
Principles of the Biomedical Sciences Course Description

This course provides an introduction to the biomedical sciences through exciting hands-on projects and problems. Students investigate concepts of biology and medicine as they explore health conditions including heart disease, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. They will determine the factors that led to the death of a fictional woman as they sequentially piece together evidence found in her medical history and her autopsy report. Students will investigate lifestyle choices and medical treatments that might have prolonged the woman's life and demonstrate how the development of disease is related to changes in human body systems. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes and allow students to design experiments to solve problems. Key biological concepts including maintenance of homeostasis in the body, metabolism, inheritance of traits, and defense against disease are embedded in the curriculum. This course is designed to provide an overview of all the courses in the biomedical sciences program and lay the scientific foundation for subsequent courses.

Principles of the Biomedical Sciences- Course Outline

Unit One: The Mystery (31 days)

Lesson 1.1: Investigating the Scene (15 days)

- Activity 1.1.1: A Mysterious Death
- Activity 1.1.2: Examining the Scene
- Activity 1.1.3: Careers in the Biomedical Sciences
- Activity 1.1.4: The Evidence
- Activity 1.1.5: Time of Death
- Project 1.1.6: Blood Spatter Analysis

Lesson 1.2: DNA Analysis (9 days)

- Activity 1.2.1: What is DNA?
- Activity 1.2.2: DNA Extraction
- Activity 1.2.3: DNA Analysis

Lesson 1.3: The Findings (7 days)

- Activity 1.3.1: The Autopsy
- Activity 1.3.2: Confidentiality
- Activity 1.3.3: Was It a Crime?

Unit Two: Diabetes (38 days)

Lesson 2.1: What Is Diabetes? (10 days)

- Activity 2.1.1: Diagnosing Diabetes
- Project 2.2.2: The Insulin Glucose Connection
- Activity 2.1.3: Feedback

Lesson 2.2: The Science of Food (13 days)

- Project 2.2.1: Food Testing
- Activity 2.2.2: Food Labels
- Activity 2.2.3: The Biochemistry of Food
- Activity 2.2.4: Energy in Food

Lesson 2.3: Life With Diabetes (15 days)

- Activity 2.3.1: A Day in the Life of a Diabetic
- Project 2.3.2: Diabetic Emergency!
- Activity 2.3.3: Complications of Diabetes
- Problem 2.3.4: The Future of Diabetes Management and Treatment

Unit Three: Sickle Cell Disease (25 days)

Lesson 3.1: The Disease (6 days)

- Activity 3.1.1: Blood Detectives
- Activity 3.1.2: Sickle Cell Diaries

Lesson 3.2: It's In the Genes (9 days)

- Activity 3.2.1: Protein Synthesis
- Activity 3.2.2: The Genetic Code
- Activity 3.2.3: Does Changing One Nucleotide Make a Big Difference?

Lesson 3.3: Chromosomes (4 days)

- Activity 3.3.1: How is DNA Passed Through the Generations?
- Activity 3.3.2: Chromosomes – A Closer Look (Optional)
- Activity 3.3.3: The Immortal Cells (Optional)

Lesson 3.4: Inheritance (6 days)

- Activity 3.4.1: Family Inheritance
- Activity 3.4.2: What's the Probability?
- Activity 3.4.3: World Distribution of Sickle Cell Disease (Optional)

Unit 4: Heart Disease (39 days)

Lesson 4.1: Heart Structure (7 days)

- Activity 4.1.1: Path of Blood in the Heart
- Activity 4.1.2: Anatomy of the Heart

Lesson 4.2: The Heart at Work (11 days)

- Project 4.2.1: Heart Rate
- Project 4.2.2: Blood Pressure
- Activity 4.2.3: EKG

Lesson 4.3: Heart Dysfunction (12 days)

- Project 4.3.1: What is Cholesterol?
- Activity 4.3.2: Hypercholesterolemia
- Problem 4.3.3: The Heart as a Pump

Lesson 4.4: Heart Intervention (9 days)

- Project 4.4.1: Unblocking the Vessels
- Project 4.4.2: Heart Disease Intervention

Unit 5: Infectious Disease (20 days)

Lesson 5.1: Infection (20 days)

- Activity 5.1.1: Contagious
- Activity 5.1.2: Infectious Disease Agents
- Activity 5.1.3: Isolating Bacteria
- Activity 5.1.4: Gram Staining
- Activity 5.1.5: Bacterial Identification
- Project 5.1.6: Lines of Defense

Unit 6: Post Mortem (8 days)

Lesson 6.1: Analyzing Anna (8 days)

- Project 6.1.1: How Do the Parts Make a Whole?
- Activity 6.1.2: How Did She Die?