

ALEKS[®] Course Syllabus

Course Name: Chem 104 Fall 2014 - Problem Solving & Chem Fund.	Course Code: NNE6N-M9GHV
ALEKS Course: General Chemistry (First Semester)	Instructor: Prof. Owens
Course Dates: Begin: 08/29/2014 End: 08/29/2015	Course Content: 202 topics
Textbook: Stoker: Introduction to Chemical Principles, 11th Ed. (Pearson Education, Paperback)	

Dates Covered	Objective
08/30 (12:01AM) - 09/05 (11:59PM)	1. Chapter 2 (20 topics)
09/05 (11:59PM) - 09/12 (11:59PM)	2. Ch. 4 & 5 (11 topics)
09/12 (11:59PM) - 09/17 (11:59PM)	3. Chapter 6 part I (19 topics)
09/17 (11:59PM) - 09/24 (11:59PM)	4. Ch. 7 Part I (41 topics)
09/24 (11:59PM) - 10/01 (11:59PM)	5. Chapter 8 (8 topics)
10/01 (11:59PM) - 10/08 (11:59PM)	6. Chapter 9 (9 topics)
10/08 (11:59PM) - 10/15 (11:59PM)	7. Chapter 10 (10 topics)
10/15 (11:59PM) - 10/24 (11:59PM)	8. Chapter 11 (11 topics)
10/24 (11:59PM) - 11/07 (11:59PM)	9. Chapter 12 (7 topics)
11/07 (11:59PM) - 11/14 (11:59PM)	10. Chapter 13 (10 topics)
11/14 (11:59PM) - 11/21 (11:59PM)	11. Chapter 14 (8 topics)
11/21 (11:59PM) - 12/01 (11:59PM)	12. Objective #1 (13 topics)

Chapter 2 (20 topics, due on 09/05 (11:59PM))

Section 2.6 (4 topics)

- Rounding to a given significant digit
- Counting significant digits when measurements are added or subtracted
- Counting significant digits when measurements are multiplied or divided
- Adding or subtracting and multiplying or dividing measurements

Section 3.1 (3 topics)

- Knowing the value of an SI prefix as a power of 10
- Addition and subtraction of measurements
- Multiplication and division of measurements

Section 3.4 (5 topics)

- Estimating the volume in liters of a square prism object
- Finding the side length of a cube from its volume in liters
- Estimating the volume in liters of a spherical object

- Estimating the volume in liters of a cylindrical object
- Calculating volume by combining the volume of simple shapes

Section 3.6 (1 topic)

- Interconversion of prefixed and base SI units

Section 3.7 (3 topics)

- Interconversion of prefixed SI units
- Interconverting compound SI units
- Simplifying unit expressions

Section 3.8 (2 topics)

- Calculating mass density
- Using mass density to find mass or volume

Section 3.11 (2 topics)

- Interconverting temperatures in Celsius and Kelvins
- Interconverting temperatures in Celsius and Fahrenheit

Ch. 4 & 5 (11 topics, due on 09/12 (11:59PM))

Section 4.9 (1 topic)

- Names and symbols of important elements

Section 5.2 (5 topics)

- Distinguishing elements and compounds
- Distinguishing compounds and mixtures
- Distinguishing chemical and physical change
- Distinguishing solid, liquid and gas phases of a pure substance
- Reading a Periodic Table entry

Section 5.4 (1 topic)

- Counting the number of atoms in a formula unit

Section 5.5 (1 topic)

- Identifying the parts of an atom

Section 5.7 (2 topics)

- Counting the number of protons and electrons in a neutral atom
- Isotopes

Section 5.8 (1 topic)

- Finding atomic mass from isotope mass and natural abundance

Chapter 6 part I (19 topics, due on 09/17 (11:59PM))

Section 6.2 (1 topic)

- Understanding periods and groups of the Periodic Table

Section 6.4 (1 topic)

- Knowing the subshells of an electron shell

Section 6.5 (1 topic)

- Calculating the capacity of electron subshells

Section 6.6 (2 topics)

- Interpreting the angular probability distribution of an orbital
- Recognizing s and p orbitals

Section 6.7 (1 topic)

- Deciding the relative energy of electron subshells

Section 6.8 (1 topic)

- Drawing a box diagram of the electron configuration of an atom

Section 6.9 (2 topics)

- Counting the electron shells in a neutral atom
- Identifying elements with a similar valence electron configuration

Section 6.10 (8 topics)

- Interpreting the electron configuration of a neutral atom
- Interpreting the electron configuration of a neutral atom in noble-gas notation
- Writing the electron configuration of a neutral atom with s and p electrons only
- Writing the electron configuration of a neutral atom with a filled d subshell
- Writing the electron configuration of an atom using the Periodic Table
- Identifying quantum mechanics errors in electron configurations
- Identifying s, p, d and f block elements
- Deducing the block of an element from an electron configuration

Section 6.11 (1 topic)

- Organization of the Periodic Table

Section 6.12 (1 topic)

- Using the Periodic Table to identify similar elements

Ch. 7 Part I (41 topics, due on 09/24 (11:59PM))

Section 7.2 (3 topics)

- Counting valence electrons in a neutral atom
- Counting valence electrons in an atomic ion
- Drawing the Lewis dot diagram of a main group atom or common atomic ion

Section 7.4 (4 topics)

- Counting protons and electrons in atoms and atomic ions
- Finding isoprotonic atoms
- Finding isoelectronic atoms
- Understanding periodic trends in atomic size

Section 7.5 (6 topics)

- Predicting the ions formed by common main-group elements
- Interpreting the electron configuration of an atom or atomic ion
- Interpreting the electron configuration of an atom or atomic ion in noble-gas notation
- Writing the electron configuration of an atom or atomic ion with s and p electrons only
- Identifying the electron added or removed to form an ion from an s or p block atom
- Identifying the electron added or removed to form an ion

Section 7.6 (2 topics)

- Predicting whether a compound is ionic or molecular
- Predicting ionic compounds formed by two elements

Section 7.7 (2 topics)

- Predicting the formula of binary ionic compounds
- Deducing the ions in a binary ionic compound from its empirical formula

Section 7.9 (4 topics)

- Identifying common polyatomic ions
- Predicting the formula of ionic compounds with common polyatomic ions
- Deducing the ions in a polyatomic ionic compound from its empirical formula
- Identifying oxoanions

Section 7.10 (1 topic)

- Predicting the compound formed by two main group elements

Section 7.11 (4 topics)

- Counting bonding and nonbonding electron pairs in a Lewis structure
- Counting valence electrons in a molecule or polyatomic ion
- Deciding whether a Lewis structure satisfies the octet rule
- Writing Lewis structures for diatomic molecules

Section 7.12 (1 topic)

- Counting electron pairs in a Lewis structure with double or triple bonds

Section 7.14 (3 topics)

- Writing a chemical formula given a molecular model
- Writing a chemical formula given a chemical structure
- Writing Lewis structures for a molecule with one central atom and no octet-rule exceptions

Section 7.15 (2 topics)

- Writing the Lewis structures for a molecule with resonance
- Predicting the relative length and energy of chemical bonds

Section 7.16 (2 topics)

- Calculating formal charge
- Drawing Lewis structures for simple organic compounds

Section 7.17 (4 topics)

- Predicting and naming the shape of molecules with a central atom
- Naming the shape of molecules with one central atom and no octet-rule exceptions
- Predicting bond angles in molecules with one central atom and no octet-rule exceptions
- Predicting the arrangement of electron groups around the central atom of a molecule

Section 7.18 (1 topic)

- Predicting the relative electronegativities of atoms

Section 7.19 (1 topic)

- Predicting bond polarity

Section 7.20 (1 topic)

- Predicting whether molecules are polar or nonpolar

Chapter 8 (8 topics, due on 10/01 (11:59PM))

Section 8.3 (2 topics)

- Naming binary ionic compounds
- Predicting and naming ionic compounds formed by two elements

Section 8.5 (2 topics)

- Naming ionic compounds with common polyatomic ions
- Naming ionic compounds with common oxoanions

Section 8.6 (1 topic)

- Predicting the single-bonded molecular compounds formed by two elements

Section 8.7 (3 topics)

- Naming inorganic acids
- Deducing the formulae of inorganic acids from their names
- Naming acid salts

Chapter 9 (9 topics, due on 10/08 (11:59PM))

Section 9.4 (1 topic)

- Finding mass percent from chemical formulae

Section 9.5 (1 topic)

- Using the Avogadro Number

Section 9.6 (4 topics)

- Calculating and using the molar mass of elements
- Calculating and using the molar mass of diatomic elements
- Calculating and using the molar mass of heterodiatomic compounds
- Finding molar mass from chemical formulae

Section 9.9 (2 topics)

- Finding mole ratios from chemical formulae
- Finding chemical formulae from a mole ratio

Section 9.14 (1 topic)

- Finding a molecular formula from molar mass and elemental analysis

Chapter 10 (10 topics, due on 10/15 (11:59PM))

Section 10.2 (1 topic)

- Writing a chemical equation from a description of the reaction

Section 10.4 (3 topics)

- Stoichiometric coefficients
- Balancing chemical equations with noninterfering coefficients
- Balancing chemical equations with interfering coefficients

Section 10.6 (1 topic)

- Identifying combination, decomposition, single and double displacement reactions

Section 10.9 (2 topics)

- Solving for a reactant using a chemical equation
- Identifying the limiting reactant in a drawing of a mixture

Section 10.10 (1 topic)

- Limiting reactants

Section 10.11 (2 topics)

- Theoretical yield of chemical reactions
- Percent yield of chemical reactions

Chapter 11 (11 topics, due on 10/24 (11:59PM))

Section 11.3 (1 topic)

- Understanding how average molecular kinetic energy scales with temperature

Section 11.6 (1 topic)

- Understanding how molecular collision rate scales with temperature and volume

Section 11.9 (5 topics)

- Interconverting calories and joules
- Calculating specific heat capacity
- Calculating molar heat capacity
- Using specific heat capacity to find heat
- Using specific heat capacity to find temperature change

Section 11.12 (1 topic)

- Identifying phase transitions on a heating curve

Section 11.16 (3 topics)

- Identifying hydrogen-bonding interactions between molecules
- Identifying the important intermolecular forces in pure compounds
- Predicting the relative strength of the dispersion force between molecules

Chapter 12 (7 topics, due on 11/07 (11:59PM))

Section 12.2 (2 topics)

- Interconverting atmospheres and kilopascals
- Interconverting atmospheres and torr

Section 12.3 (2 topics)

- Understanding Boyle's Law
- Solving applications of Boyle's Law

Section 12.4 (1 topic)

- Using Charles's Law

Section 12.9 (1 topic)

- Using the ideal equation of state

Section 12.10 (1 topic)

- Interconverting molar mass and density of ideal gases

Chapter 13 (10 topics, due on 11/14 (11:59PM))

Section 13.4 (2 topics)

- Predicting the products of dissolution
- Predicting precipitation

Section 13.6 (2 topics)

- Calculating mass percent composition
- Using mass percent composition to find solution volume

Section 13.8 (4 topics)

- Calculating molarity using solute moles
- Using molarity to find solute moles and solution volume
- Calculating molarity using solute mass

- Using molarity to find solute mass and solution volume

Section 13.9 (1 topic)

- Solving for a reactant in solution

Section 13.10 (1 topic)

- Dilution

Chapter 14 (8 topics, due on 11/21 (11:59PM))

Section 14.1 (1 topic)

- Identifying acids and bases by their chemical formula

Section 14.2 (2 topics)

- Identifying acids and bases by their reaction with water
- Recognizing common acids and bases

Section 14.3 (2 topics)

- Identifying Bronsted-Lowry acids and bases
- Finding the conjugate of an acid or base

Section 14.5 (2 topics)

- Understanding the difference between strong and weak acids
- Predicting the products of the reaction of a strong acid with water

Section 14.7 (1 topic)

- Predicting the products of a neutralization reaction

Objective #1 (13 topics, due on 12/01 (11:59PM))

Section 15.3 (1 topic)

- Writing net ionic equations

Section 15.5 (1 topic)

- Assigning oxidation numbers

Section 15.6 (4 topics)

- Recognizing reduction and oxidation
- Identifying oxidizing and reducing agents
- Identifying oxidized and reduced reactants in a metal-nonmetal reaction
- Identifying oxidized and reduced reactants in a single-displacement reaction

Section 15.9 (7 topics)

- Writing a simple half-reaction from its description
- Writing the half-reactions of a metal-nonmetal reaction
- Writing the half-reactions of a single-displacement reaction
- Writing and balancing complex half-reactions in acidic solution
- Writing and balancing complex half-reactions in basic solution
- Balancing a complex redox equation in acidic or basic solution
- Writing the half-reactions of a complex redox reaction in acidic or basic solution