



Year 12 Biology



What have students at St. Crispin's been taught to understand and be able to do?

Core Knowledge

Module 2 - Foundations in biology

All living organisms have similarities in cellular structure, biochemistry and function. An understanding of these similarities is fundamental to the study of the subject. This module gives learners the opportunity to use microscopy to study the cell structure of a variety of organisms. Biologically important molecules such as carbohydrates, proteins, water and nucleic acids are studied with respect to their structure and function. The structure and mode of action of enzymes in catalysing biochemical reactions is studied.

Membranes form barriers within, and at the surface of, cells. This module also considers the way in which the structure of membranes relates to the different methods by which molecules enter and leave cells and organelles. The division and subsequent specialisation of cells is studied, together with the potential for the therapeutic use of stem cells. Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems

2.1.1 Cell structure

2.1.2 Biological molecules

2.1.3 Nucleotides and nucleic acids

2.1.4 Enzymes

2.1.5 Biological membranes

2.1.6 Cell division, cell diversity and cellular organisation

Module 3 - Exchange and transport

In this module, learners study the structure and function of gas exchange and transport systems in a range of animals and in terrestrial plants.

Core Skills

Module 1 - Development of practical skills in Biology

The development of practical skills is a fundamental and integral aspect of the study of any scientific subject. These skills not only enhance learners' understanding of the subject but also serve as a suitable preparation for the demands of studying Biology at a higher level.

Practical skills assessed in a written examination

- These skills include experimental design, analysis of data and evaluation of practical outcomes

Practical skills assessed in the practical endorsement

- These skills include the manipulation and use of a range of scientific equipment, from use of microscopes to quadrats and working with biological molecules, enzymes and live or dead organisms.



Year 12 Biology continued



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Core Knowledge

The significance of surface area to volume ratio in determining the need for ventilation, gas exchange and transport systems in multicellular organisms is emphasised. The examples of terrestrial green plants and a range of animal phyla are used to illustrate the principle. Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.

3.1.1 Exchange surfaces

3.1.2 Transport in animals

3.1.3 Transport in plants.

Module 4 - Biodiversity, evolution and disease

Biodiversity refers to the variety and complexity of life. It is an important indicator in the study of habitats. Maintaining biodiversity is important for many reasons. Actions to maintain biodiversity must be taken at local, national and global levels.

4.1.1 Communicable diseases, disease prevention and the immune system

4.2.1 Biodiversity

4.2.2 Classification and evolution.

How has learning been assessed?

Students will complete a formative multiple choice assessment and written response task every half term. This develops writing ability and helps to identify gaps in knowledge. Students will also complete a summative written mock exam twice a year.

What is coming up in the following year?

In Year 13 students will develop each of these ideas into more applied topic areas, deepening their knowledge, such as understanding how diffusion and active transport are involved in the workings of the kidney.



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Core Knowledge

Module 5 – Communication, homeostasis and energy

It is important that organisms, both plants and animals are able to respond to stimuli. This is achieved by communication within the body, which may be chemical and/or electrical. Both systems are covered in detail in this module. Communication is also fundamental to homeostasis with control of temperature, blood sugar and blood water potential being studied as examples.

In this module, the biochemical pathways of photosynthesis and respiration are considered, with an emphasis on the formation and use of ATP as the source of energy for biochemical processes and synthesis of biological molecules.

Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.

5.1.1 Communication and homeostasis

5.1.2 Excretion as an example of homeostatic control

5.1.3 Neuronal communication

5.1.4 Hormonal communication

5.1.5 Plant and animal responses

5.2.1 Photosynthesis

5.2.2 Respiration.

Module 6 – Genetics, evolution and ecosystems

This module covers the role of genes in regulating and controlling cell function and development. Heredity and the mechanisms of evolution and speciation are also covered.

Core Skills

Module 1 – Development of practical skills in Biology

The development of practical skills is a fundamental and integral aspect of the study of any scientific subject. These skills not only enhance learners' understanding of the subject but also serve as a suitable preparation for the demands of studying Biology at a higher level.

1.1 Practical skills assessed in a written examination

⇒ These skills include experimental design, analysis of data and evaluation of practical outcomes

1.2 Practical skills assessed in the practical endorsement

⇒ These skills include the manipulation and use of a range of scientific equipment, from use of microscopes to quadrats and working with biological molecules, enzymes and live or dead organisms. Particular practicals in this year will involve genetic manipulation of E.coli, using gel electrophoresis and breeding fruit flies to study genetics. In Physiology, students have the opportunity to perform a dissection of a rat.



Year 13 Biology continued



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Some of the practical techniques used to manipulate DNA such as sequencing and amplification are considered and their therapeutic medical use. The use of microorganisms in biotechnology is also covered. Both of these have associated ethical considerations and it is important that learners develop a balanced understanding of such issues.

Learners gain an appreciation of the role of microorganisms in recycling materials within the environment and maintaining balance within ecosystems. The need to conserve environmental resources in a sustainable fashion is considered, whilst appreciating the potential conflict arising from the needs of an increasing human population. Learners also consider the impacts of human activities on the natural environment and biodiversity.

Learners are expected to apply knowledge, understanding and other skills developed in this module to new situations and/or to solve related problems.

6.1.1 Cellular control

6.1.2 Patterns of inheritance

6.1.3 Manipulating genomes

6.2.1 Cloning and biotechnology

6.3.1 Ecosystems

6.3.2 Populations and sustainability.

How has learning been assessed?

Students will complete a formative multiple choice assessment and written response task every half term. This develops writing ability and helps to identify gaps in knowledge.

Students will also complete a summative written mock exam twice a year.

Students will take their terminal exam consisting of 3 papers in the summer of Year 13.

What is coming up in the following year?

Many of our students will take science based courses at University with many taking Environmental science, Biochemistry, Neuroscience or traditional medicine and veterinary