CUMBERLAND COUNTY COLLEGE

Course: CH 102 General Chemistry II

Credits: 4

Prerequisite: CH 101

Description: A continuation of 101 with emphasis on thermochemistry and thermodynamics, chemical equilibrium, acid/base theory, electrochemistry, kinetics and organic chemistry. The laboratory offers experiments illustrative of the above topics.

Learning Outcomes:
At the completion of this course, students will be able to:

- Use the theories of chemistry, relevant to the topical outline below, in both qualitative and quantitative manner.
- Plan and execute laboratory experiments in a safe, efficient and productive manner.
- Interpret laboratory data and observations.
- Prepare laboratory reports illustrative of the topical outline below.

Topical Outline:
Classroom

- The First Law of Thermodynamics
- Heat, work and internal energy
- Functions of state vs functions of path
- Enthalpy changes
- Molar Heat Capacities – a molecular explanation
- Bond dissociation energies
- The Second Law of thermodynamics
- Entropy
- The Gibbs Free energy function
- The Third Law of Thermodynamics
- Chemical Equilibrium
- Le Chatelier's principle
- Chemical reactions and equilibrium constants
- Oxidation, Reduction and electrochemistry
- Galvanic cells
- The electrochemical series
- The Bronsted theory of Acids and Bases
- The Lewis theory of Acids and Bases
- pH and pOH
- Salts of weak acids and bases
- Strong and weak acids and bases
- Poly – protic acids and bases
- Acid/Base titration plots
- Chemical Kinetics

- Simple reaction orders – zero, first, second and third
- Differential and integral rate laws
- Activation energy
- Mechanisms
- Introduction to Organic Chemistry
- The Functional Group concept
- Some representative classes of organic compounds

Laboratory

- Molecular Geometry
- Molar mass of ethyl alcohol
- Volumetric determination of chloride ion in water
- Identification of Organic unknowns thru IR spectroscopy
- NMR spectroscopy – part II
- Calorimetry – The Law of Dulong and Petit
- Calorimetry – Enthalpy of formation of Magnesium Oxide
- Equilibrium constant by titration
- Enthalpy and Entropy changes for the dissolution of Borax
- Equivalent weight of an unknown reducing agent
- Electro – chemical cells
- Thermodynamics of a Rubber band
- Ionization constant of an unknown weak acid
- Chemical kinetics – the Formaldehyde clock reaction

Text:

Zumdahl, S. S., & Zumdahl, S. A. (2013). *Chemistry*. 9th ed., Brooks Cole Publishing

Zumdahl, S. S., & Zumdahl, S. A. (2013). *Chemistry: Student Solutions Manual.* 9th ed., Brooks Cole Publishing

CCC Custom Chemistry 102 lab manual available at college bookstore.

Student Assessment:

By means of written exams, lab reports and class/lab participation.

Academic Integrity:

Plagiarism is cheating. Plagiarism is presenting in written work, in public speaking, and in oral reports the ideas or exact words of someone else without proper documentation.
Whether the act of plagiarism is deliberate or accidental [ignorance of the proper rules for handling material is no excuse], plagiarism is, indeed, a "criminal" offense. As such, a plagiarized paper or report automatically receives a grade of **ZERO** and the student may receive a grade of **F** for the semester at the discretion of the instructor.

Tutoring & Project Assist:

If you are having difficulty with work in this class tutoring is available through the Center for Academic & Student Success. If you think that you might have a learning disability, contact Project Assist at 856.691.8600 x 1282 for information on assistance that can be provided to eligible students.

Before Withdrawing From This Course:

If a student experiences adverse circumstances while enrolled in this course and considers withdrawing, s/he should see an advisor (division or advisement center) BEFORE withdrawing from the class. A withdrawal may cause harmful repercussions to completion rate standards and overall GPA which can limit or eliminate future financial aid in addition to causing academic suspension.