Course Lecture Schedule

L1 W 8/24	***Lecture 1. General Chemistry Review*** *Lewis Structures, Molecular Geometry, Arrhenius Equation, Second Law* *Text: Lewis Structures; Molecular Geometry; Chemical Kinetics; Acids & Bases, Chemical Thermodynamics* *Handout: Lewis Structure Methodology* *Wiki: Hybridization; Aromaticity; Arrhenius Equation; Second Law of Thermodynamics*
L2 M 8/29 PS 1 Due	***Lecture 2. Intermolecular Forces (Noncovalent Interactions)*** *Coulomb's Law, Electronegativity, Hydrogen Bonds, Van der Waals Forces, Dipole-Dipole & Ion-Dipole Interactions, Solvation, Hydrophobicity* *Wiki: : Electronegativity; Intermolecular Forces; London Dispersion Forces; Hydrogen Bonds; Coulomb's Law; Solvation; Hydrophobicity* *Text: Electronegativity, Intermolecular Forces (Hydrogen Bonding, Van Der Waals Forces, Dipole-Dipole & Ion-Dipole Interactions*
L3 W 8/31 PS2 Due	***Lecture 3. Solubility and Lipids*** *Thermodynamics of Liquid-Liquid Solubility, Octanol-Water Distribution Equilibrium Constants [Partition Coefficients (P)], Phospholipid Components and Structure, Cell Membrane Structure and Properties* *Wiki: Partition Coefficient;* *Link: UCSF Membrane Tutorial (Great resource!!)* *Reading: The Components and Properties of Cell Membranes* *Link: Kimball's Biology Pages: Fats (Unsaturated Fats, Trans and Omega Fatty Acids, Phospholipids*
L4 W 9/7 PS3 Due Quiz 1	***Lecture 4. Condensation and Hydrolysis Reactions*** *Alcohols and Carboxylic Acids, Triglyceride Formation, Polyphosphate and Phospholipid Formation* *Handout: Condensation Reactions*
L5 M 9/12 PS4 Due Quiz 2	***Lecture 5. Amino Acids*** *Structure, Chirality, Side Chain Polarity, Peptide Bond,Peptide Condensation and Hydrolysis, Henderson-Hasselbalch Equation, Charge and pH, Solubility and pH* *Wiki: Amino Acids; Chirality; Peptide Bond; Henderson-Hasselbalch Equation;* *Link: Amino Acid Structures at pH=7.4 Amino Acid Chart with pKa Table*
L6 W 9/14 PS5 Due Quiz 3	***Lecture 6. Protein Structure*** *Primary Structure, Disulfide Bonds, Secondary Structure - Alpha Helices and Beta Sheets, Tertiary/Quaternary Structures and Associated Noncovalent Interactions, Prions, PostTranslational Protein Modifications* *Wiki: Protein Structure Disulfide Bonds* *Kimball's Biology Pages: Proteins; Polypeptides;* *Kimball's Biology Pages: Protein Structure: Primary; Secondary; Tertiary; Quaternary*
L7 M 9/19 Quiz 4	***Lecture 7. Chemical Kinetics*** *McQuarrie Text Chapters 17 and 18*
L8 W 9/21 PS6 Due	***Lecture 8. Enzymes: Structure and Function*** *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* *Text: Michaelis-Menten Model of Enzyme-Catalyzed Reactions* *Kimball's Biology Pages: Enzymes* *Kimball's Biology Pages: Enzyme Kinetics*
L9 M 9/26	***Lecture 9. Enzymes as Drug Targets***

PS7 Due	*Active Site Inhibitors, Allosteric Inhibition, Competitive / Non-Competitive Inhibitors, Suicidal Substrates* *Wiki: Enzymes; Enzyme Inhibitors*
L10 W 9/28 Quiz 5	***Lecture 10. Medical Approaches to Inflammation I*** *Cyclooxygenase Case Study* *Reading: Protein Function – Section III Cyclooxygenase (COX): An Example of How Enzymes Function* *Wiki: NSAIDs; COX-2 Inhibitors* *Reading: Molecular Basis of Inflammation*
L11 M 10/3 PS-8	***Lecture 11. Medical Approaches to Inflammation II*** *Steroids - Structure, Intracellular Receptors, Anti-Inflammatory MOA* *Reading: Molecular Basis of Inflammation* *Reading: Protein Function – Section II Nuclear Receptors: An Example of How Proteins Function* *Reading: Kimball's Biology Pages: Steroid Hormone Receptors and their Response Elements* *Wiki: Steroid ; Zinc Finger; Complex Ion ; d-Orbitals*
L12 W 10/5 Quiz 6	***Lecture 12. Receptors as Drug Targets I*** *Neurotransmitters & Hormones, Agonists, Antagonists, Partial Agonists, Inverse Agonists,* *Treatment of Hormone-Dependent Breast Cancers* *Wiki: Neurotransmitters; Hormones; Receptors; Antagonists; Agonists; Partial Agonists; Inverse Agonists;* *Ligands; Tamoxifen; Aromatase Inhibitors;*
L13 M 10/10	***Lecture 13. Receptors as Drug Targets II*** *Desensitization & Sensitization; Tolerance & Dependence; Receptor Types & Subtypes; Affinity, Efficacy, & Potency; Ligand-Receptor Dissociation Equilibria, EC50, IC 50* *Wiki: Efficacy; Dose-Response Curve; EC50; IC50; Therapeutic Index;* *Scribd: Sensitization and Desensitization;*
T1 W 10/12 Midterm	***Mid-Term Examination on Material from Lectures 1-13*** A Few Practice Problems....
L14 W 10/19	***Lecture 14. Nucleic Acids as Drug Targets*** *Structure of DNA, Central Dogma, Intercalating Drugs, Alkylating & Metallating Agents, Cisplatin, 5-FU* *Wiki: Akylating Agents; Sulfur Mustard; Cisplatin;*
L15 M 10/24	***Lecture 15. Receptor Structure and Signal Transduction I – Overview of Ion Channel Receptors*** *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,* *Wiki: Ion Channels; Nernst Equation; Action Potential ; K+ Ion Channel Nobel Chemistry Lecture (Video)* *UCSF Reading: "Diffusion and Transport Across Membranes" Section on Ion Channels (pages 80-86)*
L16 W 10/26 PS9 Due	***Lecture 16. Receptor Structure and Signal Transduction II – Thermodynamics of Ion Channels*** *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* *UCSF Reading: "Diffusion and Transport Across Membranes" Section on ATP-Driven Ion Pumps (pages 73-77)*

	Wiki: Neuron; Membrane Potential; Na+/K+-ATPase *McGraw-Hill: Sodium-Potassium-ATP Pump*
L17 M 10/31	***Lecture 17. Receptor Structure and Signal Transduction III – G-Protein Coupled Receptors (GPCRs)*** *G-Protein Coupled Receptor Structure, Evolutionary Tree of GPCRs, GPCR Signaling Mechanism of Action* *2012 Nobel Chemistry - Nobel Lecture Rob Lefkowitz Nobel Lecture Brian Kobilka* *Wiki: G-Protein Coupled Receptors (GPCRs);*
L18 W 11/2 Quiz 7	***Lecture 18. Cholinergics*** *Nervous System, Cholinergic System, Acetylcholine Structure & Receptor Binding, Cholinergic Antagonists, Acetylcholinesterase Inhibitors*
L19 M 11/7	***Lecture 19. Adrenergics*** *Geometry of Adrenergic Receptors, Main Types of Norepinephrine Receptors, Interaction of Adrenergic Receptors with Neurotransmitters, MOA of Activated Receptors*
L20 W 11/9	***Lecture 20. Psychoactive Drugs I: Stimulants and Tranquilizers*** *Handout:*
L21 M 11/14	***Lecture 21. Psychoactive Drugs II: Anti-Depressants*** *Handout:*
L22 W 11/16	***Lecture 22. Psychoactive Drugs III: Anti-Psychotics and Hallucinogens*** *Handout*
L23 M 11/21	***Lecture 23. Psychoactive Drugs IV: Cannabinoids, Opium & Opioid Analgesics*** *Cannabinoids, Source and History of Opiates, Structure of Opioids and Opioid Receptors,* *Endogenous Opioids, Side Effects of Opiates* *Text Assignment: MedChem – Chapter 21*
L24 M 11/28	***Lecture 24. Chemistry of Local & General Anesthetics*** *MOA for Local Anesthetics, pKa Relevance, History of Cocaine Use by Humans, MOA for General Anesthetics, Molecular Structures of Widely Used General Anesthetics* *Handout: Local and General Anesthetics*
T2 W 11/30	***Test 2 Concepts***
R1 M 12/5 Paper Due	***Review***