CEM 152 Principles of Chemistry

Description: The mole concept and stoichiometry; solution stoichiometry; thermochemistry; gases, liquids, and solids; kinetics; chemical equilibria; acid-based equilibria; aqueous equilibria; thermodynamics; redox and electrochemistry. (Note: this description does not reflect the current content, which is accurately described by the lecture topics below.)

Credit: 3 credits (3 hours lecture and 1 hour recitation per week)

Prerequisite: (CEM 151 or CEM 181H or LB 171 or CEM 141)

Lecture Topics:

1. Gases (Pressure, Ideal Gas Law, Partial Pressure, Kinetic Molecular Theory, Real Gases)
2. Liquids (Intermolecular Forces, Vapor Pressure)
3. Solids (Structure and Bonding, Modern Materials)
4. Phase Changes and Phase Diagrams
5. Solutions (Solubility, Colligative Properties)
6. Chemical Kinetics (Rate Laws, Arrhenius Equation, Reaction Mechanisms, Catalysis)
7. Chemical Equilibria (Equilibrium Expressions, Constants, and Calculations, LeChatelier's Principle)
8. Acid/Base Equilibria (pH, Strong and Weak Acids, Buffers, Titrations)
9. Solubility Equilibria (Precipitation, Common Ion Effect)
10. Chemical Thermodynamics (Second and Third Laws of Thermodynamics, Entropy, Free Energy)
11. Oxidation-Reduction Reactions and Electrochemistry (Balancing with Half-Reactions, Voltaic Cells, Cell Potential, Nernst Equation, Electrolysis)
12. Nuclear Chemistry (Radioactive Decay Processes, Decay Rates, Fission, Fusion)