

BIOLOGY I MIDTERM OBJECTIVES

Chapter 1 (The Nature of Biology)

- 1) What is the difference between a dependent (responding) variable and an independent (manipulated) variable?
- 2) List the basic characteristics of life
- 3) Explain the difference between autotrophic and heterotrophic
- 4) Explain the difference between sexual and asexual reproduction

Chapter 3 and 4 (Ecology – Community interactions)

- 1) Describe the relationship between species, populations, communities and ecosystems.
 - 2) List the trophic levels we mentioned in class and the differences between them
 - 3) Describe the niche of decomposers in an ecosystem.
 - 4) Explain the relationship between the niches of organisms and competition. Explain the difference between inter- and intraspecific competition.
 - 5) Know how to read a food chain or food web.
 - 6) Draw a simple food web and describe the trophic level of particular organisms within the food web.
 - 7) Differentiate between the different types of community interactions. Also give examples of the different types of symbiotic relationships
 - 8) Be able to explain how and why available energy and biomass decreases as you travel up the food chain. Be able to calculate how much energy is passed on (in calories) at each step of the energy pyramid as well.
 - 9) Understand the major cycles (**nitrogen, carbon, and water**) and describe the role that they play in an ecosystem. Be able to identify the major processes of each cycle. **STUDY YOUR CARBON CYCLE ASSIGNMENT.**
 - 10) Describe the niches of the different types of bacteria in the nitrogen cycle (nitrogen-fixing, denitrifying, and decomposer bacteria)
 - 11) Describe the difference between biotic and abiotic factors and be able to list some important abiotic factors. Describe how abiotic and biotic factors can influence the composition of a community.
 - *12) Describe the process of ecological succession and explain the difference between primary and secondary succession.
 - *13) Explain what is meant by a climax community? How is the climax community determined by abiotic factors?
 - *14) What is *primary productivity*? How is it influenced by limiting nutrients? How would an increase in primary productivity affect the biomass of the tertiary consumer level in a community? Explain.
- *=not in your notes – use textbook for information

Chapter 5 and 6 (Ecology – Population Ecology and Biodiversity)

- 1) Describe the combination of factors that lead to the growth of any population
- 2) Explain what a limiting factor is and be able to describe the difference between density-dependent and density-independent limiting factors
- 3) Explain how human population growth has affected natural resources, pollution of the environment, global warming, and habitat loss/fragmentation
- 4) Explain the difference between exponential and logistic growth and be able to interpret graphs of both types of growth
- 5) Explain the concept of carrying capacity and describe its significance to any population
- 6) Explain how age structure diagrams can predict the future growth rate of a population.
- 7) Explain the three parts of the definition of biodiversity and explain its importance (both to humans and to natural ecosystems)
- 8) List some ecosystem services and explain why more biodiversity improves ecosystem services.
- 9) List the threats to biodiversity and explain how each can result in a decrease in biodiversity.
- 10) Explain the concept of the tragedy of the commons and describe how it relates to natural resources. Also explain what sustainable use is and why it is necessary.
- 11) Describe the process of biological magnification and explain how the severity of the problem is related to an organism's trophic level.
- 12) Explain how climate change is worsened by the tragedy of the commons. Give specific examples, not just generalizations.

- 13) Study your Population Growth Models assignment (the online one), the online article questions (“Ocean Acidification” and “Conservation of Biodiversity”) and the questions from the film *An Inconvenient Truth*

Chapter 2 (Biochemistry and Enzymes)

- 1) Know the *location and charge* of the 3 subatomic particles (protons, neutrons and electrons)
- 2) Describe the difference between a covalent and an ionic bond.
- 3) Explain the difference between acids and bases and be able to identify an acid or base by its position on the pH scale. Also explain how a buffer affects the pH of a solution.
- 4) Describe how the properties of water (cohesion, adhesion, capillary action) result from the polar structure of a water molecule.
- 5) Explain the role of condensation (dehydration synthesis) and hydrolysis reactions in the formation and break down of organic compounds (links # 12 and 13)
- 6) ****Know the different kinds of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) and functions and properties of each (Study the table of organic compounds that you made in class and your notes) (also study links 1-4)**
- 7) Be able to recognize chemical structures of monomers and polymers of the 4 major macromolecules (biomolecules) – handout from class and pictures in the notes (see class notes page – Biochemistry)
- 8) Recognize an unsaturated fatty acid from a saturated fatty acid
- 9) Describe the structure of an amino acid. Which region differs from one amino acid to another?
- 10) Explain how peptide bonds form between amino acids in a condensation reaction. (not in book, look at link # 11, screen 3 for explanation)
- 11) Explain the four levels of organization of a protein (link #14 and video #1 (and notes/handout))
- 12) Describe what an enzyme is and be able to describe their role in a chemical reaction (any of the enzyme links)
- 13) Explain the relationship between the active site of an enzyme and its substrate. Also describe what happens to the active site of an enzyme under extreme temperatures and pH and explain how this affects the activity of the enzyme (review denaturation)
- 14) Explain the difference between a competitive and a non-competitive inhibitor and explain how they affect the rate of an enzyme catalyzed reaction.
- 15) Review the information from your enzyme tutorial and protein folding tutorial we did in class.

Chapter 7 (Cell Structure and Function)

- 1) List the three components of the cell theory
- 2) Describe the differences and similarities between prokaryotic and eukaryotic cells
- 3) Explain the differences between plant and animal cells
- 4) Review the functions of the cellular organelles (especially Golgi, ER, mitochondria, chloroplasts, ribosomes, nucleolus, lysosomes, vacuoles, cytoskeleton)
- 5) List the basic components and describe the structure of the cell membrane (study your membrane structure tutorial)
- 6) Explain the processes of **passive** and **active transport** and know **examples of each**
- 7) Explain the difference between *hypotonic*, *hypertonic* and *isotonic* solutions. Describe what will happen to both an animal cell and a plant cell that is placed in these types of solutions (use the words plasmolysis and turgor pressure in reference to plant cells)
- 8) Explain what turgor pressure is and why it is important to plant cells
- 9) Explain the difference between exocytosis and endocytosis and why they are necessary to move some substances across the plasma membrane
- 10) Understand the relationship between cell, tissues, organs, and organ systems.
- 11) Be able to identify the various parts of a compound microscope.
- 12) Be able to calculate the total magnification if given the ocular (eye-piece) magnification and the objective magnification

Chapter 10 (The Cell Cycle)

- 1) Explain the importance of cell division to an organism and the reasons why cells must stay small

- 2) Describe the events of each stage of the cell cycle: interphase (G1, S, and G2), each of the stages of mitosis (prophase, metaphase, anaphase, and telophase), and cytokinesis
- 3) Explain the difference between cytokinesis in animal vs. plant cells
- 4) Explain the importance of cyclins and CDKs to the cell cycle
- 5) Describe the role of proto-oncogenes and tumor suppressor genes in the cell cycle. Also explain how these genes can be involved in the development of cancer.
- 6) Explain the role of p53 in the cell cycle
- 7) Explain what angiogenesis is and describe how a tumor becomes metastatic
- 8) Explain what stem cells are and how they are important in regenerating and maintaining tissues throughout the body.