

Biology 220, Microbiology for Health Professionals
STUDY OBJECTIVES EXAM #1

The student should be able to:

1. Define the major groups of microorganisms and to give examples of each.
2. Discuss the concepts of spontaneous generation, biogenesis and abiogenesis.
3. Describe Koch's postulates and exceptions to Koch's postulates and how these relate to bacterial and viral etiology of disease.
4. Define/describe the following terms: agar, etiology, epidemic, pandemic, aerobic growth, anaerobic growth, fermentation, endospore, pasteurization, tyndallization, immunization.
5. Give the major contributions of the following people to microbiology: Redi, Leewenhoek, Spallanzani, Needham, Pasteur, Tyndall.
6. Describe how microorganisms are classified (i.e., shape, color, size, arrangement, stain characteristics [gram, acid-fast, spore], spore formation).
7. Discuss both procaryotic and eucaryotic cell structure with regard to the differences and similarities in structure and organelle distribution.
8. List and give characteristics of the 5 Kingdoms of Microorganisms.
9. Give examples of the major gram negative organisms: spirochetes, aerobic rods, aerobic cocci, facultative anaerobic rods, obligate anaerobic bacteria, intracellular parasites, and mycoplasma.
10. Give examples of the major gram positive organisms: cocci, endospore forming, non-sporeforming rods.
11. Describe the growth characteristics of: neisseria, streptococci, staphylococci, corynebacteria.
12. Discuss the characteristics of the bacterial cell wall.

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STUDY OBJECTIVES FOR EXAM #2

The student should be able to:

1. Define and give examples of each of the following: defined (synthetic) media, enriched media, differential media, selective media.
2. Describe ways to isolate bacterial colonies.
3. Describe physical conditions which affect bacterial growth, and define the terms used to describe temperature-dependent organismal growth, oxygen requirements, pH and osmotic requirements.
4. Define the following terms and describe how each fits into a discussion of bacterial growth: fission, conjugation, spores, budding, generation time, growth curve (4 phases and what they are), and methods to determine microbial number.
5. Discuss what metabolism is, including the following terms associated with metabolism: anabolic reactions, catabolic reactions, respiration, fermentation, NAD, FAD, cytochromes, ATP, glycolysis, Krebs cycle.
6. Discuss the composition and roles of enzymes in metabolism. How are enzymes controlled and how do they function?
7. Discuss the structure of the bacterial genome, the replication of the genome, and characteristics of plasmids.
8. Define the term mutation, and tell what types of mutations there are, and how these mutations may affect cell function.
9. Use the following terms in a meaningful discussion: DNA, RNA (3 types), nucleotides in DNA and RNA, pyrimidines, purines.
10. Define the following: transformation, transduction, bacterial conjugation, F^+ and F^- mating, Hfr, restriction and modification enzymes and endonucleases.

Biology 220, Microbiology for Health Professionals
Study Objectives For Exam # 3

The student should be able to

1. Define genotype and phenotype and to describe what DNA (genes) are for and how their activation is controlled.
2. Define the following: DNA gyrase, bacterial chromosome, haploid, dominant, recessive, plasmid, mutation, replication, transcription, translation.
3. Describe the following: bidirectional replication, replication fork, Okasaki fragment, semiconservative replication, 3'--->5' reading of DNA and 5'-->3' synthesis of new DNA, DNA ligase, codon, anticodon, nonsense (antisense) strand, sense strand, nonsense codon, start codon.
4. Discuss the regulation of gene expression in terms of constitutive, inductive and repressive expression in relation to substrate and product control.
5. Define and draw the OPERON model and illustrate catabolite repression.
6. Define transformation, transduction, and conjugation and Hfr conjugation in genetic exchange processes.
7. Describe the AMES Test, “piggyback vaccines”, gene cloning and PCR technology.
8. Discuss and give examples of symbiosis, mutualism, and antagonism (amensalism, predation, parasitism).
9. Discuss some of the physical control mechanisms/agents involved in bacterial growth control.
10. Define the following: microbicidal, germicidal, sterilization, disinfection, sanitization, antisepsis.
11. Discuss the specific sites to which antibiotics act. Give specific examples of at least two antibiotics effecting each site and be able to describe how each antibiotic acts.
12. Describe treatments of viral diseases.
13. How does antibiotic resistance occur?
14. Define the following: Kirby-Bauer technique, minimum inhibitory concentration (MIC), liposomes.

Study Objectives for Exam # 4
Introduction to Microbiology, BIOL 220
Disease and Immunology

The student should be able to.....

1. Explain the difference between colonization, infection, carrier and disease (pp. 411)
2. Define the terms pathogenicity and virulence, and MAKE A **LIST** of factors that enhance virulence (pp. 421-439).
3. Describe some of the factors (non-specific and specific) that a host uses to cause resistance to disease (pages 440-483).
4. Understand and explain the differences between innate immunity and adaptive/acquired (humoral and cellular) immunity and give examples of each type.
5. Define the following terms: antigen (epitope), hapten, antibody, antibody classes structure and functions (4 mechanisms of antibody action), T lymphocytes (helper and cytotoxic), B lymphocytes, macrophages, antigen presenting cells (APC), memory response (anamnestic), MHC proteins (class I and class II), active vs passive immunity, vaccine, ELISA assay.
6. Explain what erythroblastosis fetalis is and how it occurs and explain how the concept of universal blood donor and recipient can be explained through immunology.
7. Define and described the 4 types of hypersensitivity reactions and give an example of each.

Biology 220, Microbiology for Health Professionals
Study Objectives
Final Exam

The student should be able to

1. Discuss immunization and the types of vaccines that are used (live, attenuated, dead, etc...)
2. Discuss active vs passive immunization.

Chapter 24

1. Discuss the differences between upper and lower respiratory tract infections and to give examples of infections in both areas.
2. Discuss some of the predisposing factors involved in getting respiratory tract infections and to list some of the normal flora of the respiratory tract.
3. Define droplet nuclei, fomite, nosocomial, reservoirs, and describe how these relate to air borne diseases of the respiratory tract.
4. Define lysogeny and how it relates to respiratory diseases, especially scarlet fever and diphtheria.
4. Describe the following in terms of their etiology of causing respiratory tract infections and the symptoms they cause: viruses, *S. pyogenes*, *Corynebacterium diphtheriae*, Legionnaires' disease, pertussis and influenza (give the characteristics of these that make them unique).
5. Discuss the following and give characteristics of each disease and causative agent: chicken pox, measles, mumps, German measles, smallpox, infectious mononucleosis, histoplasmosis and Reyes syndrome.

Chapter 25

1. Describe the anatomy of the digestive system and give some of the natural defenses of the system.
2. Give some modes of transmission of GI diseases and give specific examples of each.
3. Discuss the following types of food poisoning giving the organism that causes each and the symptoms, and the vehicle: botulism, *S. aureus* food poisoning, aspergillus, cholera, *E. coli*, giardia, salmonella (typhoid fever), and Shigellosis (dysentery), polio.

Chapter 26

1. Discuss the following sexually transmitted diseases (STDs) in terms of the causative agent and its characteristics, symptoms, transmission, diagnosis and treatment-- gonorrhea, chlamydial infections, syphilis (chancre, RPR test & cardiolipin, and FTA-ABS test), herpes, candidiasis, AIDS.
2. How is a urinary tract infection determined?

Chapter XX- Use **index** of text book to find these diseases!!!!

1. Discuss the following diseases in terms of the transmission, organism involved, characteristics of the organism and the symptoms and the diagnosis and treatment-- Rabies, plague, lyme disease, rickettsial disease, yellow fever, malaria, tetanus, gas gangrene, trachoma, pinkeye.

Chapter 14

1. Define nosocomial infections, characteristics of a susceptible host, and what some reservoirs of infection are in hospitals.
2. Describe some of the mechanisms of transmission in hospitals (i.e., surgery, catheterization, etc...).
3. Give examples of some of the common nosocomial infections.
4. Give some of the ways that can be used to lower the infection rate of nosocomial diseases in hospitals.

Student Report Topics

These are to be picked by students to report on during the last week of classes: Two students will work together and prepare a short (no more than one page) written presentation to give to the Professor, and a short (no more than 6 minutes) presentation to be given to the class.

The report should include the following:

- a description of the disease causing organism and a description of the disease
- the portal of entry
- the incubation period
- how easily is the disease spread (contagiousness)
- cause of the disease symptoms (i.e., endotoxin, exotoxin, cell killing, etc.....)
- Diagnosis methods and Treatment protocols

Topics–	<u>Student Presenters</u>
1 Influenza	_____
2 Infectious mononucleosis	_____
3 Chicken pox	_____
4 Measles	_____
5 German measles	_____
6 Herpes	_____
7 AIDS	_____
8 Rabies	_____
9 Malaria	_____
10 Tetanus	_____
11 Hepatitis A	_____
12 Hepatitis B	_____
13 Cholera	_____
14 Lyme Disease	_____
15 Giardiasis	_____
16 Dengue Fever	_____
17 Ebola virus	_____
18 Hanta virus	_____
19 Anthrax	_____
20 tapeworm	_____
21 Athlete's foot	_____
22 Bovine spongiform encephalitis agent	_____
23 Hemorrhagic diarrhea	_____
24 Legionnaire's disease	_____
25 Toxic shock syndrome	_____
26 Systemic Lupus erythematosus	_____
27 Shingles	_____

