

Key

- Indicates main chapter topic, labs, and activities
- Indicates video
- Indicates a subtopic in the chapter.

Unit 1: Basic Micro-Biology

1. Chapter 1: Introduction

- Topic: What Is Microbiology?
 - Life in a Drop of Pond Water
 - Your Microbiome
 - Microbiology and the Definition of Life
 - Does Science Need a New Definition for “Life”?
 - Defining Life
- Lab: If Viruses Were the Size of a Pepper Flake... How Micro Are Microbes? Modeling Lab
 - Lab 1: Purposes, Practices, and Techniques
- Microscope Lab: Microbes in Pond Water
 - Microscope Lab: Microbes in Pond Water

2. Chapter 2: Life: It's Genetic

- Topic: Basic Genetics
 - We Are All Related
 - Self-Replication + Reproduction Leads to Sharing
 - The Code Makes the Organism
 - Proteins Do the Work
 - Everybody Makes Mistakes Sometimes
 - Everybody Makes Mistakes
 - Life: It's Genetic
- Lab: The Code that Makes Us: DNA and RNA Modeling
 - Lab 2: Purpose, Practices, and Techniques

3. Chapter 3: You Are a Warrior, Especially When You're Sick

- Topic: Immune System
 - Your Immune System Keeps You Healthy
 - Cilia Mucus Traps
 - Your Blood Is a Part of Your Immune System
 - Warrior Scouts Are in Your Blood
 - The Warrior's Playbook: The Cells of Your Immune System
- Lab: How Dirty Could They Really Be?
 - Lab 3: Purpose, Practices, and Techniques

Unit 2: Bacteria and Archaea: We Are the Prokaryotes!

4. Chapter 4: Bacteria and Archaea: Small but Mighty

- Topic: Basic Biology of the Prokaryotic Cell
 - Archaea Are Everywhere, Too
 - Bacteria and Archaea Have Prokaryotic Cells
 - Plants & Bacteria Are BFFs
 - Species: A New Definition
 - Species of Prokaryotes
 - Types of Bacteria
- Lab: Building a Prokaryote Modeling Lab
 - Version 1: A Plaster of Paris Model*
 - Version 2: A Pizza Model*
 - Lab 4: Purpose, Practices, and Techniques
- Writing Activity: Making a Microbial Mutant
 - Mutating Microbes Activity

5. Chapter 5: Beneficial and Harmful Bacteria

- Topic: The Good and the Bad of Bacteria
 - Your Microbiome
 - Your Health and the Good and Bad of Bacteria
 - Toxins: How Bacteria Make You Sick
 - How Your Immune System Fights Bacteria
 - Antibiotic Resistance
- Lab: Let's Grow and Let's Kill Microbes
 - Lab 5: Purpose, Practices, and Techniques
- Microscope Lab: A Close Look at the Good Guys: Bacteria Under the Scope
 - Microscope Lab: Bacteria Under the Scope

Unit 3: Viruses

6. Chapter 6: Basic Virology

- Topic: Virology: The Basics
 - Bacteriophages
 - If Viruses Are Alive, What Kind of Organism Are They?
 - Types of Viruses
 - The Geometry of Viruses
 - The Lifecycle of Viruses: The Lytic Cycle
- Lab: A Model Virus: Make a Bacteriophage
 - Lab 6: Purpose, Practices, and Techniques

7. Chapter 7: Virology and the Immune System

- Topic: Virology: Infection, Immunity, and You
 - Matching Proteins
 - When Viruses Mutate: Variants
 - Reassortment
 - Vaccines Teach Your Immune System
 - Vaccines: School for Your Immune System
- Lab: The Spread of Infection – Exponential Growth and the Rate of Infection
 - Lab 7: Purpose, Practices, and Techniques

Unit 4: Microbes Make History

8. Chapter 8: Synthetic Biology

- Topic: Harnessing the Power of Microbes
 - Engineering Bacteria to Identify Parasites
 - Synthetic Biology
 - The Tools of Synthetic Biology
 - A Retrovirus that Shaped Evolution
 - How Synthetic Biologists Use these Tools
 - Using the Tools of Synthetic Biology
 - Curing Sickle Cell Disease
- Lab: A Retrovirus Modeling Lab
 - Lab 8: Purpose, Practices, and Techniques
- Writing Activity: A Virus of My Very Own
 - A Virus of My Very Own

9. Chapter 9: Pathogens Make History

- Topic: Pandemics
 - But, Why Did Mammals Dominate the Land Instead of Birds or Reptiles?
 - The History of the Science of People and Pathogens
 - The Spread of the Coronavirus 2019 Pandemic
 - The Top Two Pathogens to Make History
 - Keeping Emerging Diseases from Becoming Pandemics: mRNA Vaccines
 - The Deadliest Pathogen in History: The Bacteria Yersinia Pestis*
 - The Second Deadliest Pathogen in History: The Variola Virus*

- Modeling Lab: Simple Plague Mask Tutorial
 - Lab 9: Make a Plague Mask
- Writing Activity: My Pandemic Makes History
 - My Pandemic Makes History

Unit 5: Eukaryotic Microbes

10. Chapter 10: Microscopic Fungi

- Topic: Microscopic Fungi
 - Dung Cannon Fungus
 - Fungi Have Eukaryotic Cells
 - Getting Food
 - The Two Types of Microbial Fungi
 - Yeasts*
 - Molds*
 - Fungi Lifecycle
 - The Mycorrhizal Network: How Plants Communicate
 - The Mycobiome
 - Bad Fungi and Zombie Ants
- Lab: Baking with Microbes
 - Lab 10: Purpose, Practices, and Techniques
- Microscope Lab: Microbial Fungi Under the Scope
 - Microbial Fungi Under the Scope

11. Chapter 11: Microbial Algae

- Topic: Algae: Mighty, Mighty Microbe!
 - Monitoring Photosynthesis
 - What Are These Mighty Microbes?
 - Releasing Oxygen
 - Photosynthesis: A Recipe
 - Algae, Biofuel, & Synthetic Biology
 - Molecular Modeling Basics
 - Molecular Modeling Basics with Photosynthesis
 - Good Algae Gone Bad: Algal Blooms
- Lab: Algae, Carbon Dioxide, and Global Warming
 - Lab 11: Purpose, Practices, Techniques

12. Chapter 12: Protozoans

- Topic: Protozoa: We Are Not Animals
 - Traits of Protozoa
 - Types of Protozoa
 - Vorticella and Rotifers: A Microscopic View
 - There Are Good Protozoa and Bad Ones, Too
 - Phagocytosis: The Hug of Death
 - Amoeba Activity
 - Parasitic Protozoa that Affect Human Health
 - Two Parasitic Pathogenic Protozoa
 - Giardia*
 - Plasmodium*
- Lab: Amoeba Cake Eats Algae Cupcake
 - Lab 12: Tips for Making the Cake