

Study Guide for Exam #1

Tips for success-

1. HANDWRITE out your study guide. Some (very few) students do fine with typing, but most do much better when they handwrite their study guide. If you do a really complete job, your study guide will be 8-15 pages long, depending on the size of your handwriting.
2. WORK IN GROUPS, but don't split up the parts among people in a group. The benefits of doing the study guide are gained from actually writing out the answers yourself. It's great to work in groups and discuss the answers with others, but be sure you do your own writing. Besides, if I see exact copies of study guides, no one in the group will get the extra credit for it.
3. Draw yourself diagrams and pictures whenever you can, to illustrate processes. You can redraw the pictures for yourself on your exam and use them as models to answer questions. If you can, create a little "movie" in your head of cellular processes.
4. Focus on learning **processes** rather than just definitions whenever applicable. For example, for the vocabulary term below-"photosynthesis" you should not stop at defining it, but should be sure that you understand what kinds of organism do it, what kind of environmental conditions are required, how the process works, what are the reactants and products, etc.
5. Get a good night's sleep and eat a good breakfast before the exam. An extra hour of sleep will be more valuable than an extra hour of studying if you are exhausted. If you find yourself in this predicament often, then you need to start studying much earlier for the exam. Allow 10-20 hours of total study time for each exam. Whether you do it all at once or in small increments is up to you...

GOOD LUCK!!

Characteristics & Chemistry of Life

1. List and describe the basic characteristics that all living organisms have in common.
2. Describe the basic hierarchy of living systems from atoms to ecosystems.
3. What are chemical elements? Which ones are particularly prevalent in living organisms?
4. Define each of the following: Molecule, Ion, Isotope, Proton, Electron, Neutron
5. Name and describe the three type of chemical bonds discussed in class.
6. Draw a pH scale with 0, 7 and 14 marked. Indicate where the acids would be. Indicate where the bases would be. Provide 2-3 examples of acids and bases and write them in where they would be on the scale.
7. Name and briefly describe the four macromolecules discussed in class. Know what the monomer is for each and be able to recognize them given a diagram.

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8. Name and describe the three domains of biological organization. What are the six kingdoms and what kinds of organisms are in each one?
9. Describe the conventions that are used in naming organisms. What is the difference between a genus and a species and how do we designate each in the name? How do you indicate italics when handwriting an organism's name?

Cells

10. Describe the basic characteristics of prokaryotic cells. Describe the basic characteristics of eukaryotic cells. What are the major differences between them?
11. What are the basic tenets of the cell theory? Why are cells considered the smallest units of life?
12. Describe the functions of each of the organelles/cell structures discussed in class. Cell membrane, cilia, flagella, nucleus, RER, SER, golgi, mitochondria, lysosomes (and other vesicles), cytoskeleton, chloroplasts.
13. What are the two primary structural components of the cell membrane? What is the arrangement of these components with respect to each other? What is a lipid bilayer?
14. List and describe all (diffusion, osmosis, active transport, endo/exocytosis) the ways in which substances can cross cell membranes. In each case describe what types of substances use that method to cross membranes. Be sure to discuss the roles of protein channels and pumps.
15. Define the terms isotonic, hypotonic and hypertonic. Use diagrams if necessary.

Metabolism

16. What are enzymes and how do they function in living systems? Describe how pH, temp, concentration, allosteric regulators and phosphorylation state can affect enzyme function.
17. A. What is cellular respiration? B. Where does it occur? C. What is the general formula for cellular respiration?
18. Describe *in general terms* (five or six steps) the process of cellular respiration from glycolysis to the ETC. Focus on the starting materials, the waste generated, the carrier molecules involved and the end products. Be sure to include what happens to glucose, pyruvate, NADH/FADH, H₂O, CO₂, Oxygen, ATP, electrons, H⁺ ions.

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19. How do the H ions released from the carrier molecules at the ETC get converted to energy required for ATP synthesis to occur?
20. Describe *in general terms* (five or six steps) the process of photosynthesis from the ETC to the Calvin Benson Cycle. Focus on the starting materials, the waste generated, the carrier molecules involved and the end products. Be sure to include what happens to sunlight, NADH/FADH, H₂O, CO₂, Oxygen, ATP, electrons, H⁺ ions.
21. What is the difference between the so-called “light reactions” and the “dark reactions” of photosynthesis.

Describe the following term related to *metabolism*:

Anabolism

Catabolism

ATP

Reduction-Oxidation Rxns

Fermentation

Carrier molecules (FADH₂, NADH)

Anaerobic respiration

Kreb's cycle

Chlorophylls

Electron transport chain

Pyruvate

Acetyl-CoA

Enzymes

Co-enzymes

Active site

Substrate

ATP synthase

Glycolysis