

Miramar College
Biology 205 Microbiology
Midterm Exam Study Guide

These learning objectives are intended as a study guide. This is not necessarily a complete guide and as such is not intended to be the sole source of your studies. You should use your notes, text, lab manuals and other resources in order to make sure that you are fully prepared for your exam.

1. Purchase a Scantron (½ sheet, bluish-green accent color) ☺.
2. Define microorganism, what are the various roles that microbes play on the planet?
3. Know how to correctly write an organism name using scientific nomenclature.
4. What is normal flora/microbiota? Why is it important to the overall health of the host?
5. As with many theories in science, the idea of spontaneous generation was accepted as truth for some time. Describe this theory and discuss the various experiments and scientists that led to its disproof.
6. Describe and give a function of the following microscopes:
 - a. brightfield
 - b. phase-contrast
 - c. transmission electron
 - d. scanning electron
7. Define the following terms and their relationship to microscopy and staining:
 - a. resolution
 - b. immersion oil
 - c. negative (acidic) dyes
 - d. positive (basic) dyes
 - e. differential stains
 - f. special stains
 - g. mordant
8. What are the major differences between prokaryotic and eukaryotic cells?
9. Describe the structure, arrangement and function of the prokaryotic flagellum.
10. Describe the bacterial cell wall in detail. Compare and contrast the cell wall of Gram positive and Gram negative bacteria.
11. Describe and be able to identify the various shapes and arrangements of Bacterial cells.
12. Describe the of the following:
 - a. glycocalyx (capsule & slime layer)
 - b. pili
 - c. fimbriae
 - d. axial filaments
 - e. inclusion bodies
13. Describe the purpose and circumstances for endospore formation, including the processes of sporulation (sporogenesis) and germination.
14. Distinguish an acid from a base by the pH, and define the term pH.
15. Define oxidation and reduction. Discuss why these two processes are coupled.
16. What is oxidative phosphorylation? How is this related to chemiosmosis?
17. What is the major difference between respiration and fermentation?
18. Define the following terms: metabolism, catabolism, and anabolism.
19. Describe how each the following produce energy (ATP) and what their carbon source is:
 - a. autotrophs
 - b. heterotrophs
 - c. photoautotrophs
 - d. photoheterotrophs
 - e. chemoheterotrophs
 - f. chemoautotrophs
20. Discuss the general fermentation habits of enteric bacteria.
21. Discuss the commonalities between respiration & photosynthesis in terms of ATP generation.
22. Discuss the different types of photosynthesis microbes are capable of performing. See Table 5.6 for a summary.
23. Classify microbes based on their preference and/or tolerance of temperature, pH and osmotic pressure/stress.
24. How are microbes classified based on oxygen requirements? What special enzymes allow aerobes to live & grow in an oxygen-rich environment?

25. Define, give a use for & explain the differences between complex, defined, selective, differential & enrichment media.
26. Compare the 4 phases of microbial growth and explain & differentiate between indirect & direct methods of counting microbes/cell growth.
27. Define: sterilization, commercial sterilization, disinfection, antiseptic, -cide, -stat, germicide, sanitation, and pasteurization.
28. Describe the overall mechanisms of physical & chemical methods of controlling microbial growth. Understand what is meant by “-stat,” “-lytic” or “-cide”.
29. Why is moist heat better than dry heat at killing microbes?
30. What factors affect how efficient a disinfecting agent will be?
31. Define thermal death point, thermal death time, and decimal reduction time.
32. Study figure 7.11.
33. What two types of molecules contain the genetic information in Bacteria? What three ways are these molecules passed from one bacterial cell to another (genetic recombination)?
34. What is the relationship between DNA and proteins?
35. How are prokaryotic genes regulated? Include the definition & mechanism of both inducible & repressible operons.
36. Explain the different types of mutations that can alter the genetic information in a cell. What causes these mutations and how are they repaired?
37. What is the Ames test? How and why does it result in positive mutant selection?
38. What is the difference between horizontal & vertical gene transfer?
39. Define plasmid, F factor, F⁺ cell, F⁻ cell, Hfr & R factor. Understand what happens when F⁺, F⁻ & Hfr cells interact.
40. Define genetic engineering & biotechnology.
41. During genetic engineering, both vectors and clones are used. Explain their importance to this process.
42. Discuss how recombinant DNA molecules are made using restriction enzymes. What are the steps used in making these recombinant molecules? How do both plasmids & viruses play a role in using recombinant DNA molecules?
43. Describe the ways that DNA can be introduced to the cell both *in vivo* and *in vitro*.
44. What is cDNA? What is the advantage of using cDNA during recombinant DNA experiments?
45. How are R plasmids used to detect Bacteria that have taken up foreign DNA?