

The subject content of the **Cambridge International Examinations (CIE)** programme is divided into AS and A2. The A2 includes a core and an Applications of Biology section, which is studied in its entirety, by all A2 candidates. Candidates taking the CIE AS will be assessed

on the Learning Outcomes A-K. A level candidates will be assessed on the Learning Outcomes L-U. The *Applications of Biology* section accounts for about 12% of the A level course. The acquisition of practical skills (and their assessment) underpins the course.

AS Module		Topics in AS workbook
Core Syllabus (sections L-U are in Advanced biology A2)		
A	Light microscopy, electron microscopy, and cell structure. Eukaryote and prokaryote cells. Functions of organelles.	Cell Structure
B	Structure and role of carbohydrates, lipids, and proteins. Water and inorganic ions. Hydrolysis and condensation reactions.	Biological Molecules
C	Enzyme action, enzyme activity and enzyme inhibitors.	
D	Fluid mosaic model of membrane structure. Transport across the membrane.	Cell Membranes and Transport
E	Replication and division of nuclei and cells. Role of meiosis in sexual reproduction. Chromosome behaviour during mitosis. Uncontrolled cell division (cancer).	Cell Division and Cloning
F	DNA structure and replication. The role of DNA in protein synthesis. Nucleotide base pairing.	The Genetic Code
G	Transport in multicellular plants: structure and distribution of xylem and phloem in dicots. Transpiration. Translocation. Xerophytes. Structure and function of mammalian transport systems (including the heart). Haemoglobin and gas transport, gas exchange and altitude.	Transport Systems
H	The structure and function of the human respiratory system. The effects of smoking on gas exchange. Smoking related diseases.	Gas Exchange Aspects of Human Health
I	Causes and transmission of infectious diseases, their control and prevention. HIV/AIDS, TB, cholera and malaria. The use of antibiotics.	Infectious Disease
J	Structure and function of the immune system. Types of immunity. Vaccinations.	Aspects of Human Health
K	The ecosystem concept (habitat, niche, populations, communities). Energy transfer, ecological efficiency, the nitrogen cycle.	Energy and Ecosystems
Meeting Assessment Objectives		
A	Knowledge with understanding, including the use of scientific vocabulary, understanding scientific ideas and concepts, using instruments and scientific measurements, applying of scientific and technological techniques.	Skills in Biology
B	Handling information and solving problems: organising and extracting information. Manipulating and presenting data, and drawing conclusions. Applying knowledge to solve problems.	
C	Experimental skills and investigations. Following detailed instructions, using techniques and apparatus correctly, making accurate observations, and interpreting the data to form predictions. Designing, planning and carrying out a scientific experiment or investigation.	

A2 Module		Topics in A2 workbook (unless indicated)
Core Syllabus (sections A-K are in Advanced biology AS)		
L	Energy requirements in living organisms. The structure and function of ATP. Cellular respiration, and energy transfer. Aerobic and anaerobic respiration. Respiratory quotient and the energy value of substrates. Respirometers.	Cellular Metabolism
M	Photosynthesis and energy transfer. The biochemistry of photosynthesis. Limiting factors in photosynthesis. The structure of a dicot leaf.	Cellular Metabolism
N	Homeostasis principles. Kidney function and structure. Nervous system: sensory receptors, neurones, action potential, and synapses. Endocrine glands (pancreas). Control of blood glucose (diabetes treatment). Role of hormones in flowering plants.	Homeostasis Responses & Coordination
O	Genetic transfer. Meiosis. Genes and alleles. Monohybrid and dihybrid crosses, sex linkage, codominance, multiple alleles. Chi-squared. Mutations and environmental effects on phenotype.	Sources of Variation Inheritance
P	Natural and artificial selection. The role of natural selection in evolution. The role of environmental factors and isolating mechanisms. The role of artificial selection on livestock improvement. Factors affecting allele frequencies (malaria and sickle cell anaemia).	Population Genetics and Speciation
Q	The five kingdom classification system. The importance of biodiversity. Conservation issues: endangered species and strategies to protect them.	Biodiversity & Classification • TRC: Conservation Issues
R	Gene technology, techniques in gene technology. Uses of gene technology (insulin production, DNA sequencing, genetic fingerprinting, and genetic screening). Benefits and hazards of gene technology. Ethical issues.	AS Gene Technology
S	Biotechnology. Industrial use of microorganisms. Large scale production of microorganisms. Enzyme technology. The use of monoclonal antibodies.	• TRC: Biotechnology
T	Crop plant reproduction and adaptations. Methods of improving crop production.	• TRC: Crop Plants
U	Human reproduction. Gametogenesis (mitosis, growth, meiosis and maturation). The role of hormones in the menstrual cycle. Contraception. In-vitro fertilisation.	• TRC: Aspects of Human Reproduction
Meeting Assessment Objectives		
A	Knowledge with understanding. Including the use of scientific vocabulary, understanding scientific ideas and concepts, using instruments and scientific measurements, the application of scientific and technological techniques.	Skills in Biology Practical Ecology
B	Handling information and solving problems. Understand how to organise and extract information. Know how to manipulate and present data, and draw conclusions. Apply knowledge to problem solve.	
C	Experimental skills and investigations. Following detailed instructions, using techniques and apparatus correctly, making accurate observations, and interpreting the data to form predictions. Designing, planning and carrying out a scientific experiment or investigation.	