

Principles of General Chemistry & Lab CHEM 1200



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Course Description: This course is a survey of general chemistry and will prepare students for entry into CHEM 1210 or CHEM 2210. Students will develop a grounding in major principles of general chemistry including atoms, nomenclature, molecular structure, bonding and stoichiometry. No prior knowledge of chemistry is assumed.

Optional Credit Hours: 4

Required Text and Other Learning Resources:

Free textbook: https://saylordotorg.github.io/text_introductory-chemistry/index.html or at <https://2012books.lardbucket.org/pdfs/beginning-chemistry.pdf>

Optional text may be checked out:

Wilbraham, Antony C. *Prentice Hall Chemistry*. Upper Saddle River, N.J: Prentice Hall, 2005. Print.

Course Overview: Principles of General Chemistry 1200/1200L is a college level preparatory chemistry course with a laboratory component. This course assumes very little or no previous exposure to the topics in chemistry. The content of this course includes principles, problems, and applications in the areas of atomic structure, chemical bonding, reaction stoichiometry, behavior of gasses, reactions in solutions, solution concentrations, thermochemistry, chemical kinetics, equilibrium, and acids and bases. The scientific method is a major component of this course. Problem solving and the practical skills involved in laboratory science are a necessary part of the course. Students should review basic mathematics and algebra with emphasis on exponents and roots, manipulations of algebraic equations, and construction of graphs and tables. The use of a scientific calculator is permitted for all aspects of this course.

***You must read assigned material for success in this course.**

Course Objectives: Upon completion of this course, students should be able to do the following:

1. Students will be prepared to be critical and independent thinkers, who are able to function effectively in a scientific and technological society.
2. Students will be able to analyze scientific and societal issues using scientific problem solving.
3. In each laboratory experiment, students will physically manipulate equipment and materials in order to make relevant observations and collect data; use the collected data to form conclusions and verify hypotheses; and communicate and compare results and procedures (informally to other experimenters, and also in a formal, written report to the teacher).

12. **Course Outline: (tentative).**

The following outline presents topics in the order they will be discussed in class along with laboratory activities and scheduled tests. In order to receive credit from NW Nazarene University for this course, students will be required to successfully complete an end of the year exam designed by the American Chemical Society.

Topics	Investigation Concepts
<u>Matter and Measurement (~2wk)</u> Symbols & Nomenclature Properties of matter Changes in matter Measurement Significant figures Conversions Ch. 1 and 2 Assessment (with performance tasks)	Measurement / Lab Techniques
<u>Atomic Structure (~3wk)</u> History of atomic structure Atomic symbols and protons, neutrons, electrons Converting mass to moles, moles to particles, etc. Ch. 3 Assessment	Law of conservation of mass / E -Calorimetry
<u>Electrons and the Quantum Model (~3wk)</u> Electromagnetic radiation Quantum numbers Electron configuration and orbital notation Ch. 8 Assessment	Flame Tests / emission spectra
<u>Periodic Table (~2wk)</u> History of the periodic table Families Trends of the periodic table Ch. 8 Assessment	Patterns / Trends Properties of Matter
<u>Ionic and Covalent Compounds (~3wk)</u> Bonding General characteristics of ionic and covalent compounds Ions, lewis structures, and octet rule Naming ionic and covalent compounds Molecular shape Ch. 9 Assessment	Properties of Matter
<u>Chemical Reactions (~3wk)</u> Reactants and products Balancing chemical reactions Types of chemical reactions (Decomp., syn., single, double) Activity series Ch. 4 Assessment	Rxn's predictions & outcomes
<u>Stoichiometry (~2wk)</u> Converting from mass to moles to particles Mole Mole Ratio Empirical formulas and molecular formula determination % composition	% Composition / Emp Formula MgO Lab

Limiting reactant

Ch. 5 Assessment (Sem 1 final / midterm)

Gases (~3wk)

Kinetic molecular theory

Gas Laws

Ideal Gas law

Deviations from ideal gasses

Ch. 6 Assessment

Solutions (~3wk)

Molarity

Dilutions

Stoichiometry of solutions

Colligative properties

Ch. 11

Acids and Bases (~3wk)

Properties of acids and bases

Titrations

Indicators

pH and calculating concentrations

Ch. 12

Reaction Rates (~3wk)

Factors affecting reaction rates

Activation energy and Enzymes

Equilibrium

Ch. 7 & 13

Gas law demos

Ideal gas law and molar volume

Preparing and diluting solutions

acid/base titration

Hess's law

Final: ACS Exam (10% of Final Grade for NNU Students)

13. Grading Policy and Rubric:

- Below you will find how the course is weighted:

Assessments / Quizzes.....	40%
Final Exam 2nd semester.....	15%
Classwork / Projects / Labs.....	45%

Assessments

- Summative assessments include unit tests, research projects, and lab write-ups. All summative assignments will have prior notification of when the assignment is due. For unit tests, students will be provided with a periodic table and will be allowed to use a scientific calculator (no cell phones). Formative assessments (more frequent checks of student progress) will also be given. These quizzes will include open-ended problems, specific problem checks, and other brief progress checks. Quizzes will normally have prior notification but may be given without notification.
- Each formative assessment or quiz will be graded on the following 4 point rubric
 - 4 pts Advanced (Achieves mastery) = $\geq 95\%$
 - 3 pts Proficient (Meets Standard) = $\sim 85-94\%$
 - 2 pts Developing = $\sim 75-84\%$

14. **Course Policies:**

Homework/Problem Assignments

Each type of problem or calculation is explained in class. Problem assignments, as listed in the course schedule, are the responsibility of the students to work out and review. Students who are taking this class for college credit will be expected to keep an organized notebook containing all the assigned problems from the textbook worked out in full. These notebooks will be collected periodically and reviewed for assessment of the work. Quizzes may contain problems directly from the assigned work.

Quizzes

There will be regular quizzes. Quizzes are not always announced ahead of schedule and they may come directly from homework assignments / reading. Every effort is made to grade and return quizzes by the next class period. At the conclusion of each quiz, an answer key is distributed to the class and the quiz is reviewed.

Tests

Tests cover information discussed in class, reading, classroom demonstrations, materials assigned and laboratory work. All problems will require proper organized set-ups and calculations.

Semester Exams

At the end of the first semester, there will be a lab practical exam. This will require a formal lab report. The format and rubrics for the report will be provided at a later date. At the end of the year, there will be a final examination and exam provided by NNU from the American Chemical Society (ACS) and all students, whether they are seeking college credit or not, will be required to take this examination for statistical purposes. A practice examination (pre-test) will be administered and graded in the fall as well as spring (post-test) in preparation for the final exam. There is a study guide linked to this syllabus as well. [W General Chemistry – Year Review.docx](#)

Laboratory Notebook

Every laboratory activity is required and will be recorded in the laboratory notebook. A missed lab must be made up within a week from the scheduled time of completion. Labs that are not made up count as a zero. The lowest lab grade of the semester will be dropped.

Make-up Policy

Make-ups will require collaboration between student and instructor. A plan will be established and adhered to in the event of longer duration absences.

Academic Integrity

Violations of scholastic ethics are considered serious offenses. Cheating on exams or quizzes will result in a grade of zero for that exam, test, or quiz, at the instructor's discretion. Any zero grade assigned for cheating will remain as part of your average and will not be dropped or discounted.

Duplicate answers to questions or problems on quizzes and/or tests and/or exams from individuals sitting next to one another can be considered as circumstantial evidence of cheating.

Occasionally, students may receive a take-home quiz. Such assignments can be completed by conferring with other students, researching information in textbooks or reference books, or on the Internet. It is expected that the final work turned in will be essentially the student's own work, but it may be similar to the work of other students, use your own words. A large number of identical papers will invalidate that assignment.

Attendance

Attending class is a major responsibility a student has in this course. Most of the material that will be on tests and quizzes is discussed in depth in class. Relevant information and applications of course material, as well as demonstrations, are also presented in class. If a student misses a class, he/she is responsible to get the notes from other students.

All laboratory experiments are expected to be completed. If a student is absent from class for an extended period due to illness, an accident or another valid reason, please contact the instructor.

Lateness

Lateness to class is disruptive to the other students. Please make every effort to get to class on time. If a student does arrive late to class, it is expected that the student will come into the room quietly, find a seat, and get organized for class quickly.

