Biology 3 Study Guide – Exam #1

This is a list of the general topics you should be prepared to answer questions on for each chapter. You are still responsible for all material covered in class and need to know all of the key terms at the end of the Powerpoint slides for each chapter.

Chapter 1 (Introduction/Scientific Method)
- the characteristics of living things
- the scientific method
- experimentation: independent, dependent, standardized variables; controls

Chapter 2 (Atoms, Molecules and Water)
- the properties of each subatomic particle
- atomic number and atomic mass
- isotopes
- determining electron configurations and numbers of unpaired electrons
- ions and ionic bonds
- polar and non-polar covalent bonds
- properties of water
- hydrogen bonds
- water as a solvent
- the nature of pH and the pH scale
- acids, bases and buffers

Chapter 3 (Biological Macromolecules)
- the 6 main elements used in macromolecules
- the important properties of carbon
- the various functional groups and their properties
- polymers, dehydration synthesis and hydrolysis
- general roles and structures of carbohydrates
- mono-, di- and polysaccharides
- the functions of cellulose, starch and glycogen
- general roles and structures of lipids
- fatty acids, triglycerides, phospholipids, steroids
- saturated vs unsaturated fatty acids
- general roles and structure of proteins
- amino acid structure, how amino acids are linked together in polypeptides
- levels of protein structure
- general roles, structures of nucleic acids (DNA, RNA)
- nucleotide structure
- basic structure of double-stranded DNA
**Chapter 4 (Tour of the Cell)**

- why cells are small
- characteristics and structures associated with prokaryotic cells
- the general roles of each major organelle
- the secretory pathway
- organelles, structures found in plant cells vs animal cells
- general structure and roles of the cytoskeleton
- general structure and roles of flagella and cilia

**Chapter 5A (Biological Membranes & Membrane Transport)**

- the general structure of membranes
- membrane components: phospholipids, membrane proteins, cholesterol
- factors that influence membrane fluidity
- diffusion and osmosis
- facilitated diffusion by channel proteins, transport proteins
- active transport by protein pumps
- exocytosis & endocytosis (pinocytosis, phagocytosis, receptor-mediated endocytosis)

**Chapter 5B (Energy, ATP & Enzymes)**

- kinetic vs potential energy
- 1st law of thermodynamics: “conservation of energy”
- 2nd law of thermodynamics: “energy conversions are never 100% efficient, some energy is always lost as heat”
- endergonic vs exergonic chemical reactions
- the coupling of biochemical reactions
- activation energy
- the structure of ATP and why it’s a good cellular fuel
- how enzymes catalyze biochemical reactions
- enzyme inhibition
- biochemical pathways and feedback inhibition

**Extra Credit Article**


“Carbon dioxide emissions are making the oceans more acidic, imperiling the growth and reproduction of species from plankton to squid.”