

# 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](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 gases, 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 a 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.

**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
<b><u>Matter and Measurement</u></b>	
Properties of matter	Density of Salt Solutions
Changes in matter	Density of solids
Measurement	Separation of mixture
Significant figures	
Conversions	
<b>Ch. 1 and 2 Assessment (with performance tasks)</b>	
<b><u>Atomic Structure</u></b>	
History of atomic structure	Law of conservation of mass
Atomic symbols and protons, neutrons, electrons	Law of definite composition
Converting mass to moles, moles to particles, etc.	
<b>Ch. 3 Assessment</b>	
<b><u>Electrons and the Quantum Model</u></b>	
Electromagnetic radiation	Flame Tests
Quantum numbers	Spectroscopes and line emission spectra
Electron configuration and orbital notation	
<b>Ch. 8 Assessment</b>	
<b><u>Periodic Table</u></b>	
History of the periodic table	Inquiry activity Periodic table
Families	Mendeleev for a day
Trends of the periodic table	Family Brochure Research assignment
<b>Ch. 8 Assessment</b>	
<b><u>Ionic and Covalent Compounds</u></b>	
Bonding	Inquiry ionic compound and its properties
General characteristics of ionic and covalent compounds	Inquiry covalent compound
Ions, lewis structures, and octet rule	Model kits
Naming ionic and covalent compounds	
Molecular shape	
<b>Ch. 9 Assessment</b>	
<b><u>Chemical Reactions</u></b>	
Reactants and products	Reaction types
Balancing chemical reactions	Activity Series
Types of chemical reactions (Decomp., syn., single, double)	
Activity series	
<b>Ch. 4 Assessment</b>	
<b><u>Stoichiometry</u></b>	
Converting from mass to moles to particles	Precipitate lab
Mole	Hydrate Lab
Mole Ratio	% Composition lab
Empirical formulas and molecular formula determination	Empirical formula
% composition	
Limiting reactant	
<b>Ch. 5 Assessment</b>	

## Gases

Kinetic molecular theory  
Gas Laws  
Ideal Gas law  
Deviations from ideal gases

Gas law demos  
Ideal gas law and molar volume

### **Ch. 6 Assessment**

## Solutions

Molarity  
Dilutions  
Stoichiometry of solutions  
Colligative properties

Preparing and diluting solutions

### **Ch. 11**

## Acids and Bases

Properties of acids and bases  
Titrations  
Indicators  
pH and calculating concentrations

Introduction to acid -base titration

### **Ch. 12**

## Reaction Rates

Factors affecting reaction rates  
Activation energy and Enzymes  
Equilibrium

### **Ch. 7 & 13**

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

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### 13. **Grading Policy and Rubric:**

- The MMACHS standard grading scale will apply to non-concurrent credit students, while students taking the course for college credit will be graded on the Northwest Nazarene University grading scale. Below you will find how the course is weighted:

Assessments.....	40%
Final ACS Exam (NNU Credit).....	10%
Laboratory Notebook / Projects.....	50%

#### **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). **No loaner calculators will be available.** 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)
  - 3 pts Proficient (Meets Standard)
  - 2 pts Developing
  - 1 pt Beginning

## 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 occasional quizzes during the year. Quizzes are not always announced ahead of schedule and they may come directly from homework assignments. 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. If a student has taken all the quizzes, the lowest quiz grade is dropped.

### **Tests**

Tests cover information discussed in class, 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. This exam will be provided by the American Chemical Society (ACS) and all students, whether they are seeking college credit or not, will be required to take this examination. 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.

### **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, and 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. 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 important material that will be on tests and quizzes is discussed 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.