Study Guide, Exam 2, Chemistry 5700

Exam 2 Material: Enzyme mechanisms through membrane transport (equivalence of lectures 13-22 materials).

Here are some compounds you should be able to draw structures for and number properly:
•palmitic, stearic, oleic, linoleic acid
•glycerol
• a triacylglycerol
• a glycerophospholipid
•sphingosine, ceramide, sphingomyelin
• describe GENERALLY the structural features of cholesterol (don't memorize all the subleties)
•D-glyceraldehyde, dihydroxyacetone, D-ribose, 2-deoxyribose, D-glucose, D-fructose in linear forms (Fischer projections)
•draw Haworth projections for alpha- and beta-D-glucopyranose, D-fructofuranose, D-ribofuranose, 2-deoxyribofuranose
•N-acetyl-D-glucosamine, N-acetylmuramic acid
•adenine, thymine, guanosine, uracil, cytosine
•nucleosides and nucleotides of above bases, and name them properly

Here is a list of terms that you should be familiar with and be able to define/explain the relevance of:

ENZYME MECHANISM:
•strategies for enzymatic rate enhancement, general acid/base, metal ion catalysis, covalent catalysis, nucleophiles and electrophiles in catalysis
•be able to push electrons properly when drawing an enzymatic mechanism
•Schiff base formation, and role of Schiff base in catalysis, as illustrated by acetoacetate decarboxylase
•metal ion catalysis as illustrated by carbonic anhydrase. What role(s) does the metal ion play in catalysis?
•charge shielding vs. charge stabilization
•features of chymotrypsin catalysis. Be able to draw the complete mechanism for chymotrypsin, and explain how the enzyme illustrates general principles of catalysis (general acids/bases, covalent catalysis, changing an amino acids pKa, transition state stabilization, substrate specificity)

ENZYME REGULATION:
•covalent vs. allosteric regulation of enzymes
•allosteric enzyme regulation: principles, multiple binding sites, heterotropic and homotropic positive and negative modulators (effectors)
•product inhibition vs. feedback inhibition

CARBOHYDRATES:
• monosaccharide, polysaccharide, aldose, ketose
•hemiacetal, hemiketal, acetal, ketal

•epimers, anomers, mutarotation, equatorial, axial
•reducing end, nonreducing end
•O-gycosidic, N-glycosidic
•amylose, amylopectin, glycogen
•cellulose, chitin, peptidoglycan, glycosaminoglycan, proteoglycan

NUCLEIC ACIDS:
•nucleotide, nucleoside, nucleic acid, polynucleotide, 5' and 3' ends
•Chargaffs rules
• DNA double helix, B-DNA, base pairing, anti parallel, pitch
•major groove, minor groove
•base tilt, sugar pucker, anti vs. syn
• palindrome, mirror repeat, hairpin, cruciform
• RNA structure: single stranded vs. double stranded
• denaturation, annealing, hybridization, melting temperature

LIPIDS/MEMBRANES:
•micelle, bilayer, liposome, vesicle
•soap, detergent
•phosphodiester
•lipase, phospholipase
•lateral, transverse diffusion
•cholesterol function
•order-disorder bilayer transition, transition temperature
• mechanisms of hormone action
• hormone/cofactor functions of prostaglandin, vitamins D, A, K
• integral, peripheral, and lipid-linked membrane proteins: properties, and methods used to solubilize them from a membrane preparation
• Hydropathy plot, $\Delta G°$ hydrophobicity

MEMBRANE TRANSPORT:
•simple diffusion
•passive transport: thermodynamics and kinetics
•glucose permease
•uniport, synport, antiport
•chloride-bicarbonate exchange protein
•primary and secondary active transport
•sodium-potassium ATPase
•lactose permease
•bacteriorhodopsin
•ion channels: properties and distinguishing features