

**Midterm 1**  
**Study Guide**

This review sheet provides guidance for your study efforts, and includes a few examples of questions that I may ask on the exam. The purpose of this review sheet is to point out the topics that are most important so that you may focus your studying. When answering these questions or those on the exam give specific data, accurate information, correct terminology, and concrete examples. Because there is not much time to prepare for this first test, you may use your book and/or notes during class time to take this exam, but NO computers will be allowed in class (you must print out your notes). The test is long and asks specific questions, so you need to study in addition to preparing your notes for class, or you will not finish the test in the allotted time.

**Topics and Information Covered by this Midterm**

- Biology and Life: Lecture 1 & Chapter 1
- Scientific Method: Lecture 2, Chapter 1, & Assignment 1
- Chemistry and the Origin of Life: Lecture 3 & Chapters 2 & 3
- Photosynthesis and Cellular Respiration: Lecture 4 & Chapters 6 & 7
- Global Warming: An Inconvenient Truth (movie) & Assignment 2
- DNA and Genetics: Lecture 5, Chapter 4, & Assignment 3

**Biology and Life**

- How does the study of biology relate to our understanding of environmental problems?
- What is biology?
- Why is the definition of “life” often controversial?
- What are the 5 characteristics of living things? Be able to give examples of each.
- Describe and give an example of a biological hierarchy.

**Scientific Method**

- What are the 2 approaches to science, and how are they different?
- How do scientists use the weight of evidence and scientific consensus to evaluate biological topics?
- Draw a flow chart illustrating the scientific method
- Know and understand the steps in the Scientific Method. You should be able to give an example of a scientific inquiry. You must also be able to take an idea and make a scientific experiment, complete with null hypotheses, alternative hypotheses, and an experimental design.
- What is a hypothesis?
- What is a dependent variable? Independent variable?
- In a controlled experiment, what does a scientist manipulate? How do they ensure that the results are due to their manipulations?
- What are scientific theories? Laws?
- What is pseudoscience and how does it compare to the scientific method?

- How do we use the scientific method to make decisions in the face of uncertainty of data?
- How does the scientific method add to the “body of knowledge”? What is the “body of knowledge”?
- What does it mean when we say a hypothesis must be “testable”?

### **Chemistry & the Origin of Life**

- List and describe the 2 main theories on the Origin of Life.
- What kind of atmosphere did early earth exhibit? What chemicals were present?
- What did Oparin and Haldane contribute to the theory of the Origin of Life?
- In the theory of the Origin of Life, what genetic material most likely “arose” first, DNA or RNA? Why?
- How did the earth end up with an oxidizing atmosphere?
- Describe and differentiate prokaryotes and eukaryotes.
- Know what an element is, and which elements are essential for life.
- Know how to determine the reactants and products of a chemical equation.
- Be able to describe the specific characteristics that make Carbon so important in the structure of organic molecules.
- Know how to use the periodic table to determine an element’s number of protons, neutrons, and electrons.
- Know what functional groups are and how they affect the reactivity of organic molecules.
- Know the basic structure and function of the following biological molecules: Carbohydrates, Lipids, Proteins, and Nucleic Acids. Be able to give examples of each.
- Discuss the changes of the earth’s atmosphere from the formation of the earth through the origin of “life” and the oxygenation of the atmosphere.

### **Cellular Respiration and Photosynthesis**

- Know the difference between autotrophs and heterotrophs.
- Know the difference between kinetic and potential energy, and be able to give examples of each (within the cell).
- Know the purpose of cellular respiration and how it relates to metabolism.
- Be able to write the overall chemical equations for cellular respiration and photosynthesis and know which reactants are oxidized and which are reduced.
- What is a redox reaction?
- Know which kinds of organisms undertake photosynthesis, and be able to give examples.
- Know the location (within the organism as well as the cell) and structure (the parts) of a chloroplast.
- Be able to describe how photosynthesis relates to cellular respiration (from a chemical standpoint as well as how they contribute to the survival of plants).
- Be able to list the specific pigments found in most plant cells. Be able to describe how plant pigments harvest light energy.
- Know what portion of the electromagnetic spectrum are used in photosynthesis.

- How does photosynthesis affect our earth's temperature? How does it relate to the greenhouse effect?

### **Global Warming and Ozone Issues**

- What is the function of a greenhouse gas?
- How have humans altered the balance of greenhouse gases in the atmosphere?
- What are some potential impacts from global warming?
- Be able to discuss some causes, effects, and solutions regarding global climate change.
- What things are “unknown” about global warming? How do scientists deal with this uncertainty?
- How can we decrease the amount of greenhouse gases in the environment?
- Be able to name causes of anthropogenic climate change and how to stop it (specific examples that relate cause and effect).

### **DNA and Genetics**

- How does DNA differ from RNA?
- What are the parts of a nucleotide?
- What are complementary bases/nucleotides? What are they used for?
- What is a codon?
- Describe the difference between transcription and translation. How is each important for Protein Synthesis?
- What are the 2 “jobs” of DNA?
- Be able to describe the chemical composition and shape of DNA and its nucleotide components.
- After learning about GMO's, would you eat genetically-modified food? Why or why not, and give specific examples from Assignment 3 that led you to this conclusion.