevant formula sheet. In preparation for the exams, your goal each week should be work through each of the homework problems independently, and the only way to become proficient at this is practice.
2. Review your lecture notes. Read over your notes and make sure they are clear and complete. If you are missing something, consult the textbook or a classmate; if you still cannot find the missing information, ask an instructor. If you find something confusing, write it down and ask about an instructor or classmate about it. Try to answer the clicker questions and example problems by yourself. Here are other review activities that may be helpful depending on your learning preferences: \*Make a recording of yourself summarizing important ideas from the lecture. \*Teach the material to a friend. \*Convert the lecture notes into questions and answers on flash cards and quiz yourself. \*Write summaries of your notes in your own words. Note: Just re-reading the notes tends not to be very effective.

**Before each lab:** Complete the pre-lab for that week's lab.

Sample study schedule (Your schedule will vary depending on your commitments and on your strengths and weaknesses. For example, if solving chemistry problems is difficult for you, you may need to spend more time on the homework problems.)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Attend office hours to ask about questions on the HW problems (30 min)	Attend lecture.	Attend discussion section. Ask about any HW problems covered in Tuesday's lecture you were unable to do.	Attend lecture.	Finish attempting HW problems. (60-90 min)	Try to work through HW problems independently. (90-120 min) Note any mistakes you make or anything that's a struggle.
	Take the HW quiz (60 min)	Review your lecture notes (30-45 min)	Lab	Review your lecture notes (30-45 min)		Complete the pre-lab.
	Read textbook in preparation for Tuesday's lecture (45 min)	Attempt the HW problems covered during Tuesday's lecture (60-90 min)	Read textbook in preparation for Thursday's lecture (45 min)	Attempt the HW problems covered during Tuesday's lecture (60-90 min)		