



Exit Exam Study Guide

Students graduating with a Biomedical Sciences or Biotechnology degree should be able to:

1. Differentiate eukaryotic from prokaryotic cells, Eubacteria from Archae, and know function of endospores, capsules, and flagella
2. Differentiate gram positive from gram negative microorganisms with regard to cell wall differences and describe cell wall functions
3. Describe how microorganisms grow (also phases of growth, generation time, numbers of generations, and binary fission) and their interactions/effects on the environment – how they respond and adapt their metabolic pathways depending on what energy sources are available
4. Describe structure of major macromolecules, nucleic acids, proteins, lipids, carbohydrates, their function in living cells, the bonds linking their subunits, and their structure-function relationships
5. Define important cell wall characteristics and functions
6. Describe energy generating mechanisms in the chemoorganotrophs: oxidative phosphorylation (electron transport) and substrate level phosphorylation
 - a. Fermentation and glycolysis (contrast electron acceptors)
 - b. TCA or Krebb's cycle in aerobic respiration
7. Relate host-pathogen interactions and virulence:
 - a. Contrast exo versus endotoxins
 - b. Two aspects of virulence: invasiveness versus toxigenicity
 - c. Host resistance versus virulence
8. Differentiate humoral and cellular immune response
9. Compare innate immunity with humoral and cellular immunity; describe and explain what is responsible for active humoral immunity (second exposure is enhanced)
10. Describe the importance of self antigen expression for the immune system
11. Describe the structure and functions of immunoglobulins, including antigen binding sites and roles in immunity
12. Describe the interactions and functions of cells of the immune system, including T cell receptors, MHC, coreceptors, cytokines, etc.
13. Define the characteristics of DNA
14. Compare DNA and RNA as to structure and function
15. Compare and contrast the steps to DNA replication, DNA transcription and regulation in prokaryotes and eukaryotes
16. Describe the central dogma of molecular biology, i.e. DNA → RNA → Protein synthesis
17. Describe molecular methods for DNA analysis, protein elucidation, and PCR
18. Contrast steps in lytic cycle with the lysogenic cycle
19. Important characteristics of antibiotics and mechanics to produce antibiotic resistance
20. Describe the methods bacteria to use to transfer genetic information