ALEKS® Course Syllabus

Course Name:	CHEM 1311 Fall 2015	**Course Code:**	N/A
ALEKS Course:	General Chemistry (First Semester)	**Instructor:**	Master Templates
Course Dates:	Begin: 08/21/2015 End: 12/31/2015	**Course Content:**	229 topics
Textbook:	Burdge et al.: Chemistry: Atoms First, 2nd Ed. (McGraw-Hill) - ALEKS 360		

Dates	Objective
08/22/2015 12:01 AM - 08/28/2015 11:59 PM	**1.** Pre-Assignment (69 topics)
08/28/2015 11:59 PM - 09/04/2015 11:59 PM	**2.** Chapter 2 (11 topics)
09/04/2015 11:59 PM - 09/10/2015 11:59 PM	**3.** Chapter 3 - Part I (12 topics)
09/10/2015 11:59 PM - 09/15/2015 11:59 PM	**4.** Chapter 3 - Part II (9 topics)
09/15/2015 11:59 PM - 09/18/2015 11:59 PM	**5.** Chapter 4 - Part I (7 topics)
09/18/2015 11:59 PM - 09/20/2015 11:59 PM	**6.** Chapter 4 - Part II (7 topics)
09/20/2015 11:59 PM - 10/12/2015 11:59 PM	**7.** Chapter 5 and 6 (39 topics)
10/12/2015 11:59 PM - 10/18/2015 11:59 PM	**8.** Chapter 7 (12 topics)
10/18/2015 11:59 PM - 10/29/2015 11:59 PM	**9.** Chapter 8 (8 topics)
10/29/2015 11:59 PM - 11/04/2015 11:59 PM	**10.** Chapter 9 - Part I (15 topics)
11/04/2015 11:59 PM - 11/08/2015 11:59 PM	**11.** Chapter 9 - Part II (10 topics)
11/08/2015 11:59 PM - 11/18/2015 11:59 PM	**12.** Chapter 10 (10 topics)
11/18/2015 11:59 PM - 12/02/2015 11:59 PM	**13.** Chapter 11 (13 topics)
12/02/2015 11:59 PM - 12/06/2015 11:59 PM	**14.** Chapter 12 - Part I (4 topics)
12/06/2015 11:59 PM - 12/09/2015 11:59 PM	**15.** Chapter 12 - Part II (3 topics)

Pre-Assignment (69 topics, due on 08/28/2015 11:59 PM)

Section 0.1 (16 topics)

- Integer multiplication and division
- Simplifying a fraction
- Equivalent fractions
- Evaluating expressions with exponents: Problem type 1
- Ordering numbers with positive exponents
- Signed fraction addition or subtraction: Basic
- Signed fraction multiplication: Basic
- Signed fraction division
- Introduction to inequalities
- Writing expressions using exponents
- Introduction to exponents
- Introduction to order of operations
- Evaluating expressions with exponents of zero
- Evaluating an expression with a negative exponent: Whole number base
- Evaluating an expression with a negative exponent: Positive fraction base
- Complex fraction without variables: Problem type 1

Section 0.2 (23 topics)

- Introduction to the product rule of exponents
- Evaluating a quadratic expression: Integers
- Distributive property: Integer coefficients
- Combining like terms: Integer coefficients
- Algebraic symbol manipulation
- Multiplying rational expressions involving multivariate monomials
- Combining like terms in a quadratic expression
- Using distribution and combining like terms to simplify: Univariate
- Product rule with positive exponents: Univariate
- Introduction to the product rule with negative exponents
- Introduction to the quotient rule of exponents
- Simplifying a ratio of univariate monomials
- Quotient rule with negative exponents: Problem type 1
- Introduction to the power of a product rule of exponents
- Power and quotient rules with positive exponents
- Rewriting an algebraic expression without a negative exponent
- Additive property of equality with integers
- Additive property of equality with a negative coefficient
- Multiplicative property of equality with signed fractions
- Solving a multi-step equation given in fractional form
- Solving a rational equation that simplifies to linear: Denominator x+a
- Solving a proportion of the form a/(x+b) = c/x
- Solving for a variable in terms of other variables using addition or subtraction with division

Section 0.5 (6 topics)

- Multiplication of a decimal by a power of ten
- Division of a decimal by a power of ten
- Converting between decimal numbers and numbers written in scientific notation
- Multiplying and dividing numbers written in scientific notation
- Calculating positive powers of scientific notation
- Finding negative powers of scientific notation

Section 0.6 (1 topic)

- Understanding that opposite charges attract and like charges repel

Section 1.2 (1 topic)

- Distinguishing solid, liquid and gas phases of a pure substance

Section 1.4 (11 topics)

- Knowing the dimension of common simple SI units
- Understanding the purpose of SI prefixes

- Knowing the value of an SI prefix as a power of 10
- Interconversion of prefixed and base SI units
- Interconversion of prefixed SI units
- Interconverting temperatures in Celsius and Kelvins
- Interconverting temperatures in Celsius and Fahrenheit
- Simplifying unit expressions
- Estimating the volume in liters of a square prism object
- Calculating mass density
- Using mass density to find mass or volume

Section 1.5 (5 topics)

- Counting significant digits
- 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 1.6 (3 topics)

- Interconverting compound SI units
- Addition and subtraction of measurements
- Multiplication and division of measurements

Section 5.1 (3 topics)

- Distinguishing elements and compounds
- Distinguishing compounds and mixtures
- Distinguishing chemical and physical change

Chapter 2 (11 topics, due on 09/04/2015 11:59 PM)

Section 2.1 (1 topic)

- Names and symbols of important elements

Section 2.2 (1 topic)

- Identifying the parts of an atom

Section 2.3 (4 topics)

- Reading a Periodic Table entry
- Counting the number of protons and electrons in a neutral atom
- Isotopes
- Interpreting the symbol for a nuclide

Section 2.5 (1 topic)

- Finding atomic mass from isotope mass and natural abundance

Section 2.6 (2 topics)

- Understanding periods and groups of the Periodic Table
- Organization of the Periodic Table

Section 2.7 (2 topics)

- Using the Avogadro Number
- Calculating and using the molar mass of elements

Chapter 3 - Part I (12 topics, due on 09/10/2015 11:59 PM)

Section 3.1 (1 topic)

- Understanding how electrostatic energy scales with charge and separation

Section 3.2 (1 topic)

- Interconverting the wavelength and frequency of electromagnetic radiation

Section 3.3 (1 topic)

- Interconverting wavelength, frequency and photon energy

Section 3.4 (3 topics)

- Calculating the wavelength of a spectral line from an energy diagram
- Predicting the qualitative features of a line spectrum
- Calculating the wavelength of a line in the spectrum of hydrogen

Section 3.7 (2 topics)

- Deducing the allowed quantum numbers of an atomic electron
- Knowing the subshells of an electron shell

Section 3.8 (4 topics)

- Interpreting the radial probability distribution of an orbital
- Interpreting the angular probability distribution of an orbital
- Recognizing s and p orbitals
- Deciding the relative energy of electron subshells

Chapter 3 - Part II (9 topics, due on 09/15/2015 11:59 PM)

Section 3.9 (6 topics)

- Drawing a box diagram of the electron configuration of an atom
- Calculating the capacity of electron subshells
- 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

Section 3.10 (3 topics)

- 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

Chapter 4 - Part I (7 topics, due on 09/18/2015 11:59 PM)

Section 4.2 (4 topics)

- Counting valence electrons in a neutral atom
- Counting the electron shells in a neutral atom
- Identifying elements with a similar valence electron configuration
- Deducing the block of an element from an electron configuration

Section 4.4 (3 topics)

- Counting protons and electrons in atoms and atomic ions
- Predicting the relative ionization energy of elements
- Deducing valence electron configuration from trends in successive ionization energies

Chapter 4 - Part II (7 topics, due on 09/20/2015 11:59 PM)

Section 4.5 (6 topics)

- Finding isoelectronic atoms
- Predicting the ions formed by common main-group elements
- Counting valence electrons in an atomic ion
- Interpreting the electron configuration of an atom or atomic ion
- 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

Section 4.6 (1 topic)

- Understanding periodic trends in atomic size

Chapter 5 and 6 (39 topics, due on 10/12/2015 11:59 PM)

Section 5.2 (1 topic)

- Drawing the Lewis dot diagram of a main group atom or common atomic ion

Section 5.3 (1 topic)

- Counting the number of atoms in a formula unit

Section 5.4 (3 topics)

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

Section 5.5 (4 topics)

- Writing a chemical formula given a molecular model
- Writing a chemical formula given a chemical structure
- Understanding the prefixes used in naming binary compounds
- Predicting whether a compound is ionic or molecular

Section 5.6 (1 topic)

- Naming binary covalent compounds

Section 5.7 (8 topics)

- Identifying common polyatomic ions
- Predicting the formula of ionic compounds with common polyatomic ions
- Naming ionic compounds with common polyatomic ions
- Deducing the ions in a polyatomic ionic compound from its empirical formula
- Identifying oxoanions
- Naming ionic compounds with common oxoanions
- Naming inorganic acids
- Deducing the formulae of inorganic acids from their names

Section 5.9 (1 topic)

- Finding mass percent from chemical formulae

Section 5.10 (5 topics)

- Calculating and using the molar mass of diatomic elements
- Calculating and using the molar mass of heterodiatomic compounds
- Finding molar mass from chemical formulae
- Elemental analysis
- Finding a molecular formula from molar mass and elemental analysis

Section 6.1 (6 topics)

- Counting bonding and nonbonding electron pairs in a Lewis structure
- Counting electron pairs in a Lewis structure with double or triple bonds
- Counting valence electrons in a molecule or polyatomic ion
- Deciding whether a Lewis structure satisfies the octet rule
- Writing Lewis structures for diatomic molecules
- Predicting the relative length and energy of chemical bonds

Section 6.2 (2 topics)

- Predicting the relative electronegativities of atoms
- Predicting bond polarity

Section 6.3 (3 topics)

- Predicting the single-bonded molecular compounds formed by two elements
- Writing Lewis structures for a molecule with one central atom and no octet-rule exceptions
- Drawing Lewis structures for simple organic compounds

Section 6.4 (1 topic)

- Calculating formal charge

Section 6.5 (1 topic)

- Writing the Lewis structures for a molecule with resonance

Section 6.6 (2 topics)

- Recognizing exceptions to the octet rule
- Writing Lewis structures for an expanded valence shell central atom

Chapter 7 (12 topics, due on 10/18/2015 11:59 PM)

Section 7.1 (5 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
- Predicting deviations from ideal bond angles

Section 7.2 (1 topic)

- Predicting whether molecules are polar or nonpolar

Section 7.3 (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

Section 7.5 (2 topics)

- Identifying hybridization in a small molecule
- Identifying carbon hybridization in simple organic molecules

Section 7.6 (1 topic)

- Counting sigma and pi bonds in a small molecule

Chapter 8 (8 topics, due on 10/29/2015 11:59 PM)

Section 8.1 (3 topics)

- Writing a chemical equation from a description of the reaction
- Balancing chemical equations with noninterfering coefficients
- Balancing chemical equations with interfering coefficients

Section 8.3 (1 topic)

- Solving for a reactant using a chemical equation

Section 8.4 (4 topics)

- Identifying the limiting reactant in a drawing of a mixture
- Limiting reactants
- Theoretical yield of chemical reactions
- Percent yield of chemical reactions

Chapter 9 - Part I (15 topics, due on 11/04/2015 11:59 PM)

Section 9.1 (2 topics)

- Predicting the products of dissolution
- Identifying acids and bases by their chemical formula

Section 9.2 (2 topics)

- Writing net ionic equations
- Predicting precipitation

Section 9.3 (6 topics)

- Predicting the products of a neutralization reaction
- Identifying acids and bases by their reaction with water
- Understanding the difference between strong and weak acids
- Identifying Bronsted-Lowry acids and bases
- Predicting the products of the reaction of a strong acid with water
- Recognizing common acids and bases

Section 9.4 (5 topics)

- Assigning oxidation numbers
- 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

Chapter 9 - Part II (10 topics, due on 11/08/2015 11:59 PM)

Section 9.5 (6 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
- Dilution
- Solving for a reactant in solution

Section 9.6 (4 topics)

- Solving limiting reactant problems in solution
- Determining the volume of base needed to titrate a given mass of acid
- Determining the molar mass of an acid by titration
- Standardizing a base solution by titration

Chapter 10 (10 topics, due on 11/18/2015 11:59 PM)

Section 10.3 (3 topics)

- Understanding the definition of enthalpy
- Using the general properties of reaction enthalpy
- Calculating the heat of reaction from molar reaction enthalpy and the mass of a reactant

Section 10.4 (3 topics)

- Calculating specific heat capacity
- Using specific heat capacity to find heat
- Using specific heat capacity to find temperature change

Section 10.5 (1 topic)

- Using Hess's Law to calculate net reaction enthalpy

Section 10.6 (2 topics)

- Writing a standard formation reaction
- Calculating a molar heat of reaction from formation enthalpies

Section 10.7 (1 topic)

- Calculating the heat of reaction from bond energies

Chapter 11 (13 topics, due on 12/02/2015 11:59 PM)

Section 11.2 (3 topics)

- Interpreting a graph of molecular speed distribution
- Predicting how molecular speed distribution changes with temperature and molar mass
- Using relative effusion rates to find an unknown molar mass

Section 11.3 (2 topics)

- Interconverting atmospheres and kilopascals

- Interconverting atmospheres and torr

Section 11.4 (3 topics)

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

Section 11.5 (2 topics)

- Using the ideal equation of state
- Interconverting molar mass and density of ideal gases

Section 11.7 (2 topics)

- Calculating mole fraction in a gas mixture
- Calculating partial pressure in a gas mixture

Section 11.8 (1 topic)

- Solving for a gaseous reactant

Chapter 12 - Part I (4 topics, due on 12/06/2015 11:59 PM)

Section 12.2 (1 topic)

- Relating vapor pressure to vaporization

Section 12.4 (1 topic)

- Predicting the type of solid formed by a compound

Section 12.5 (2 topics)

- Identifying phase transitions on a heating curve
- Interpreting a heating curve

Chapter 12 - Part II (3 topics, due on 12/09/2015 11:59 PM)

Section 12.6 (3 topics)

- Using a phase diagram to predict phase at a given temperature and pressure
- Labeling a typical simple phase diagram
- Using a phase diagram to find a phase transition temperature or pressure