**Chapters 8 and 9**

**Lipids, Membranes and Membrane Transport**

**8.1: Recognize the physical characteristics of lipids.**

* Explain how fatty acids are esterified to make larger structures.
* Describe the structures of amphipathic lipids.
* List some functions of lipids.

**fatty acid structure**

**fatty acid nomenclature: systematic vs. shorthand naming system**

**triacylglycerols**

**glycerophospholipids: choline, ethanolamine, glycerol, and serine**

**phospholipases: A1, A2, C, and D**

**sphingolipids: sphingomyelins, cerebrosides, and gangliosides**

**archaeal lipids**

**isoprene derivatives: cholesterol and ubiquinone**

**waxes**

**arachidonate derivatives**

**plant lipids: geraniol, limonene, and capsaicin**

**lipid vitamins: A, D, E, and K**

**Vitamin A**

**Vitamin D**

**Vitamin E**

**Vitamin K**

**8.2: Describe the physical properties of the lipid bilayer.**

* List the ways that membrane lipids can move.
* Relate lipid composition to bilayer fluidity.
* Compare transverse and lateral lipid diffusion.

**lipid bilayer formation**

**thermodynamic forces**

**variations in lipid behavior**

**bilayer fluidity**

**TM and membrane fluidity**

**cholesterol in eukaryotes**

**lipid rafts**

**bilayer diffusion – lateral vs. transverse**

**8.4: Summarize the features of the fluid mosaic model.**

**composite structure of lipids and (glyco)proteins**

**leaflet differentiation**

**mobility limitations**

**glycoprotein diversity**

**8.3: Explain how proteins associate with membranes.**

* Distinguish integral, peripheral, and lipid-linked membrane proteins.
* Describe how an alpha helix or beta barrel spans the membrane.

**membrane-associated proteins: integral, peripheral, and lipid-linked**

**lipid-linked proteins: myristoylation, palmitoylation, prenylation**

**“glycosylphosphatidyinositol-ation”**

**alpha-helical transmembrane proteins**

**beta-barrel transmembrane proteins**

**9.2 Passive Transport**

**Describe the operation of passive transport systems.**

* Compare the structures of porins, channels, and transporters.
* Explain the mechanisms of solute selectivity in the different types of transporters.
* Describe the role of conformational changes in the GLUT proteins.
* Compare transport proteins to enzymes.

**porins**

**ion channels**

**gated ion channels**

**mechanosensitive channels**

**aquaporins**

**glucose transporter (GLUT)**

**transporters vs. enzymes**

**9.3: Active Transport**

**Describe the operation of active transport systems.**

* Distinguish primary and secondary active transport.
* Describe the reaction sequence of the Na,K-ATPase.

**primary active transport: Na,K-ATPase**

**secondary active transport: Na-Glc transporter**

**9.1: Thermodynamics of Membrane Transport**

**Explain how ion movements affect membrane potential.**

* Calculate the membrane potential from ion concentrations. (calc 9.1)
* Describe the ion movements of an action potential.
* Analyze the thermodynamics of ion movement across membranes. (calc 9.2, 9.3)



R = 8.3145 J/K\*mol

*F* = 96,485 J/V\*mol

*Z* = net charge per ion

**ΔG = RT ln [X]in/[X]out**

**ΔG = RT ln [X]in/[X]out + ZFΔΨ**

**intra/extracellular concentrations of Na+/K+**

**ion movements during action potential**

**resting potential:**

**depolarization:**

**repolarization:**

**propagation of signal:**

**directionality:**

**9.4: Membrane Fusion**

**Describe the process of membrane fusion.**

* Summarize the events that occur at a nerve-muscle synapse.
* Describe the role of SNARES and membrane curvature in vesicle formation.
* Compare exocytosis and endocytosis.

**exocytosis: neurotransmitter release**

**membrane fusion/lipid remodeling**

**SNARE complexes**

**endocytosis**

**exosomes**