

L1 T 8/20	<p><u>Lecture 1. General Chemistry Review</u></p> <p>Lewis Structures, Molecular Geometry, Arrhenius Equation, Second Law</p> <p>Text: Lewis Structures; Molecular Geometry; Chemical Kinetics; Acids & Bases, Chemical Thermodynamics</p> <p>Handout: Lewis Structure Methodology</p> <p>Wiki: Hybridization; Aromaticity; Arrhenius Equation; Second Law of Thermodynamics</p>
L2 R 8/22 PS 1 Due	<p><u>Lecture 2. Intermolecular Forces (Noncovalent Interactions)</u></p> <p>Coulomb's Law, Electronegativity, Hydrogen Bonds, Van der Waals Forces, Dipole-Dipole & Ion-Dipole Interactions, Solvation, Hydrophobicity</p> <p>Wiki: : Electronegativity; Intermolecular Forces; London Dispersion Forces; Hydrogen Bonds; Coulomb's Law; Solvation; Hydrophobicity</p> <p>Text: Electronegativity, Intermolecular Forces (Hydrogen Bonding, Van Der Waals Forces, Dipole-Dipole & Ion-Dipole Interactions)</p>
L3 T 8/27 PS2 Due	<p><u>Lecture 3. Solubility and Lipids</u></p> <p>Thermodynamics of Liquid-Liquid Solubility, Octanol-Water Distribution Equilibrium Constants [Partition Coefficients (P)], Phospholipid Components and Structure, Cell Membrane Structure and Properties</p> <p>Wiki: Partition Coefficient;</p> <p>Link: UCSF Membrane Tutorial (Great resource!!)</p> <p>Reading: The Components and Properties of Cell Membranes</p> <p>Link: Kimball's Biology Pages: Fats (Unsaturated Fats, Trans and Omega Fatty Acids, Phospholipids)</p>
L4 R 8/29 PS3 Due Quiz 1	<p><u>Lecture 4. Condensation and Hydrolysis Reactions</u></p> <p>Alcohols and Carboxylic Acids, Triglyceride Formation, Polyphosphate and Phospholipid Formation</p> <p>Handout: Condensation Reactions</p>
L5 T 9/3 PS4 Due Quiz 2	<p><u>Lecture 5. Amino Acids</u></p> <p>Structure, Chirality, Side Chain Polarity, Peptide Bond, Peptide Condensation and Hydrolysis, Henderson-Hasselbalch Equation, Charge and pH, Solubility and pH</p> <p>Wiki: Amino Acids; Chirality; Peptide Bond; Henderson-Hasselbalch Equation;</p> <p>Link: Amino Acid Structures at pH=7.4 Amino Acid Chart with pKa Table</p>
L6 R 9/5 PS5 Due Quiz 3	<p><u>Lecture 6. Protein Structure</u></p> <p>Primary Structure, Disulfide Bonds, Secondary Structure - Alpha Helices and Beta Sheets, Tertiary/Quaternary Structures and Associated Noncovalent Interactions, Prions, PostTranslational Protein Modifications</p> <p>Wiki: Protein Structure Disulfide Bonds</p> <p>Kimball's Biology Pages: Proteins; Polypeptides;</p> <p>Kimball's Biology Pages: Protein Structure: Primary; Secondary; Tertiary; Quaternary</p>
7 T 9/10 Quiz 4	<p><u>Lecture 7. Enzymes: Structure and Function</u></p> <p>Enzyme Catalysis, Mechanism of Action, Active Site, Substrate Binding, Catalytic Roles, Michaelis-Menton Kinetics, Lineweaver-Burk Plots, Km and Vmax Determination, Turnover Numbers, Km and Substrate-Enzyme Affinity</p> <p>Text: Michaelis-Menten Model of Enzyme-Catalyzed Reactions</p> <p>Kimball's Biology Pages: Enzymes</p> <p>Kimball's Biology Pages: Enzyme Kinetics</p>
L8 R 9/12 PS6 Due	<p><u>Lecture 8. Enzymes as Drug Targets</u></p> <p>Active Site Inhibitors, Allosteric Inhibition, Competitive / Non-Competitive Inhibitors, Suicidal Substrates</p> <p>Wiki: Enzymes; Enzyme Inhibitors</p>
L9 T 9/17	<p><u>Lecture 9. Medical Approaches to Inflammation I</u></p> <p>Cyclooxygenase Case Study</p>

Quiz 5	<p>Reading: Protein Function – Section III Cyclooxygenase (COX): An Example of How Enzymes Function</p> <p>Wiki: NSAIDs; COX-2 Inhibitors</p> <p>Reading: Molecular Basis of Inflammation</p>
L10 R 9/19 PS7 Due	<p>Lecture 10. Medical Approaches to Inflammation II</p> <p>Steroids - Structure, Intracellular Receptors, Anti-Inflammatory MOA</p> <p>Reading: Molecular Basis of Inflammation</p> <p>Reading: Protein Function – Section II Nuclear Receptors: An Example of How Proteins Function</p> <p>Reading: Kimball's Biology Pages: Steroid Hormone Receptors and their Response Elements</p> <p>Wiki: Steroid ; Zinc Finger; Complex Ion ; d-Orbitals</p>
L11 T 9/24 Quiz 6	<p>Lecture 11. Receptors as Drug Targets I</p> <p>Neurotransmitters & Hormones, Agonists, Antagonists, Partial Agonists, Inverse Agonists, Treatment of Hormone-Dependent Breast Cancers</p> <p>Wiki: Neurotransmitters; Hormones; Receptors; Antagonists; Agonists; Partial Agonists; Inverse Agonists; Ligands; Tamoxifen; Aromatase Inhibitors;</p>
L12 R 9/26	<p>Lecture 12. Receptors as Drug Targets II</p> <p>Desensitization & Sensitization; Tolerance & Dependence; Receptor Types & Subtypes; Affinity, Efficacy, & Potency; Ligand-Receptor Dissociation Equilibria, EC50, IC 50</p> <p>Wiki: Efficacy; Dose-Response Curve; EC50; IC50; Therapeutic Index;</p> <p>Scribd: Sensitization and Desensitization;</p>
L13 T 10/1 Quiz 7	<p>Lecture 13. Nucleic Acids as Drug Targets</p> <p>Structure of DNA, Central Dogma, Intercalating Drugs, Alkylating & Metallating Agents, Cisplatin, 5-FU</p> <p>Wiki: Alkylating Agents; Sulfur Mustard; Cisplatin;</p>
C1 R 10/3	Compensatory Time for Review Paper Preparation
T1 T 10/8 Midterm	<p>Mid-Term Examination on Material from Lectures 1-13</p> <p>A Few Practice Problems....</p>
L14 R 10/10	<p>Lecture 14. Receptor Structure and Signal Transduction I – Overview of Ion Channel Receptors</p> <p>Ion Concentration Gradients, Ion Channel Structure and Mechanisms of Action, Ligand-Gated and Voltage-Gated Ion Channels, Cell Membrane Potentials, Nernst Equation and Membrane Equilibrium Potentials, Ion Movements and Resulting Inhibitory/Excitatory Potential Changes,</p> <p>Wiki: Ion Channels; Nernst Equation; Action Potential ; K+ Ion Channel Nobel Chemistry Lecture (Video)</p> <p>UCSF Reading: "Diffusion and Transport Across Membranes" Section on Ion Channels (pages 80-86)</p>
L15 T 10/17 PS8 Due	<p>Lecture 15. Receptor Structure and Signal Transduction II – Thermodynamics of Ion Channels</p> <p>Sodium-Potassium-ATP Pump Mechanism, Cell Membrane Potentials, Nernst Equation and Membrane Equilibrium Potentials, Free Energy Changes of Ion Movement across Voltage and Concentration Gradients, Ion Movements and Resulting Inhibitory/Excitatory Potential Changes</p> <p>UCSF Reading: "Diffusion and Transport Across Membranes" Section on ATP-Driven Ion Pumps (pages 73-77)</p> <p>Wiki: Neuron; Membrane Potential; Na+/K+-ATPase</p> <p>McGraw-Hill: Sodium-Potassium-ATP Pump</p>

L16 R 10/22	<p>Lecture 16. Receptor Structure and Signal Transduction III – G-Protein Coupled Receptors (GPCRs)</p> <p><i>G-Protein Coupled Receptor Structure, Evolutionary Tree of GPCRs, GPCR Signaling Mechanism of Action</i></p> <p>2012 Nobel Chemistry - Nobel Lecture Rob Lefkowitz Nobel Lecture Brian Kobilka</p> <p>Wiki: G-Protein Coupled Receptors (GPCRs);</p>
L17 T 10/24 Quiz 7	<p>Lecture 17. Cholinergics I</p> <p><i>Nervous System, Cholinergic System, Acetylcholine Structure & Receptor Binding</i></p>
L18 R 10/29	<p>Lecture 18. Cholinergics II</p> <p><i>Cholinergic Antagonists, Acetylcholinesterase Inhibitors</i></p>
L19 T 10/31	<p>Lecture 19. Adrenergics</p> <p><i>Geometry of Adrenergic Receptors, Main Types of Norepinephrine Receptors, Interaction of Adrenergic Receptors with Neurotransmitters, MOA of Activated Receptors</i></p>
L20 T 11/5	<p>Lecture 20. Psychoactive Drugs I: Stimulants and Tranquilizers</p> <p>Handout:</p>
L21 R 11/7	<p>Lecture 21. Psychoactive Drugs II: Anti-Depressants</p> <p>Handout:</p>
L22 T 11/12	<p>Lecture 22. Psychoactive Drugs III: Anti-Psychotics and Hallucinogens</p> <p>Handout</p>
L23 R 11/14	<p>Lecture 23. Psychoactive Drugs IV: Cannabinoids, Opium & Opioid Analgesics</p> <p><i>Cannabinoids, Source and History of Opiates, Structure of Opioids and Opioid Receptors, Endogenous Opioids, Side Effects of Opiates</i></p> <p>Text Assignment: MedChem – Chapter 21</p>
L24 T 11/19	<p>Lecture 24. Chemistry of Local & General Anesthetics</p> <p><i>MOA for Local Anesthetics, pKa Relevance, History of Cocaine Use by Humans, MOA for General Anesthetics, Molecular Structures of Widely Used General Anesthetics</i></p> <p>Handout: Local and General Anesthetics</p>
T2 R 11/21	<p><u>Test 2 Concepts</u></p>
R1 T 11/26 Paper Due	<p>Review</p>