Massasoit Community College
General Chemistry II
CHEM 152

Course description: This course is a continuation of General Chemistry I (CHEM 151). Major topics covered include thermochemistry, thermodynamics, the states of matter, solutions, chemical kinetics, chemical equilibrium, acids/bases, and an introduction to organic chemistry. The laboratory includes classical and spectroscopic techniques. Lecture: 3 hours, Laboratory: 2 hours.

Prerequisite: C- or higher in General Chemistry I (CHEM 151) or Departmental Approval. Pre/Co-requisite: College Algebra (MATH 203) or higher.

Textbook: * N. Tro, *Chemistry, A Molecular Approach*, Pearson

- A scientific calculator will also be needed.

- Organic Chemistry Lab. Notebook (New) (Custom); Brooks / Cole, **Edition :** 98; **Publisher :** CENGAGE ; **ISBN 13 :** 9780875402529

No calculators on your phone are allowed or computer-algebra calculators

Course Objectives: Students at the end of the semester should be able to discuss:

- **Thermochemistry:** Know first law of thermodynamic; Differentiate between energy and enthalpy; Perform calculations with Hess's law; Free energy calculations; discuss entropy and state functions

- **Thermodynamics:** Know the second law of thermodynamics; Determine if reactions are spontaneous; Predict entropy signs as positive or negative; Perform standard entropy of reaction calculations; perform standard free energy of reaction calculation and determine the equilibrium constant
- **States of matter:** Determine if molecule is polar using VSEPR geometries and EN; Know the intermolecular forces; Using a phase change diagram, determine the enthalpy and entropy signs; perform calculations using the Clausius-

Clapeyron Equation; Draw a phase diagram; Calculate the radius and density of metals using the info from the unit cell

- **Solutions:** Determine heat of vaporization and entropy of vaporization using free energy equation; Determine molarity, mole fraction, mass percent, and molality of a solution; Use Henry's law to determine solubility; Determine vapor pressures using Raoult's law; Calculate osmotic pressures; use and explain the freezing point depression and boiling point elevation
- **Chemical Kinetics:** Calculate rate of reactions; Determine order of a reaction using various methods; Estimate half-life of a reaction; Draw an Arrhenius plot and determine unknown variables from the plot; reaction mechanisms; use the integrated first and second order rate equations
- **Chemical equilibriums:** Write equilibrium equations; Calculate equilibrium constants; Perform calculations to determine concentrations of reactants and products; Determine effect of catalysis on a system at equilibrium; Calculate rates of equilibrium reactions
- **Acid and Bases:** Determining acid, base, and conjugates; calculate concentrations of ions; calculate the pH and pOH of a solution; determine equilibrium values of acid and base reactions; use and explain the pK_a and pK_b values; solubility of salts; perform buffer calculations; explain titrations
- **Lab:** be familiar with lab safety, lab glassware, working with a partner; volume, mass, and temperature measurements; recording data in a lab notebook, and writing formal lab reports

Grading Policy

The grades will be based upon quizzes, exams, lab reports, and homework

There is NO EXTRA CREDIT!

A 94-100
A- 90-93
B+ 87-89
B 83-86
B- 80-82
C+ 77-79
C 73-76
C- 70-72
D+ 67-69
D 63-66
D- 60-62
F less than 60

Attendance Policy: Students are expected to watch all videos and do all HW and attend labs. You are responsible for the material you missed. Refer to CANVAS for the material as soon as possible.

Labs For CHEM 152

Heat of Neutralization

Specific heat of objects

Solubility of organic compounds and a salt

Freezing point depression

Kinetic rate with Acetone, Iodine

Transesterification (GC) part 1 & 2 (Equilibrium)

pKa determination

Buffer lab