Honors Biology

Course	Dates	Schedule	Instructor
Honors Biology	9/19/2026 - 5/30/2027	Sunday 9:00 AM - 10:30 AM	Ms. Patel
Assessment test	12/6/2026 2/14/2027 4/11/2027 5/16/2027	Sunday 9:00 AM - 10:30 AM	

Course Description

Honors Biology is an accelerated, inquiry-based course designed for highly motivated students seeking a rigorous understanding of the living world. Over an intensive 7-week trajectory, students will explore life from the microscopic scale of molecular biology to the macroscopic scale of global ecosystems.

Because this course mirrors the pace and depth of an advanced introductory high school curriculum, students will move rapidly beyond rote memorization. Instead, the focus is placed heavily on the biochemical pathways, mathematical modeling of populations, and analytical data synthesis. Through collaborative laboratory investigations and critical analysis of scientific literature, students will develop the foundational skills necessary for advanced placement (AP) sciences and future STEM pursuits.

Core Learning Objectives

By the end of this course, students will be able to:

- **Analyze Biological Systems:** Explain how structure dictates function at the molecular, cellular, organismal, and ecosystem levels.
- **Apply Chemical Principles:** Utilize foundational chemistry concepts to decipher metabolic pathways like cellular respiration and photosynthesis.
- **Model Genetic Patterns:** Use statistical tools (such as Chi-Square analysis) to predict genetic inheritance and map evolutionary change.
- **Engage in Scientific Inquiry:** Design controlled experiments, collect and analyze quantitative data, and formulate evidence-based arguments.

Course Syllabus

The Chemistry of Life & Enzyme Kinetics

- **Topics:** Water polarity and hydrogen bonding; structure and function of the four major biological macromolecules (carbohydrates, lipids, proteins, nucleic acids).
- **Honors Focus:** Enzyme structures, activation energy, and the effects of pH, temperature, and inhibitors on reaction rates.

Cell Structure & Membrane Transport

- **Topics:** Prokaryotic vs. eukaryotic cell architecture; cellular organelles and the endomembrane system.
- **Honors Focus:** Thermodynamics of the fluid mosaic model; mathematical modeling of surface-area-to-volume ratios; active vs. passive transport mechanisms (tonicity and water potential).

Cellular Energetics & Metabolism

- **Topics:** Introduction to thermodynamics in biological systems; the role of ATP.
- **Honors Focus:** Deep-dive into the biochemistry of **Cellular Respiration** (Glycolysis, the Krebs Cycle, and the Electron Transport Chain) and **Photosynthesis** (Light-dependent and Calvin Cycle reactions).

Molecular Genetics & Gene Expression

- **Topics:** DNA replication topology; the Central Dogma of molecular biology (Transcription and Translation).
- **Honors Focus:** RNA processing, mutations, and mechanisms of gene regulation (e.g., the bacterial *lac* operon model and eukaryotic transcription factors).

Cellular Reproduction & Heredity

- **Topics:** The cell cycle and Mitosis; Meiosis and the generation of genetic diversity.
- **Honors Focus:** Cell cycle checkpoints and the genetic basis of cancer; Mendelian and non-Mendelian genetics (linkage, epistasis, and mitochondrial inheritance patterns).

Evolution & Population Genetics

- **Topics:** Evidence for evolution; natural selection and adaptation.
- **Honors Focus:** Applying the **Hardy-Weinberg equilibrium equation** to calculate changing allele frequencies in populations; speciation mechanisms and phylogenetic trees.

Ecology & Biosphere Dynamics

- **Topics:** Population ecology, community interactions, and energy flow through trophic levels.
- **Honors Focus:** Mathematical models of population growth (exponential vs. logistic growth curves); human impact on biogeochemical cycles and global biodiversity.

The classes will include homework, quizzes/exams.

Program Pricing

*Click here then scroll down for tuition pricing

Additional pricing options available

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Teacher Profile

Ms. Patel

Biology

Ms. Patel, has a Master's degree in Secondary Education specializing in Life Sciences and over 20 years of teaching experience in Biology and AP Biology. She has developed a skillset directly relevant to teaching different levels of students in Honors Biology, CP Biology, AP Biology, Honors Anatomy and Physiology, and elective science classes such as Emerging Diseases and Science, Technology, and Society. Ms. Patel also coaches Science League teams and has advised the Science National Honor Society. Ms Patel thoroughly enjoys teaching courses with inquiry-based science practices including cause and effect with CER (claim, evidence, and reasoning) experiments.