

CH 232 - General Chemistry (4 credits)

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CH 231, 232, 233: A general chemistry sequence taught on Ecampus for students majoring in most sciences, pharmacy, and chemical, biological, and environmental engineering. CH 232 is a lecture course; CH 262 is the laboratory component. CH 262 may be taken simultaneously or following completion of CH 232. **These courses may be subject to Enforced Prerequisites that restrict registration into the courses.**

Prerequisites: One year of high school chemistry and acceptable aptitude test scores. CH 121 is accepted in lieu of high school chemistry as a prerequisite for this sequence. CH 231, CH 232, CH 233 must be taken in order.

Time Requirements: It is expected that students will spend approximately 6 hours /week reading the materials posted on Blackboard (lecture notes, worked examples, videos, etc.) and an additional 6-9 hours/week reading the textbook, studying the material covered in the lecture notes, and working on the Mastering Chemistry assignments.

Textbook and Related Items:

Tro, *Chemistry A Molecular Approach*, 3 ed., Pearson Education, 2014. ISBN: 0-321-80924-6
(Required)

Modified Mastering Chemistry, Pearson Education. (Required)

Solutions Manual to accompany *Chemistry A Molecular Approach* (Optional)

Course Content:

Chapter 5: Gases
Chapter 6: Thermochemistry
Chapter 11: Liquids, Solids and Intermolecular Forces
Chapter 12: Solutions
Chapter 13: Chemical Kinetics
Chapter 14: Chemical Equilibrium
Chapter 15: Acid and Bases

Student Learning Outcomes:

The successful student will:

- 1) Demonstrate mastery of basic chemical concepts and principles covered in this course as measured by performance on exams.
 - a) Thermochemistry
 - Be able to state and explain the meaning and significance of the 1st Law of Thermodynamics
 - Be able to determine the energy change in a chemical reaction from experimental data or tables of thermodynamic data.
 - Be able to use thermodynamics to discuss foods and fuels
 - b) Gases

- Be able to use Kinetic Molecular Theory to describe the behavior of gases
 - Be able to use the Ideal Gas Law and its derivatives (e.g. Boyle's Law, Charles' Law) to predict the behavior of gases
 - Be able to explain the assumptions made in defining the term "Ideal Gas" and the consequences of these assumptions when using the Ideal Gas Law to predict the behavior of gases
- c) Intermolecular Forces and Solutions
- Be able to use your knowledge of bonding and molecular shapes to determine the types of intermolecular forces exhibited molecules
 - Be able to explain how intermolecular forces affect properties such as boiling point and vapor pressure
 - Be able to define the term "colligative properties" and explain the effect solutes have on solution properties such as boiling points and freezing points
- d) Kinetics
- Be able to determine the rate law for a reaction from experimental data
 - Be able to explain how the rate of a reaction will be affected by changing the initial concentration a reactant
 - Be able to state the necessary and sufficient conditions for a reaction to occur
 - Be able to explain what a reaction mechanism is and the relationship between the rate law of a reaction and the mechanism of a reaction
- e) Equilibria
- Be able to explain what a dynamic equilibrium is and give examples of chemical systems that do, and do not, illustrate dynamic equilibrium.
 - Be able to explain LeChatelier's Principle and use it to predict the effects of changes made to a system at equilibrium.
 - Be able to apply the principles of equilibrium to a variety of quantitative and qualitative problems, including weak acids & bases, buffers, slightly soluble salts, and complex ion formation.
- 2) Demonstrate the ability to think scientifically and critically as measured by performance on exam questions requiring written explanations.
 - 3) Demonstrate problem-solving skills applicable to a wide variety of problems drawn from the topics covered in this course, as measured by performance on exams.
 - 4) Begin to build an understanding of how molecular structure, thermodynamics, kinetics, and equilibrium are interrelated and are all factors that affect the feasibility and outcome of chemical processes as measured by performance on exam questions requiring written explanations.

Successful completion of both CH 232 and CH 262 are required to fulfill OSU's Baccalaureate Core course requirement in the Perspectives category under Physical Science (Lab).

Physical Science Baccalaureate Core Rational: Science seeks to develop a fundamental description and understanding of the natural world, from elementary particles to the cosmos, including the realm of living systems. Students should have the opportunity to explore the insights of science, to view science as a human achievement, and to participate in scientific inquiry. This experience includes the challenge of drawing conclusions based on observation, analysis, and synthesis.

CH 231, 232, 233 has adopted the "atoms first" approach to teaching general chemistry. This means that early on we will discuss quantum mechanics and the seminal experiments that have lead to our current conception of atomic structure and function. One advantage to this approach is that it emphasizes the tentative nature of science. Science, and by extension chemistry, will be viewed as a process rather than a static set of facts. The process of 'doing science' will be further explored in the laboratory component of these courses. Students will perform experiments, collect, analyze, and draw conclusions from the data, and write formal laboratory reports to communicate the results of the experiments.

Examinations:

Students will take a midterm exam (in week 6) and a comprehensive final exam (in week 11), both under the supervision of an approved proctor. Because these exams are taken on paper, **ProctorU is NOT an option for proctoring exams in this course.** There is a three day window for taking the exams. Be sure you are aware of the dates and times the exam is available (all times are local Oregon times). Proctoring guidelines and registration for proctored exams are available online through the Ecampus Exams and Proctoring website: <http://ecampus.oregonstate.edu/services/proctoring>

It is important to submit your proctoring request as early as possible to avoid delays.

There will be quizzes, available on Canvas, for each chapter covered this term. The quizzes covering the material on the midterm exam must be completed no later than the day the midterm exam is first available. The quizzes on the material after the midterm exam must be completed no later than the day the final exam is first available. The best 6 of the 7 scores will count toward your final course grade. The quizzes do NOT require a proctor.

Grading:

Midterm Exam*	100 pts	Feb 8 (12:05 am) to Feb 10 (11:55 pm)
Final Exam *	200 pts	Mar 14 (12:05 am) to Mar 16 (11:55 pm)
Mastering Chemistry	50 pts	Chapters 5,6,11,12 due Feb 7 at 11:59 pm Chapters 13,14,15 due Mar 13 at 11:59 pm
Quizzes (best 6 of 7; 10 pts each)	60 pts	Quizzes for chapters 5,6,11,12 due Feb 8 Quizzes for chapters 13,14,15 due Mar 14

*If the percentage on the final exam is higher than the percentage on the midterm exam the midterm score will be dropped and the final exam score will be used for the entire exam component of the course grade.

Course grade % of total pts

A	92.0 - 100 %
A-	90.0 - 91.9%
B+	88.0 - 89.9%
B	82.0 - 87.9%
B-	80.0 - 81.9%
C+	78.0 - 79.9%
C	72.0 - 77.9%
C-	70.0 - 71.9%
D+	68.0 - 69.9%
D	62.0 - 67.9%
D-	60.0 - 61.9%
F	<60.0%

Services for Students with Disabilities:

Accommodations are a collaborative effort between students, faculty, and the Disability Access Services (DAS) office. Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to, or during, the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations, but who have not yet obtained approval through DAS, should contact DAS immediately at 541-737-4098.

Expectations for Student Conduct:

Student conduct is governed by the universities policies, as explained in the Office of Student Conduct: Information and Regulations. In an academic community, students and faculty, and staff each have responsibility for maintaining an appropriate learning environment, whether online or in the classroom. Students, faculty, and staff have the responsibility to treat each other with understanding, dignity, and respect. Further information may be found at: <http://oregonstate.edu/admin/stucon/achon.htm>

Academic Integrity - Students are expected to comply with all regulations pertaining to academic dishonesty, defined as: *An intentional act of deception in which the student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.* For further information, visit *Avoiding Academic Dishonest*, or contact the office of Student Conduct and Mediation at 541-737-3656

Conduct in this online classroom -- Students are expected to conduct themselves in the course (e.g. on discussion boards, email postings) in compliance with the university's regulations regarding civility. Students will be expected to treat all others with the same respect as they would want afforded to themselves. Disrespectful behavior (such as harassing behavior, personal insults, inappropriate language) or disruptive behaviors are unacceptable and can result in sanctions as defined by Oregon Administrative Rules Division 015 Student Conduct Regulations.