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

1. 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!

1. 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

1. 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

1. 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

1. 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

1. 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

1. 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

1. 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

1. 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
2. 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