Experience **Biology**

Upper Level

Scope and Sequence

Lesson 1: Introduction to Biology

- What is biology?
- Scientific investigation
- Limits of the scientific method
- Why is Earth well suited for life?
- Importance of water to life

Lesson 2: The Chemistry of Life

- Cells, molecules, elements, and atoms
- Ionic & covalent bonding
- Organic chemistry — the importance of carbon
- Carbohydrates, lipids, proteins, and nucleic acids

Lesson 3: Cytology

- Discovery of the cell
- Cell theory
- Cell structure: cytomembrane, cytoplasm, organelles, and the nucleus
- Passive and active transport

Lesson 4: Cellular Metabolism Part I

- Heterotrophs & Autotrophs
- Photosynthesis

Lesson 5: Cellular Metabolism Part II

- Cellular energy – ATP
- Cellular respiration
- Aerobic vs anaerobic pathways

Lesson 6: Cellular Metabolism Part III

- Basics of DNA
- Protein Synthesis
    - Replication
    - Transcription
    - Translation

Lesson 7: Life Cycle of the Cell

- Mitosis
- Meiosis

Lesson 8: Genetics Part I

- Mendelian genetics
- Law of Segregation
- Law of Independent Assortment
- Incomplete dominance, co-dominance, multiple alleles, and sex-linked traits
- Polygenic inheritance

Lesson 9: Genetics Part II

- Functional vs structural genes
- Mutations & errors
- Variation
- Eugenics
- Biotechnology

Lesson 10: EXAM 1

Lesson 11: Living Organisms

- Classification
- Binomial Nomenclature
- Overview of 6 Kingdoms
    - Archaebacteria
    - Eubacteria
    - Plantae
    - Fungi
    - Protista
    - Animalia

Lesson 12: Microbiology

- Kingdom Archaebacteria
- Kingdom Eubacteria
- Viruses

Lesson 13: Kingdom Protista

- Protozoans — animal-like protists
- Algae — plant-like protists
- The “molds” — fungal-like protists

Lesson 14: Kingdom Fungi

- Characteristics of fungus
- Structure of fungi
- Fungi reproduction
- 3 main groups of fungus
  - Zygomycota
  - Ascomycota
  - Basidomycota

Lesson 15: Kingdom Plantae Part I

- Characteristics of Plants
- Overview of Phyla
  - Bryophyta
  - Pteriodphyta
  - Coniferophyta
  - Anthophyta
- Root and shoot system
- Tissue types
- Plant cells

Lesson 16: Kingdom Plantae Part II

- Structure and function of leaves
- Review of Photosynthesis
- Structure and function of stems
- Structure and function of roots

Lesson 17: Kingdom Plantae Part III

- Reproductive organs: flowers, fruits, and seeds
- Vegetative vs. sexual reproduction
- Alternation of generations
- Hormones
- Tropisms
- Photoperiodism
- Importance of minerals

Lesson 18: EXAM 2

Lesson 19: Kingdom Animalia

Characteristics of Kingdom Animalia
Formation of germ layers
Vertebrates vs. invertebrates
Endotherms vs. ectotherms
Phylum Porifera: the sponges

Lesson 20: The Worms

Phylum Platyhelminthes: flatworms
Phylum Nematoda: roundworms
Phylum Annelida: segmented worms

Lesson 21: Creatures in the sea

Phylum Cnidaria: jellyfish, hydra, and sea anemones
Phylum Echinodermata: sea stars, sea urchins, and sea cucumbers

Lesson 22: Phylum Mollusca

Characteristics of mollusks
Class Bivalvia: clams, oysters, and mussels
Class Gastropoda: snails, slugs, and conchs
Class Cephalopoda: squid, octopus, and nautilus

Lesson 23: Phylum Arthropoda

Characteristics of arthropods
Class Insecta (the insects)
Complete vs. incomplete metamorphosis
Sub-Phylum Crustacea: crabs, lobster, and crayfish
Class Arachnid: spiders, scorpions, and mites
Class Chilopoda & Diplopoda: centipedes and millipedes

Lesson 24: Phylum Chordata Part I

Characteristics of Chordates
Sub-Phylum Urochordata: tunicates
Sub-Phylum Cephalochordata: lancelets
Sub-Phylum Vertebrates
    Class Agnatha: jawless fish
    Class Chondrichthyes: cartilaginous fish
    Class Osteichthyes: bony fish

Lesson 25: Phylum Chordata Part II

Class Amphibians: salamanders, frogs, and caecilians
Class Reptilia: snakes, lizards, turtles, and alligators

Lesson 26: Phylum Chordata Part III

Class Aves: the birds
Class Mammalia

Lesson 27: EXAM 3

Lesson 28: Human Anatomy Part I

Skeletal System
Muscular System

Lesson 29: Human Anatomy Part II

Circulatory System
Respiratory System

Lesson 30: Human Anatomy Part III

Nervous System
Endocrine System

Lesson 31: Human Anatomy Part IV

Lymphatic System
Immune System
Integumentary System

Lesson 32: Human Anatomy Part V

Digestive System
Excretory System

Lesson 33: Human Anatomy Part VI

Reproductive System
Embryology & Human Development

Lesson 34: Introduction to Ecology

Lesson 35: EXAM 4