



**In Fascinating Biology, you will learn the basic principles of biology, including the components of life: cell membranes, taking in nutrients, creating chemical energy, growing and repairing, reproducing, maintaining a stable internal environment, and adapting to a changing external environment.**

### **Lesson 1: What is Life?**

- Creation of life
- Recognizing something living

### **Lesson 2: Chemistry Review**

- Chemical bonding
- Intermolecular bonding
- Polar and non-polar molecules
- High-energy molecules
- Long-chain molecules

### **Lesson 3: The Cell Membrane**

- Chemical structure: phospholipids and glycerol
- Lipid bilayer

### **Lesson 4: Take in Nutrients**

- Brownian Movement
- Diffusion
- The Law of Entropy
- Concentration gradients
- Diffusing across cell membranes
- Movement of water
- Osmosis
- Facilitated diffusion
- Active transport
- Equilibrium
- Hypertonic and hypotonic solutions
- Reverse osmosis
- Osmotic pressure
- Pinocytosis

### **Lesson 5: Take in Energy, Part 1**

- ATP (adenosine triphosphate)
- Classification of organisms by energy intake
- Photosynthesis
- Electron transport chain
- NADPH
- Glucose synthesis: The Calvin Cycle

### **Lesson 6: Take in Energy, Part 2**

- Glycolysis
- The Krebs Cycle
- Oxidative phosphorylation
- Mitochondria

### **Lesson 7: Take in Energy, Part 3**

- Energy storage
- Glycogen
- Fat
- Starch

### **Lesson 8: Take in Energy, Part 4**

- Anerobic metabolism
- Fermentation
- Aerobic metabolism
- Aerobic and anerobic muscles

### **Lesson 9: Grow**

- Proteins
- DNA
- Nucleotides
- RNA synthesis
- Messenger RNA
- Ribosomes
- Transfer RNA
- Exons and introns

### **Lesson 10: Reproduce, Part 1**

- Chromosomes
- Cell life cycle
- Chromatids
- P53 Protein
- DNA replication
- DNA primers
- Leading and lagging strands
- Okazaki fragments
- Telomeres

### **Lesson 11: Reproduce, Part 2**

- Human chromosomes
- Mitosis
- Meiosis
- Synapsis
- Genetic diversity
- Asexual reproduction

### **Lesson 12: Reproduce, Part 3**

- Alleles
- Mutations
- Dominant and recessive genes
- Wild-type traits
- X-linked mutations
- Barr Body
- Karyotypes
- Genotypes and phenotypes
- Homozygous and heterozygous
- Pedigrees
- Punnett squares
- Hemophilia
- Codominance
- Blood types
- Mitochondrial DNA

### **Lesson 13: Homeostasis, Part 1**

- What to keep constant
- Temperature
- Hypothalamus
- Hypothermia and hyperthermia
- Antidiuretic hormone

### **Lesson 14: Homeostasis, Part 2**

- Blood pressure
- Glucose
- Oxygen
- Carbon dioxide
- pH

### **Lesson 15: Adapt, Part 1**

- Theory of Evolution
- Dinosaurs and birds
- Hearing
- Pangea
- Yanoconodon
- Aquatic mammals
- Vestigial structures
- Dating fossils with carbon dating

### **Lesson 16: Adapt, Part 2**

- The Changing Environment
- Theory of Natural Selection
- Sickle Cell Anemia
- Improving in an Unchanging Environment
- Countercurrent Circulation
- Genetic Diversity
- Genetic Diversity in Prokaryotes
- Genetic Drift
- Speciation
- Symbiosis
- Predators, Prey, Scavengers

### **Lesson 17: Prokaryotes, Protists, Animals and Fungi**

- Domains
- Prokaryotes
- Bacteria and Archae Bacteria
- Cyanobacteria
- Eukaryote energy production
- Protists
- Animal Phyla
- Porifera
- Cnidaria
- Platyhelminths and Annelids
- Nematodes and annelids
- Protosomes and Deuterostomes
- Molluscs
- Arthropods
- Echinoderms and chordates
- Fungi
- Lichens, rusts, and mycorrhiza

### **Lesson 18: Plants**

- Algae
- Charales
- Bryophytes
- Spores
- Gametophytes
- True plants
- Tracheophytes
- Spores
- Vascular structures
- Gymnosperms
- Wood
- Water transport
- Roots
- Angiosperms
- Endoderm
- Fruit