

Chemistry 111: Foundations of Chemistry
(CRN 2370 – CHM 111 – section 201)
Spring 2017

Instructor: Phil Alexander
Email: alexand1@marshall.edu

Phone: 304-696-4808(Office)
Office: Science 408

Class Time: 9-9:50 M, W, F

Classroom: S465

Office hours: 11-12 and 1-2 M, T, W or by appointment

Prerequisite: MTH ACT of 21 or better, or C or better in MTH 127 or equivalent.

Required Text: *“Foundations of College Chemistry (14th edition) Abridged for CHM 111” by Hein.* ISBN: 978-1-11991-870-7. You may find this in a complete edition from other sources.

Required Materials:

ALEKS account access available online for \$60/6months or at the bookstore for \$81.75/6months.

Simple non-programmable calculator. Please use a simple non-programmable calculator for exams and quizzes. Using a calculator to store information for a test is a reason for receiving a zero on that test. Academic dishonesty will not be tolerated.

Catalogue description:

This course will introduce students to basic chemical facts and concepts. Topics will include units, dimensional analysis, nomenclature, solutions, atomic structure, and stoichiometry. (PR: MTH ACT of 21 or better or C or better in MTH 127 or MTH 130)

Note that a Grade of “C” or better in CHM 111 is required as a prerequisite for CHM 211.

Purpose of Course: This 3 credit course will provide you with many of the basics of a first semester, college chemistry course. Topics will include mathematics review, metric units, dimensional analysis, nomenclature, properties of matter, atomic structure, stoichiometry, Lewis dot structures, and balancing equations. Additional topics will be covered if time permits. CHM 111 is intended to prepare students for CHM 211.

Course content and grading: The grading scale will be no higher than **A** $\geq$ 90%, **B** 80 to 89%, **C** 70 to 79%, **D** 60 to 69%, and **F** < 60%. I reserve the right to use any modification to this system leading to no lower grades. Tests will be given composed of multiple choice and free response (problem) questions. The tests will make up 60% of the final grade. The final exam will count as 20% of the grade. Quizzes will be given and will represent 10% of the final grade. Approximately 1 in 5 quizzes will be dropped. ALEKS Online homework will represent 10% of the grade.

Attendance: Regular attendance is expected. No random makeup tests or quizzes will be given unless prompt arrangements are made (complete before next class). Makeup days are 3/2 and 4/27 (sign up and a university excuse are required).

ALEKS online homework problems will be assigned for each chapter and will be graded. Problems similar to those on the homework will be included on the tests and quizzes. Attendance, reading, and working the homework are essential for successful completion of this course. Plan on doing 2 hours out of class work for each hour in class. **Please seek me out if you want or need help.** Should attendance problems arise contact me before you miss if at all possible. Please be on time and do not disrupt class when coming in late.

Your Responsibility: To study this subject as intensely as possible so that you can do well on the tests and quizzes. You should spend a sufficient amount of time doing homework problems and reviewing your notes so that you are convinced that you understand the material. The biggest mistake is that students think they know the material when in actuality, they DO NOT! Do the homework problems assigned from the text. You may need to do the homework problems more than once and make sure that you can do them without looking at the answers or worked examples.

Transferring from CHM 211 to CHM 111: If you transferred from CHM 211 into CHM 111, the determination of your grade will be based on the average of the work that you have completed in CHM 111.

Homework: Online homework through ALEKS will be assigned regularly and on time completion will be necessary to receive the 10% of your grade from homework. Make sure you complete both your pie and assessments. Homework grades will be a combination of pie completion and assessment scores.

Withdrawals: The last day to withdraw from this class is 3/17/2017.

Makeup: Contact me immediately if you miss a graded assignment. No makeup tests or quizzes will be given unless prompt arrangements are made (complete before next class). Makeup days are 3/2 and 4/27 (sign up and a university excuse are required).

Comments on success in this class:

1. **Keep up.** Do reading, problems, etc. promptly.
2. **Ask for help.** Ask questions in class and seek out other students and the instructor for help. Study/homework groups are often helpful.
3. **Read before class** to improve understanding.
4. **Do the homework.**
5. **Form a study group.**
6. **Use MUOnline** to access class resources.

Important Dates:

January 9	First day of Class
January 16	MLK Day Holiday
February 27	Freshman midterm grades due
March 17	Last Day to Drop
March 20-26	Break No Class
April 24-28	Dead Week

The final exam will be given to all CHM 111 students on Saturday, April 29 at 9:50am.

Electronic Device Policy: All cell phones and pagers must be turned to vibrate during class. The instructor reserves the right to answer any ringing cell phones during lecture, or to dismiss the offending student. Recording of lectures without the instructor's permission is prohibited.

During examinations, all electronic devices except calculators must be inaccessible. Students **MUST BRING A CALCULATOR** to class for all lectures and exams. Calculators that are part of a cell phone or PDA are not acceptable during an exam or quiz.

All **university policies**, which can be found at this <http://www.marshall.edu/academic-affairs/policies/>, will be observed.

	Approximate Schedule
Week of	
1/9	Chapters 1, 2
1/16	Chapter 2
1/23	Chapter 3
1/30	Chapters 3, 4
2/6	Chapter 4, 5, Test 1 (Chapters 1-4)
2/13	Chapters 5, 6
2/20	Chapter 6, Test 2 (Chapters 5, 6)
2/27	Chapter 7
3/6	Chapters 7, 8
3/13	Chapter 8, 9
3/27	Chapter 9
4/3	Chapter 9, 10, Test 3 (Chapters 7-9)
4/10	Chapter 10, 11
4/17	Chapters 11, Test 4 (Chapters 10, 11 or Monday 4/24)
4/24	Chapter 11, Exam Review
	Saturday April 29 9:50am Final Exam

Course practice and assessment:

For all the objectives stated below the following methods will consistently be applied:

Reading the textbook is a standard expectation for quality learning. Reading before class presentations and after are both excellent methods to enhance understanding.

Khan Academy and other online resources can be accessed to provide more information for study.

PowerPoints will be made available in MUOnline and will be used to guide classroom lecture and discussion. It is recommended that you print these out (3 slides or so to a page and black and white to save costs). Bring the printouts to class when the chapter is to be discussed allowing you to annotate then.

Problem solving will be demonstrated during lecture.

ALEKS is an interactive homework/learning system and will be used by students to practice and learn about the concepts of this course. The system can offer an alternative view which may help some students with their struggles and will broaden other students understanding. By working through both the “pie” and the assessments a student learns and also earns 10% of the course grade.

Quizzes will be given regularly on chapters and skills to guide student learning and represent 10% of the course grade.

Students are encouraged to develop study groups.

Homework problems for practice on each chapter’s content and skills will be assigned.

Students are encouraged to visit during office hours and by appointment to work with their instructor to aid learning.

Tests will be given 4 times to assess learning for grading and a final exam covering all course content will be given.

Course objectives:

Chapter 1

State the definition of chemistry and why the study of chemistry is important.

Describe the steps involved in the scientific method.

Distinguish among a pure substance, a homogeneous mixture, and a heterogeneous mixture.

Describe the characteristics of matter, including the states of matter.

Chapter 2

Write decimal numbers in scientific notation and vice versa.

Explain the significance of uncertainty in measurement in chemistry and how significant figures are used to indicate a measurement's uncertainty

Determine the number of significant figures in a given measurement and round measurements to a specific number of significant figures.

Apply the rules for significant figures in calculations involving addition, subtraction, multiplication and division.

Name the units for mass, length and volume in the metric system and convert from one unit to another.

Use dimensional analysis to solve problems involving unit conversions.

Convert measurements among the Fahrenheit, Celsius and Kelvin temperature scales.

Solve problems involving density.

Chapter 3

Define an element and write the chemical symbol for an element when given its name.

Explain the arrangement of the elements on the periodic table and classify elements as metal, nonmetal or metalloid.

Distinguish between molecular and ionic compounds and write chemical formulas for compounds.

Chapter 4

Compare the physical and chemical properties of a substance.

Compare the physical and chemical changes of a substance.

List the basic steps involved in solving chemistry problems.

List the various forms of energy, explain the role of energy in chemical changes and state the law of conservation of energy.

Calculate the amount of heat lost or gained in a given system.

Define a hydrocarbon compound and explain their role in the world's energy supply.

Chapter 5

Describe Dalton's model of the atom and compare it to the earlier concepts of matter.

Use Coulomb's Law to calculate the force between particles and distinguish between a cation and an anion.

Describe the three basic subatomic particles and how they changed Dalton's model of the atom.

Explain how the nuclear model of the atom differs from Dalton's and Thomson's model.

Define the terms atomic number, mass number and isotope.

Explain the relationship between the atomic mass of an element and the masses of its isotopes.

Chapter 6

Distinguish between the common and systematic names of chemical substances.

Discuss the formation, charge, and naming of simple ions.

Write the chemical formula for an ionic compound from the name of the compound.

Name binary ionic and nonionic compounds.

Recognize names, formulas and charges of common polyatomic ions, name compounds containing polyatomic ions and write formulas from names of compounds containing polyatomic ions.

Use the rules to name an acid from its formula and to write the formula for an acid from its name.

Chapter 7

Apply the concepts of the mole, molar mass and Avogadro's number to solve chemistry problems.

Calculate the molar mass of a compound.

Calculate the percent composition of a compound from its chemical formula and from experimental data

Compare an empirical formula to a molecular formula and determine the empirical formula for a compound from its percent composition.

Compare an empirical formula to a molecular formula and calculate a molecular formula from the empirical formula of a compound and its molar mass.

Chapter 8

Describe the information present in a chemical equation.

Write and balance chemical equations.

Give examples of a combination reaction, single displacement reaction, and double displacement reaction.

Explain the following terms and how they relate to a chemical reaction: exothermic reaction, endothermic reaction, heat of reaction, and activation energy.

Discuss the possible causes and results of the greenhouse effect.

Chapter 9

Define stoichiometry and describe the strategy required to solve problems based on chemical equations.

Solve problems where the reactants and products are both in moles.

Solve problems where the mass is given and the answer is to be determined in moles or the moles are given and mass is to be determined.

Solve problems where mass is given and the answer is to be determined as mass.

Solve problems involving limiting reactants and yield.

Chapter 10

List the three basic characteristics of electromagnetic radiation.

Explain the relationship between the line spectrum and the quantized energy levels of an electron in an atom.

Describe the principal energy levels, sublevels, and orbitals of an atom.

Use the guidelines to write electron configurations.

Describe how the electron configurations of the atoms relate to their position on the periodic table and write electron configurations for elements based on their position on the periodic table.

Chapter 11

Discuss the atomic trends for metals and nonmetals, atomic radius, ionic radius, and ionization energy.

Draw the Lewis electron dot structure and orbital notation, as well as prepare the electron configuration notation for a given atom.

Discuss and use the formation of an ionic bond and the chemical change that results from the bond.

Predict the formulas of ionic compounds from their ions position on the periodic table.

Draw the electron structure of a covalent bond.

Explain how electronegativities of component atoms in a molecule determine the polarity of the molecule.

Draw the Lewis structure of a compound.

Draw the resonance structures for compounds and polyatomic ions.

Describe a structure that contains both ionic and covalent bonds.

Determine the shape of a compound by using VSEPR method.