

Biology 103
Final Exam Study Guide
Final Exam will be on Monday, March 16, 2:00-4:00

You may have ONE 3x5 card of notes for this exam. The exam will have a short written section worth 10-20 points and a multiple choice section worth 55-65 points for a total of 75 points.

Study tips:

1. **Begin studying for the final exam NOW! There is a strong difference between test scores of people who begin studying a week ahead and those who begin only one or two days ahead.**
2. Review the midterms. There will be many “recycled” questions, though they may be reworded or turned around backwards. Use these as a self-test to see what you have learned and what you need to work on.
3. Come to the review on Friday. Download and print the in-class review that will be available on the class website and bring it to class.
4. Use the review questions at the end of each chapter to test yourself on key concepts.
5. Don't just read the chapters. Take notes as you go.
6. Notice the ALL CAPS section headings in the textbook that are in the form of a question. Try to answer these questions before you read on, and see how well you do.
7. Notice the blue subsection headings that are in the form of a statement. These summarize the main points in the chapters. Write these down as you take notes.
8. Look at important conceptual diagrams in the text, especially those that have been used in presentations in class. Try drawing them from memory.
9. Review the PowerPoint presentations (available on the class website) to focus in on important topics from each chapter.
10. If possible, study in groups. Quiz one another on important key concepts. Social learning has been shown to improve knowledge retention.

Use this study guide as a review of the concepts you have learned in class. Remember that this is a list of possible test question topics, NOT the actual questions. Focus on these main points as you review for this exam:

1. State the differences between monocots and dicots by the features of their leaves, flowers, roots, and their patterns of vascular tissue (note that monocots and dicots are flowering plants, so these terms don't apply to pines, ferns, and other nonflowering plants).
2. State the differences between and know the functions these types of plant tissues: epidermis, parenchyma, sclerenchyma, collenchyma, xylem, phloem, meristem.
3. Know the arrangement of vascular tissue in a dicot root, stem, and leaf.
4. Know the differences between primary and secondary growth in plants.
5. Know the stages of the plant life cycle. Note how the gametophyte phase is more prominent in algae and mosses, while the sporophyte phase is more prominent in conifers and flowering plants. Be able to label a generalized plant life cycle with the terms sporophyte, gametophyte, meiosis, mitosis, spore, gamete, fertilization, zygote.
6. Know the general features of flowers pollinated by wind, bees, butterflies, and hummingbirds.
7. Know the general features of fruits dispersed by wind, water, animals, and self-propelled means.
8. List the major functions of the following plant hormones: auxins, gibberellins, cytokinins, ethylene gas, abscisic acids. Name some of the commercial uses of these hormones. How are auxins used by home gardeners?
9. Trace the path of water from root hair to leaf stomata. Understand the roles of the following processes in transpiration: osmosis, active transport, capillary action, evaporation.
10. Trace the path of sap from source to sink. Understand the roles of the following processes in the pressure-flow model of sap transport: active transport, osmosis, bulk flow.
11. Know the roles of mycorrhizal fungi and nitrogen-fixing bacteria on plant health. How can this knowledge be of use to gardeners and organic farmers?
12. Sketch negative feedback loops for: blood glucose control, temperature control, blood calcium control, blood pressure. Name the hormones, if any, that are involved. Consider known knowledge

- of these feedback loops could help people avoid Type II diabetes, loss of bone density, hypothermia, heat stroke, and kidney failure.
13. Describe how a nerve “fires.” Define: action potential, resting potential. State the functions of the axon, dendrites, cell body, synapse.
 14. Describe what a neurotransmitter is and how it functions in nervous system control.
 15. List the parts of the nervous system and what they control: central and peripheral, motor and sensory branches, sympathetic and parasympathetic divisions of the motor branch.
 16. Know these parts of the brain and their functions: medulla, pons, corpus calosum, limbic system, cerebellum, cerebrum. State the general functions of these lobes of the cerebrum: frontal, temporal, parietal, occipital. If a person’s brain were damaged in any of these brain parts, what would be the result?
 17. Sketch a reflex arc that includes a sensory receptor, sensory neuron, interneuron, spine, motor neuron, effector. Review the reflexes that you observed in lab and consider what kinds of environmental threats they protect you from.
 18. Review the function of the nephron in the kidney. Know the roles of each of these parts: glomerulus, Bowman’s capsule, proximal convoluted tubule, loop of Henle, distal convoluted tubule, collecting duct. On a diagram of the nephron, be able to show where the following occur: active transport of sodium, osmosis of water, active transport of potassium and drugs. Be able to describe why a high sodium, low potassium diet is potentially harmful to the kidneys and can (in people with sodium sensitivity) raise blood pressure.
 19. Describe the anatomy of a muscle cell (muscle fiber), including the arrangement of filaments in the cell. Describe the changes that occur in the muscle cell due to exercise. How do the ratios of fast-twitch and slow-twitch fibers differ between weight lifters and long-distance runners? What is myoglobin, and what role does it play in muscle activity?
 20. Know these movements: flexion, extension, adduction, abduction, rotation. Why would physical therapists be interested in understanding the muscles and bones involved in these movements.
 21. Review circulation in arthropods (open circulation) and in vertebrates (closed circulation). Why does open circulation limit the size of arthropods?
 22. Review circulation of blood through the human heart. Why is a four-chambered heart an advantage to “warm-blooded” (homeothermic) animals?
 23. Describe how the structure of arteries, veins, and capillaries is related to their function (for example, consider the thickness and muscularity of the walls of the larger vessels).
 24. Describe how atherosclerosis forms, how it is treated, and how it can be prevented.
 25. What roles to the bones and the kidneys play in blood cell formation?
 26. Review the parts of the human respiratory system. State the functions of the: sinuses, trachea, bronchi, bronchioles, alveoli.
 27. Describe how diffusion plays a role in moving oxygen and carbon dioxide into and out of the blood at the body cells and at the alveoli. How does hemoglobin help create a high diffusion gradient? How does breathing in carbon dioxide with cigarette smoke interfere with this diffusion gradient?
 28. Describe the major classes of nutrients and their role in human nutrition: carbohydrates, proteins, lipids, minerals, vitamins. From which of these do we get actual energy?
 29. Describe these parts of the digestive system and their functions: mouth and teeth, salivary glands, esophagus, stomach, small intestine (including the duodenum), pancreas, gall bladder, large intestine. Describe how frequent use of various herbal “colon cleansers” can disrupt the function of the large intestine.
 30. How to hormones play a role in digestion and control of appetite?
 31. Describe basic, non-specific defenses against diseases. How can you take advantage of these to avoid colds?
 32. Describe the roles of the following cells in human immune function: Macrophages, T-helper cells, T-killer cells, B-memory cells. Be able to describe how these cells are activated by vaccines, and how this gives us immunity to certain diseases. Why is a measles shot good for most of your life, but a flu shot is good only for a year?
 33. Describe what happens in these situations when the immune system goes wrong: allergies, autoimmune diseases, AIDS.