**BIOL 112 – COMPILED KEY CONCEPTS**

1. Darwinian Evolution
* Evidence for evolution
* Darwin’s theory
* The Modern Synthesis
1. Evolution of Populations
* The Modern Synthesis
* Populations and the Gene Pool
* The Hardy-Weinberg Equilibrium
* Micro-evolution
* Sources of Genetic Variation
* Natural Selection
* Preservation of Genetic Variation
1. Origin of Species
* Species concepts
* Development of reproductive isolation
* Patterns of speciation
* Macroevolution
* Human evolution
* Evolution continues…..
1. Plant Structure, Growth and Development
* What is a kingdom?
* What makes a plant a plant?
* The hierarchy of structure – plant cells, tissues and organs
* Primary growth – elongation
* Secondary growth – diameter expansion
* Morphogenesis occurs during growth
1. Plant Transport
* The importance of water
* Water potential: Ψ = P - s
* How water moves – gradients, mechanisms and pathways
* Transpiration – water movement from soil to plant to atmosphere
* The pressure flow model of phloem transport
1. Plant Nutrition and Soils
* Resources
	+ Which are required
	+ How they are used
* Essential elements
	+ What they are
	+ What they do
* Soils and soil forming factors
* The rhizosphere
* Some alternate methods to acquire nutrients
1. Angiosperm Reproduction
* Life Cycles – the alternation of generations
* The structure of a flower
* Development of the male gametophyte
* Pollination in all its glories
* Development of the female gametophyte
* Fertilization
* Embryos, seeds and fruit
* Asexual reproduction
1. Introduction to Animal Structure and Function
* What separates animals from other organisms?
* Introduction to structure and function relationships
* Exchanges with the external environment
* Hierarchical organization in animals
* Cells and tissues
* Organ systems
* Homeostasis and thermoregulation
1. Animal Nutrition and Digestion
* Animals are heterotrophic!
* Nutritional needs
	+ Energy
	+ Carbon skeletons
	+ Essential nutrients
* Food processing
* The human digestive system
1. Animal Circulation and Gas Exchange Systems
* Circulation and gas exchange
* How we circulate – spanning diversity
* Hearts – the evolution of double circulation
* Blood circulation and capillary exchange
* Blood structure and function
* Gas exchange – spanning diversity
* Breathing – spanning diversity
* Respiratory pigments
1. Animal Osmoregulation
* Water and metabolic waste
* The osmotic challenges of different environments
* The sodium/potassium pump and ion channels
* Nitrogenous waste
* Osmoregulation and excretion in invertebrates
* Osmoregulation and excretion in vertebrates
1. Animal Immune Systems
* Innate immunity provides broad-spectrum defense against many pathogens
* Acquired immunity is very specific, develops over time, and relies on B and T cells
* Antigen recognition properties of B and T cells
* B and T cell binding sites develop randomly!
* Integrated B and T cell function
* When the immune system goes wrong…
1. Animal Nervous Systems
* Evolution of organization in nervous systems
* Neuron structure and function
* Neuron communication at synapses
* Organization of the vertebrate nervous systems
* Brain structure and function
* The cerebral cortex
* Nervous system injuries and diseases