

Biology Units 3 & 4

Unit 3: How do cells maintain life?

This unit explores cellular processes from various angles. It covers the relationship between nucleic acids and proteins, analysing their structure and function in both prokaryotic and eukaryotic cells. Students also study the manipulation of DNA and biotechnologies' biological implications. Biochemical pathways, including photosynthesis and cellular respiration, are examined, along with how biotechnologies can improve agricultural practices. Students apply their knowledge through case studies, data analysis, and exploring bioethical issues. Topics include DNA structure discovery, proteomic research, transgenic organisms, gene technologies like CRISPR-Cas9, and the impact of enzyme inhibitors and poisons on cellular processes. Ethical considerations are integrated, and students undertake a scientific investigation related to cellular processes or responses to challenges, assessed in Unit 4.

Area of Study 1: What is the role of nucleic acids and proteins in maintaining life?

- Analyse the relationship between nucleic acids and proteins.
- Evaluate tools and techniques for manipulating DNA and their applications.

Area of Study 2: How are biochemical pathways regulated?

- Analyse the structure and regulation of biochemical pathways in photosynthesis and cellular respiration.
- Evaluate the use of biotechnology to address issues related to the regulation of biochemical pathways.

Unit 4: How does life change and respond to challenges?

In this unit, students explore the ever-changing challenges life on Earth faces. They delve into the human immune system, bioethical issues surrounding disease, and evolutionary biology's reliance on accumulating evidence. They analyse various factors affecting populations' genetic makeup and study evidence of species relatedness and evolutionary trends. Students also investigate case studies like deviant cell behaviour and immunotherapy, applying their knowledge through data analysis. Topics include disease prevention, vaccinations, evolutionary patterns, conservation efforts, and the influence of technology on evolutionary studies.

Area of Study 1: How do organisms respond to pathogens?

- Analyse the immune response to specific antigens.
- Compare different methods of acquiring immunity.
- Evaluate challenges and strategies in disease treatment.

Area of Study 2: How are species related over time?

- Analyse evidence for genetic changes in populations and species over time.
- Analyse evidence for relatedness between species.
- Evaluate evidence for human evolution over time.

Area of Study 3: How is scientific inquiry used to investigate cellular processes and/or biological change?

- Design and conduct a scientific investigation related to cellular processes or responses to challenges.
- Present a scientific poster including an aim, methodology, methods, results, discussion, and conclusion.