

**General Chemistry I and General Chemistry II**  
**Mediasite Lecture List**  
(in order of presentation of topics)

**Unit 1: Foundational Aspects of Chemistry**

Foundations of Chemistry

FA-1-0	Foundations of Foundations
FA-1-1	A Mindmap for General Chemistry
FA-1-2	Matter
FA-1-3	Properties
FA-1-4	Elements, Compounds, and Mixtures
FA-1-5	Measurements and Units
FA-1-6	Numbers
FA-1-7	Significant Figures
FA-1-8	Scientific Notation
FA-1-9	Unit Conversions
FA-1-10	Unit Conversion Example
FA-1-11	Density
FA-1-12	Heat and Temperature
FA-1-13	Moles

Chemical Formulas & Composition Stoichiometry

FA-2-1	Atoms
FA-2-2	Formulas
FA-2-3	Mass and Moles
FA-2-4	Percent Composition

Chemical Equations & Reaction Stoichiometry

FA-3-1	Equations Basics
FA-3-2	Limiting Reactant & Percent Yield
FA-3-3	Concentration

**Unit 2: Structure & Bonding**

Atomic Structure

SB-1-1	Fundamental Particles
SB-1-2	The Nuclear Atom
SB-1-3	Mass Number & Isotopes
SB-1-4	Atomic Weight Scale
SB-1-5	Electromagnetic Radiation
SB-1-6	Atomic Spectra
SB-1-7	The Quantum Mechanical Atom
SB-1-8	Quantum Numbers
SB-1-9	Atomic Orbitals

- SB-1-10 Electrons & Magnetism
- SB-1-11 Electron Configurations

#### Interlude: Oxidation and Reduction (Oxidation Numbers)

- SB-I-1 Introduction to Redox
- SB-I-2 Assigning Oxidation Numbers, Part 1
- SB-I-3 Assigning Oxidation Numbers, Part 2

#### Periodicity

- SB-2-1 A Map of the Periodic Table
- SB-2-2 Atomic Radii
- SB-2-3 Ionic Radii
- SB-2-4 Electron Affinity
- SB-2-5 Ionization Energy
- SB-2-6 Electronegativity

#### Chemical Bonding

- SB-3-1 Types of Bonds
- SB-3-2 Lewis Dot Structures
- SB-3-3 Ionic Refresher
- SB-3-4 Forming Ionic Compounds
- SB-3-5 Covalent Bonds
- SB-3-6 Covalent Lewis Structures
- SB-3-7 The Octet Rule
- SB-3-8 Resonance
- SB-3-9 Formal Charge
- SB-3-10 Polar & Nonpolar Bonds
- SB-3-11 Dipole Moment & Molecules

#### Molecular Structure

- SB-4-1 Introduction to Molecular Structure
- SB-4-2 VSEPR Theory
- SB-4-3 Using VSEPR Theory
- SB-4-4 Geometry and Polarity
- SB-4-5 Valence Bond Theory
- SB-4-6 Visualizing Geometries
- SB-4-7 Visualizing Multiple Bonds

### **Unit 3: Chemical Reactions**

#### The Basics of Chemical Reactions

- CR-1-1 Types of Elements: A Quick Review
- CR-1-2 Electrolytes & Nonelectrolytes
- CR-1-3 Strong and Weak Acids
- CR-1-4 Strong and Weak Bases
- CR-1-5 Solubility Rules

CR-1-6	Representing Chemical Reactions
CR-1-7	Combination Reactions
CR-1-8	Decomposition Reactions
CR-1-9	Displacement Reactions
CR-1-10	Metathesis Reactions

Interlude: Oxidation and Reduction (Redox Equations)

CR-I-1	Balancing Redox Equations, Part 1
CR-I-2	Balancing Redox Equations, Part 2

Reactions in Aqueous Solution

CR-2-1	Properties of Acids & Bases
CR-2-2	Arrhenius Acid-Base Theory
CR-2-3	Bronsted-Lowry Acid-Base Theory
CR-2-4	Autoionization of Water
CR-2-5	Amphoterism
CR-2-6	Acid Strength
CR-2-7	Classifying Acid-Base Reactions
CR-2-8	Acidic & Basic Salts
CR-2-9	Lewis Acid-Base Theory
CR-2-10	Molarity Calculations
CR-2-11	Titrations
CR-2-12	Equivalents & Normality

**Unit 4: Phases of Matter**

Gases

PM-1-1	Properties of Gases
PM-1-2	Boyle, Charles, Gay-Lussac, & the Combined Gas Law
PM-1-3	Avogadro's Law & Standard Molar Volume
PM-1-4	The Ideal Gas Law
PM-1-5	Dalton's Law of Partial Pressures
PM-1-6	Kinetic Molecular Theory
PM-1-7	Diffusion & Effusion
PM-1-8	Real Gases

Solids & Liquids

PM-2-1	Condensed Matter
PM-2-2	Intermolecular Interactions
PM-2-3	Properties of Liquids
PM-2-4	Processes with Liquids
PM-2-5	Processes with Solids
PM-2-6	Phase Diagrams
PM-2-7	Crystallinity
PM-2-8	Unit Cells
PM-2-9	Bonding in Solids

PM-2-10	Atomic Radii
PM-2-11	Band Theory

### Solutions

PM-3-1	Dissolution
PM-3-2	Solids in Liquids
PM-3-3	Liquids & Gases in Liquids
PM-3-4	Dissolution Rates & Saturation
PM-3-5	Temperature & Pressure Effects on Solubility
PM-3-6	Molality & Mole Fraction
PM-3-7	Colligative Properties
PM-3-8	Vapor Pressure Lowering & Raoult's Law
PM-3-9	Boiling Point Elevation
PM-3-10	Freezing Point Depression
PM-3-11	Osmotic Pressure
PM-3-12	The van't Hoff Factor
PM-3-13	Colloids

## **Unit 5: Thermodynamics & Kinetics**

### Chemical Thermodynamics

TK-1-1	Thermodynamic Terms
TK-1-2	The First Law of Thermodynamics
TK-1-3	Enthalpy Changes
TK-1-4	Calorimetry
TK-1-5	Thermochemical Equations
TK-1-6	Standard States
TK-1-7	Hess's Law
TK-1-8	Bond Energies
TK-1-9	Entropy
TK-1-10	Spontaneity & Gibbs Free Energy

### Chemical Kinetics

TK-2-1	Kinetics Terms
TK-2-2	Reaction Rates
TK-2-3	Factors Affecting Reaction Rates
TK-2-4	Nature of Reactants
TK-2-5	Concentrations of Reactants
TK-2-6	Integrated Rate Equation & Half-life
TK-2-7	Determining Reaction Order
TK-2-8	Collision Theory
TK-2-9	Transition State Theory
TK-2-10	Determining Reaction Mechanisms
TK-2-11	Temperature & Rate
TK-2-12	Catalysts

## Unit 6: Chemical Equilibrium

### The Basics of Chemical Equilibrium

EQ-1-1	Basic Equilibrium Concepts
EQ-1-2	The Equilibrium Constant
EQ-1-3	$K_c$ and Equation Form
EQ-1-4	The Reaction Quotient
EQ-1-5	Le Châtelier's Principle
EQ-1-6	The Equilibrium Constant & Pressure
EQ-1-7	Heterogeneous Equilibria
EQ-1-8	Gibbs Free Energy & Equilibrium
EQ-1-9	$K_c$ & Varying Temperature

### Acid-Base Equilibria

EQ-2-1	Strong & Weak Acids & Bases
EQ-2-2	Autoionization of Water
EQ-2-3	The pH and pOH Scales
EQ-2-4	Acid and Base Ionization Constants
EQ-2-5	Polyprotic Acids
EQ-2-6	Solvolysis
EQ-2-7	Salts, Part 1
EQ-2-8	Salts, Part 2
EQ-2-9	Summary of Salient Points About Salts
EQ-2-10	Hydrolysis of High Charge Density Cations

### Buffers & Titrations

EQ-3-1	Buffers & the Common Ion Effect
EQ-3-2	Weak Acid-Soluble Salt Buffers
EQ-3-3	Weak Base-Soluble Salt Buffers
EQ-3-4	The Henderson-Hasselbach Equation
EQ-3-5	Acid-Base Indicators
EQ-3-6	Strong Acid-Strong Base Titration Curves
EQ-3-7	Weak-Strong Titration Curves
EQ-3-8	Weak-Weak Titration Curves

### Solubility Product Equilibria

EQ-4-1	The Solubility Product Constant
EQ-4-2	Miscellaneous $K_{sp}$ Concepts
EQ-4-3	Dissolving Precipitates
EQ-4-4	The Dissociation Constant

## Unit 7: Other Topics

### Electrochemistry

OT-1-1	Introduction to Electrochemistry
OT-1-2	Electrolysis & Electrolytic Cells

OT-1-3	Coulometry & Faraday's Law
OT-1-4	Applications of Electrolysis
OT-1-5	Voltaic Cells
OT-1-6	Standard Electrode Potentials
OT-1-7	Using Standard Potentials
OT-1-8	Corrosion
OT-1-9	The Nernst Equation
OT-1-10	$E^\circ$ , $\Delta G$ , and $K$
OT-1-11	Primary Voltaics
OT-1-12	Secondary Voltaics
OT-1-13	Fuel Cells

### Nuclear Chemistry

OT-2-1	Comparing Chemical and Nuclear Reactions
OT-2-2	The Nucleus
OT-2-3	Nuclear Stability
OT-2-4	Radioactive Decay
OT-2-5	Detecting Radiation
OT-2-6	Rate of Decay
OT-2-7	Disintegration Series
OT-2-8	Radioactive Dating
OT-2-9	Transmutation
OT-2-10	Nuclear Fission
OT-2-11	Nuclear Fusion

### Coordination Chemistry

OT-3-1	d-Block Metals
OT-3-2	d-Block Metal Ions
OT-3-3	Coordination Chemistry Terminology
OT-3-4	Nomenclature
OT-3-5	Structures
OT-3-6	Structural Isomerism
OT-3-7	Stereoisomerism
OT-3-8	Crystal Field Theory
OT-3-9	Color