

# BIOS 312 Review Sheet Lecture Test 1

## Chapter 1. Introduction and History of Microbiology

- Van Leeuwenhoek, microscope
- Pasteur, pasteurization, swan-necked flasks
- Koch's Postulates, pure culture

## Chapter 2: Overview

- Bacteria, Archaea, Algae, Viruses, Protozoa, Fungi
- Comparison eukaryotic and prokaryotic cell
- Photoautotrophs, photoheterotrophs, chemoautotrophs, chemoheterotrophs, chemolithotrophs

## Chapter 4: Cell Structure/Function

- Light microscope: bright field, dark-field, phase contrast, fluorescence, confocal scanning laser
- Electron microscope: transmission, scanning
- Total magnification, resolution, refractive index
- Shapes of Bacteria (coccus, bacillus, ...)
- Cell membrane
- Cell wall - peptidoglycan
  - Gram-positive, Gram-negative cell wall, basis of Gram stain
  - Outer membrane, LPS, lipidA, endotoxin
- DNA free in cytoplasm
  - Supercoiling
- Cell appendages
  - Flagella, arrangements, chemotaxis
  - Fimbriae
  - Sex-Pilus
  - S-layer
  - Glycocalyx
- Cell Inclusions
  - Endospore Formation (who, how, when, resistant to ?)
  - Other prokaryotic cell inclusions

# BIOS 312 Review Sheet Lecture Test 1

## Chapter 5: Nutrition and Metabolism

- Anabolism, catabolism
- Macro- and micronutrients
- Media: chemically defined (minimal media), chemically undefined (rich media)
- Pure culture, aseptic technique
- $\Delta G^{\circ}$
- Enzymes as catalysts, activation energy, active site, cofactors
- Oxidation, reduction, reduction potential,  $E_0'$ , electron tower
- Glycolysis
- Fermentation
- Different fermentation end products: ethanolic, lactic acid (hetero-, homofermentative), propionic acid, mixed acids, butanediol, butyric acid), Chapter 12!
- Electron transport system – principle, chemiosmosis, proton motive force, ATP synthase
- $e^-$  carriers: NAD, FAD, cytochromes, quinones, iron-sulfur proteins
- Citric acid cycle
- Fermentation – Respiration
  - Energy balance
- Respiration: final  $e^-$  acceptors:  $O_2$
- Anaerobic respiration, final  $e^-$  acceptors:  $NO_3^-$ ,  $SO_4^{2-}$ ,  $Fe^{3+}$

## Chapter 6: Microbial Growth

- Binary fission
- growth, growth curve
- Measurements of bacterial growth: direct microscopic count, plate counts, serial dilutions, turbidity
- chemostat
- Environmental factors influencing bacterial growth
- Temperature: psychrophiles, mesophiles, thermophiles, hyperthermophiles
  - Strategies: membranes, proteins, lipids of Archaea
- pH
- Salt tolerance, halophiles
- Oxygen: aerobes, obligate anaerobes, facultative anaerobes, microaerophiles, aerotolerant
  - Strategies: catalase, superoxide dismutase, peroxidase