Microbiology—Week 2 Study Guide

**Readings:**

Chapter 4—Microscopy, Staining, and Classification (abbreviated per slides and study guide)

Chapter 6—Microbial Nutrition and Growth (abbreviated)

Chapter 7—Microbial Genetics (abbreviated coverage)

**Key Concepts from Chapter 4:**

1. Which primary metric units are used to measure the diameters of most microbes?
2. Define: microscopy
3. What type of microscope do we utilize in our lab at CCV?
4. What differentiates a simple vs. compound microscope
5. Study the photo and illustration of Figure 4.4. Have a basic knowledge of each of the parts of the microscope.
6. How should a microscope be carried to prevent accidental damage?
7. What function does the oil immersion lens with immersion oil have with regard to light refraction? How is this helpful? (Hint: study Figure 4.5)
8. Which structure/organisms can be visualized using the electron microscope? (Hint: see Figure 4.3 and the write-up on p. 104)
9. Why must organisms be smeared, heat fixed or chemically fixed in preparation for staining?
10. What is the difference between a simple stain and a differential stain?
11. List the sequential steps in a Gram stain? Why do Gram negatives stain pink?
12. List the hierarchy of taxa from general to specific.
13. What is binomial nomenclature?
14. Who is Linnaeus? What contribution did her make to classification of organisms?
15. Which three domains were defined by Woese? What is unique about his method for classifying organisms?
16. Review the 5 procedures that may be used (mostly in the lab setting) to identify and classify organisms.
* Physical Characteristics
* Biochemical Tests
* Serological Tests
* Phage Typing
* Analysis of Nucleic Acids
1. What are dichotomous keys? How are these utilized?

**Key Concepts from Chapter 6 :**

1. Define: autotroph
2. Define: heterotroph
3. Define: chemotroph
4. Define: phototroph
5. Define: obligate aerobe
6. Define: obligate anaerobe
7. Define: facultative anerobes
8. Define: aerotolerant anaerobes
9. Define: microaerophiles
10. Define: nitrogen fixation
11. Define: optimum growth temperature, minimum and maximum growth temperatures
12. Define: psychrofile
13. Define: mesophile
14. What temperature range do most human pathogens require for maximum growth
15. What are thermoduric organisms?
16. Define: thermophiles and hyperthermophiles
17. pH concepts: neutrophils, acidophiles, alkalinophiles
18. What is a biofilm?
19. What is quorum sensing?
20. Define: complex media
21. Define: selective media
22. Define: differential media
23. What special requirements are necessary for cultivating anaerobic organisms?
24. Why are animal and cell culture techniques necessary in some cases?
25. How do bacteria reproduce?
26. What is generation time?
27. What is logarithmic growth/exponential growth?
28. What are the phases of microbial population growth? Describe what’s happening in each phase.

**Key Components of Chapter 7:**

1. What is a nucleotide? What is it composed of in all cases?
2. How does DNA replication happen?
3. What is binary fission?
4. Why is it important to replicate DNA before undergoing binary fission?
5. What are base pairs?
6. What are nucleic acids?
7. How is bacterial DNA organized?
8. What are purines and pyrimidines? (which nitrogenous bases are in which category?—see Fig. 6-1)
9. Define the following with relation to genetics or bacterial genetics:
10. Transcription
11. Translation
12. Recombination
13. Transformation
14. Transduction
15. Conjugation
16. What is a mutation?
17. What are the following: mRNA, tRNA, rRNA (know these very well)
18. What is a codon?
19. What is an anticodon?
20. How does tRNA contribute to protein synthesis?
21. What is the difference between vertical and horizontal transmission of genetic material?
22. Why are mutation and recombination important in the process of natural selection and the evolution of organisms?
23. What is a point mutation?
24. What is a mutagen? Give some examples of mutagens.
25. What is a sex pili or conjugation pili?
26. What are plasmids?
27. What is an Hfr?