1. BIO 205 – Microbiology for Health Professionals
   - The study of microscopic agents as they relate to human health
     - The causes of infectious disease.
     - The control of infectious disease.
     - Host defenses against infectious disease.
     - Host pathology caused by infectious disease and avoidance of infection transmission.

2. Causes of Mortality Table

3. Causes of Mortality Chart

4. Microbiology-related Study
   - Bacteriology
   - Virology
   - Mycology
   - Parasitology
   - Immunology
   - Pathology
   - Epidemiology

5. Types of Microbes
   - Microbe alternate terms
     - Germs, microorganisms, pathogens, agents, bugs
   - Groups of Microbes
     - Viruses
     - Bacteria
     - Fungi
     - Protists or Protozoa
     - Helminths

6. Microbial diversity image

7. Organization of organisms
   - Atomic
   - Molecular
     - Macromolecular, Biochemical
   - Organelle
     - Cell organs
     - Viruses
   - Cellular
     - Single celled organisms
     - Bacteria
     - Fungi
   - Tissues
   - Organs
   - Organ systems
   - Multi-system organisms

8. Size scale

9. Size scale
Cell theory
- Cell theory definition
  - Cells are the smallest unit of life
  - Ability to reproduce and metabolize
  - All living things are made up of individual cells
- Types of cellular organisms
  - Animals, Plants, Fungi, Protists, Bacteria

Acellular Agents
- Characteristics
  - Lack ability to reproduce and metabolize
    - Not organisms or living
  - Obligate intracellular parasites
  - Subcellular size
- Types of Acellular Microbes
  - Viruses
    - Organelle sized
  - Viroids
    - Nucleic acid
  - Prions
    - Protein molecule

Prokaryotic cell characteristics
- Unicellular or single celled organisms
- Smallest living organisms
  - Bacteria
- Simple components and organelles
- No nuclear membrane
  - free chromosome

Eukaryotic cell characteristics
- Single celled and multicelled organisms
- Largest living organisms
- Complex organelles
- Nuclear membranes
  - Multiple chromosomes

Comparison of Cells and Viruses
20 Germ theory
- Infectious diseases are caused by specific microbes
- Infectious microbes cause specific pathology (damage) and symptoms
- Infectious disease microbes are also termed
  - Infectious agents
  - Causative agents
  - Pathogens

21 Pasteur’s germ experiment

22 Determination of infection causative agent
- Koch’s Postulates
  1. The microorganism must be detectable in the infected host at every stage of the disease.
  2. The microorganism must be isolated from the diseased host and grown in pure culture.
  3. When susceptible, healthy animals are infected with pathogens from the pure culture, the specific symptoms of the disease must occur.
  4. The microorganism must be re-isolated from the diseased animal and correspond to the original microorganism in pure

23 Koch’s postulates image

24 Diseases and Syndromes
- Infectious diseases and syndromes
  - A disease transmitted only by contact and caused by an infectious agent
- Noninfectious or Chronic diseases
  - Symptoms are not transmissible and usually not caused by a microbe
    - Osteoarthritis
  - Chronic disease caused by an infectious agent after the agent is absent
    - Lyme disease

25 World-wide Infection Rates

26 Disease Pathology
- Pathology is tissue damage and inflammation
  - Pathology causes symptoms
- Pathology terms relating to specific tissues or organs not relating to the cause
  - Pneumonia – lungs
  - Hepatitis – liver
  - Dermatitis - skin
  - Meningitis – menninges
  - Gingivitis - gums
  - Arthritis - joints

27 Bacterial Diseases & Agents
- Pharyngitis - Strep throat
  - *Streptococcus pyogenes*
  - Flesh-eating forms
• Gangrene
  • *Clostridium difficile*

• Bubonic or Black plague
  • *Yersinia pestis*

28 📊 *Streptococcus pyogenes* photos
29 📊 Clostridial myonecrosis pathology image
30 📊 Bubonic plague image
31 📊 Fungal Diseases & Agents
  • Valley fever
    • Caused by *Coccidioides immitis*
    • Flu-like symptoms
    • Spread by inhalation of soil & dust
  • Athletes foot, Jock itch
    • Caused by dermatophytes (mold)
      • *Dermophyton* or *Tricophyton*
    • Symptoms include rash & itching

32 📊 Coccidiomycosis image
33 📊 Mold growth on host image
34 📊 Viral Diseases & Agents
  • Colds
    • *Rhinovirus*
  • Severe Acute Respiratory Syndrome
    • *Coronavirus*
  • AIDS
    • Human Immunodeficiency Virus (HIV)
    • Retrovirus (RNA→DNA)
    • Childhood Measles (red rash)
      • *Rubeola* virus

35 📊 AIDS image
36 📊 Rubeola photo
37 📊 Protozoal Diseases & Agents
  • Dysentery
    • *Entamoeba histolytica*
    • Ingested cysts produce trophozoites
    • Diarrhea and abdominal pain
    • Fecal contaminated food or water
  • Giardiasis
    • *Giardia lamblia*
Ingested cysts produce trophozoites
- Vomiting & diarrhea
- Fecal contaminated water

38 □ Amebic dysentery image

39 □ Giardia lamblia image

40 □ Helminths or Worm Diseases & Agents
- Malaria
  - Plasmodium
  - Violent chills & fever
  - Red blood cells rupture
  - Carried by mosquito vector

2 □ Pinworm
  - Enterobius

41 □ Plasmodium life cycle image

42 □ Enterobius infection cycle image