ALEKS® Course Syllabus

Course Name:	CHEM106 Owens S16	**Course Code:**	DFVXM-4TXQ3
ALEKS Course:	General Chemistry (Second Semester)	**Instructor:**	Prof. Owens
Course Dates:	Begin: 01/04/2016 End: 04/30/2016	**Course Content:**	90 topics
Textbook:	McQuarrie et al.: General Chemistry, 4th Ed. (University Science Books, Paperback)		

Dates	Objective
01/05/2016 12:01 AM - 01/15/2016 11:59 PM	**1.** Intermolecular Forces IMF (11 topics)
01/15/2016 11:59 PM - 01/22/2016 11:59 PM	**2.** Thermodynamics, Sig Fig (18 topics)
01/22/2016 11:59 PM - 01/29/2016 11:59 PM	**3.** Acids&Buffers-Metric Sys (13 topics)
01/29/2016 11:59 PM - 02/05/2016 11:59 PM	**4.** Kinetics-Dimensi Analysis (13 topics)
02/05/2016 11:59 PM - 02/12/2016 11:59 PM	**5.** Molarity and Precipitation Reactions (10 topics)
02/12/2016 11:59 PM - 02/19/2016 11:59 PM	**6.** Enthalpy & Heat Capacity (10 topics)
02/19/2016 11:59 PM - 02/26/2016 11:59 PM	**7.** Acid/Base & Redox Rxns (7 topics)
02/26/2016 11:59 PM - 03/11/2016 11:59 PM	**8.** Electrochemistry (7 topics)
03/11/2016 11:59 PM - 04/29/2016 11:59 PM	**9.** Exam Review (1 topic)

Intermolecular Forces IMF (11 topics, due on 01/15/2016 11:59 PM)

Section 0-6 (2 topics)

- Understanding that opposite charges attract and like charges repel
- Sketching polarization induced by a nearby charge

Section 7-9 (1 topic)

- Predicting the relative electronegativities of atoms

Section 7-10 (2 topics)

- Predicting bond polarity
- Identifying a molecule from its electrostatic potential map

Section 8-9 (1 topic)

- Predicting whether molecules are polar or nonpolar

Section 15-4 (5 topics)

- Predicting the strength of intermolecular forces from an electrostatic potential map
- Identifying hydrogen-bonding interactions between molecules
- Identifying the intermolecular forces between atoms, ions and molecules
- Identifying the important intermolecular forces in pure compounds
- Predicting the relative strength of the dispersion force between molecules

Thermodynamics, Sig Fig (18 topics, due on 01/22/2016 11:59 PM)

Section 1-4 (1 topic)

- Interconverting temperatures in Celsius and Kelvins

Section 1-8 (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 2-8 (1 topic)

- Finding molar mass from chemical formulae

Section 3-2 (1 topic)

- Balancing chemical equations with interfering coefficients

Section 11-8 (1 topic)

- Solving for a reactant using a chemical equation

Section 23-3 (2 topics)

- Predicting qualitatively how entropy changes with mixing and separation
- Qualitatively predicting reaction entropy

Section 23-5 (1 topic)

- Calculating reaction entropy using the standard molar entropies of reactants

Section 23-6 (5 topics)

- Using the general properties of Gibbs free energy
- Calculating dG from dH and dS
- Using the conditions of spontaneity to deduce the signs of ΔH and ΔS
- Calculating standard reaction free energy from standard free energies of formation
- Estimating a phase transition temperature from standard thermodynamic data

Section 23-8 (1 topic)

- Calculating reaction free energy under nonstandard conditions

Acids&Buffers-Metric Sys (13 topics, due on 01/29/2016 11:59 PM)

Section 1-4 (8 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
- Addition and subtraction of measurements
- Multiplication and division of measurements
- Calculating mass density
- Using mass density to find mass or volume

Section 20-4 (1 topic)

- Understanding the effect of induction on acidity

Section 20-7 (1 topic)

- Interconverting Ka and pKa

Section 21-1 (2 topics)

- Identifying the major species in weak acid or weak base equilibria
- Calculating the pH of a buffer

Section 21-2 (1 topic)

- Calculating the composition of a buffer of a given pH

Kinetics-Dimensi Analysis (13 topics, due on 02/05/2016 11:59 PM)

Section 1-9 (4 topics)

- Interconversion of prefixed SI units
- Interconverting compound SI units
- Interconverting derived SI units
- Predicting the units of the solution to a basic quantitative problem

Section 17-3 (3 topics)

- Using a rate law
- Using reactant reaction order to predict changes in initial rate
- Deducing a rate law from initial reaction rate data

Section 18-2 (2 topics)

- Interpreting a reaction energy diagram
- Relating activation energy to reaction rate

Section 18-3 (3 topics)

- Understanding the qualitative predictions of the Arrhenius equation
- Using the Arrhenius equation to calculate k at one temperature from k at another
- Using the Arrhenius equation to calculate Ea from k versus T data

Section 18-6 (1 topic)

- Drawing the reaction energy diagram of a catalyzed reaction

Molarity and Precipitation Reactions (10 topics, due on 02/12/2016 11:59 PM)

Section 10-9 (3 topics)

- Identifying combination, decomposition, single and double displacement reactions
- Writing net ionic equations
- Predicting precipitation

Section 12-2 (5 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

Section 12-5 (2 topics)

- Solving for a reactant in solution
- Solving limiting reactant problems in solution

Enthalpy & Heat Capacity (10 topics, due on 02/19/2016 11:59 PM)

Section 14-2 (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 14-5 (3 topics)

- Interconverting calories and joules
- Writing a standard formation reaction
- Calculating a molar heat of reaction from formation enthalpies

Section 14-7 (4 topics)

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

Acid/Base & Redox Rxns (7 topics, due on 02/26/2016 11:59 PM)

Section 10-10 (1 topic)

- Predicting the products of a neutralization reaction

Section 10-11 (6 topics)

- Identifying precipitation, combustion and acid-base reactions
- 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

Electrochemistry (7 topics, due on 03/11/2016 11:59 PM)

Section 25-4 (2 topics)

- Recognizing consistency among equilibrium constant, free energy, and cell potential
- Using the Nernst equation to calculate nonstandard cell voltage

Section 25-5 (2 topics)

- Designing a galvanic cell from two half-reactions
- Analyzing a galvanic cell

Section 25-7 (1 topic)

- Calculating standard reaction free energy from standard reduction potentials

Section 25-8 (2 topics)

- Using the Faraday constant
- Calculating the mass of an electrolysis product from the applied current

Exam Review (1 topic, due on 04/29/2016 11:59 PM)

Section 0-1 (1 topic)

- Simplifying a fraction