Curriculum Map
Year 10

Biology

Learning Aims and Curriculum Intent:

Studying Biology at GCSE enables students to learn about the world around us.

- Students will gain surface and some deeper understanding of cellular processes as well as environmental interactions, becoming more capable of applying familiar content to new scenarios.
- Students will be able to plan experiments, analyse problems, interpret the impact of changes to organisms and to ecosystems, and apply biological knowledge to unseen investigations.
- They will learn how to apply mathematical skills to 'real world' contexts to investigate relationships.
- Students will carry out experimental work to develop their experimental knowledge and practical skills.

Term	Content, Key Questions and Knowledge	Skills	Assessment
Michaelmas	**1. Life processes, cells, systems, and organisms** • Understand the eight basic characteristics shared by all living organisms. • Describe the levels of organisation in organisms. • Describe the common features shown by all eukaryotic organisms including the cell structures and their functions. • Compare and contrast the structure of plant and animal cells. • Compare and contrast features of prokaryotic and eukaryotic organisms. • Understand the term pathogen and the diseases caused by pathogens. • Understand the features of viruses and how viruses cause disease. • Explain the importance of differentiation in the development of specialised cells, and the advantages and disadvantages of using stem cells in medicine. **2. Movement and molecules** • Understand the processes of diffusion, osmosis, and active transport. • Understand how factors affect the rate of movement of substances into and out of cells, including practical investigations. • Describe the structure of carbohydrates, proteins and lipids, and investigate food samples for the presence of glucose, starch, protein and fat. • Understand the role of enzymes as biological catalysts in metabolic reactions including how enzyme function can be affected by changes in temperature and pH. **3. Digestion** • Understand the requirements of a balanced diet, and lifestyle factors affecting the energy requirements of an individual's diet. • Describe the structure and function of the human alimentary canal (gut), including the processes occurring in each organ/section, and the conditions which enable effective digestion and absorption. • Understand how the small intestine is adapted for absorption. • Practically investigate the energy content in a food sample.	• Apply prior knowledge to new concepts. • Learn definitions for (and practice remembering) new key words. • Preparation and viewing of slides for light microscopy. • Convert numbers between orders of magnitude (e.g. micrometres to millimetres) and use this to calculate magnification. • Write methods to validly test hypotheses. • Predict expected results of required practicals, explaining reasons. • Present data in a scientific way (tables, graphs). • Interpret information and results of experiments to draw conclusions and explain them using scientific understanding. • Suggest the limitations of an experimental procedure. • Suggest ways to improve experimental validity, accuracy and reliability (distinguishing between each one).	All of the Biology teachers at Forest will use some or all of the following modes of assessment throughout the IGCSE course: • Retrieval quizzes. • Online topic progress multiple choice quizzes. • Exam questions from Edexcel IGCSE board. • Extended-response questions. • End of topic tests composed of IGCSE exam questions.

Lent	**4. Respiration** • Understand how different organisms release energy from glucose, including the differences between aerobic and anaerobic respiration. • Understand simple controlled experiments that demonstrate production of carbon dioxide and heat from respiring organisms. **5. Gas Exchange in Humans** • Describe the structure of the human thorax and how structures within are adapted for gas exchange. • Understand the process of breathing, including pressure changes in the thorax. • Understand the biological consequences of smoking, including lung diseases and the impact on foetal growth. • Practically investigate factors affecting breathing rate/volume in humans. **6. Transport in Humans** • Understand why unicellular organisms can rely on diffusion for absorption of oxygen (and perhaps nutrients), but multicellular organisms require specialised systems. • Understand the roles and specialisations of the components of the blood within the circulatory system. • Understand the structure and function of the circulatory system including the heart and blood vessels. • Understand the effects of exercise and adrenaline on the circulatory system. • Understand the immune response in generating natural immunity, the importance of blood clotting, and how vaccination leads to artificial immunity. • Understand the diseases of the circulatory system (e.g. CHD), including the risk factors and consequences. **7. Nutrition in Plants** • Understand the process, purpose and factors which affect the rate of photosynthesis. • Practically investigate limiting factors via changing conditions to measure their effect on the rate of oxygen production in pondweed. • Understand how the structure of a leaf is specialised for photosynthesis. • Understand the requirements of mineral ions in plants. • Describe controlled experiments to show the requirement of light, CO_2 and chlorophyll for photosynthesis, via testing for starch. **8. Gas Exchange in Plants** • Understand how the leaf acts as an organ of excretion. • Understand how the structure of the leaf is adapted for gas exchange. • Understand the balance of respiration and photosynthesis in plants. • Practically investigate the effect of light on net gas exchange, using hydrogen carbonate indicator.	• Apply prior knowledge to new concepts. • Learn definitions for (and practice remembering) new key words. • Calculate SA:Vol ratio. • Write methods to validly test hypotheses. • Predict expected results of required practicals, explaining reasons. • Present data in a scientific way (tables, graphs). • Sketch and explain trends in graphs. • Explain suitable control variables for required practical experiments. • Interpret information and results of experiments to draw conclusions and explain them using scientific understanding. • Suggest the limitations of an experimental procedure. • Suggest ways to improve experimental validity, accuracy and reliability (distinguishing between each one).	All of the Biology teachers at Forest will use some or all of the following modes of assessment throughout the IGCSE course: • Retrieval quizzes. • Online topic progress multiple choice quizzes. • Exam questions from Edexcel IGCSE board. • Extended-response questions. • End of topic tests composed of IGCSE exam questions.
Trinity	**9. Transport in Plants** • Understand how water, minerals and nutrients are transported around plants. • Understand how water is absorbed in the roots, linking this to water transport through the xylem and from the leaves via the transpiration stream. • Understand how the rate of transpiration is affected by environmental changes. • Practically investigate the effect of changing environmental factors on the rate of transpiration, using a mass or volume potometer. **10. Ecology and the Environment** • Understand the interactions of organisms and their environment, particularly feeding relationships and energy transfer (including how these can be represented as food chains, food webs, pyramids of number and pyramids of biomass). • Understand how carbon and nitrogen are cycled within ecosystems. • Practical: investigate the population size of an organism using quadrats, and the distribution of organisms using transects. **11. Human Influences on the Environment** • Understand biological consequences of pollution, including air pollution, water pollution. • Understand how human activities contribute to greenhouse gases, and how this links to the causes and consequences of global warming. • Understand the global consequences of deforestation.	• Apply prior knowledge to new concepts. • Learn definitions for (and practice remembering) new key words. • Write methods to validly test hypotheses. • Predict expected results of required practicals, explaining reasons. • Present data in a scientific way (tables, graphs). • Sketch and explain trends in graphs. • Interpret information and results of experiments to draw conclusions and explain them using scientific understanding. • Explain suitable control variables for required practical experiments. • Suggest ways to improve experimental validity, accuracy and reliability (distinguishing between each one). • Conduct ecological fieldwork to investigate population size and distribution. • Consider source reliability when using research skills.	All of the Biology teachers at Forest will use some or all of the following modes of assessment throughout the IGCSE course: • Retrieval quizzes. • Online topic progress multiple choice quizzes. • Exam questions from Edexcel IGCSE board. • Extended-response questions. • End of topic tests composed of IGCSE exam questions. End of year exam (covering all content learned throughout the year).

What consolidation looks like in this subject	Use of departmental checklists (on SharePoint), using flashcards and/or quizlet regularly, CenturyTech, mind-mapping, using past paper question	
Examples of Homework	Practice question booklets, past paper questions, extended response questions (CORMMSS and SCAP), research tasks, experimental planning, experimental conclusion/evaluation, other worksheets.	
Key terminology	Topic specific key words: Eukaryote, prokaryote, unicellular, multicellular, protoctists, pathogens, bacteria, organelle, mitochondria, ribosomes, vacuoles, cellulose, peptidoglycan, hyphae, plasmid, differentiation, embryonic stem cells, adult stem cells, therapeutic cloning, magnification, tissue, organ, system, diffusion, osmosis, active transport, diffusion, surface area: volume ratio, concentration gradient, turgid, flaccid, plasmolysed, kinetic energy, enzyme, active site, activation energy, enzyme-substrate complex, denature, optimum, substrate, product, protein, carbohydrate, lipid, mineral, vitamin, monomer, polymer, soluble, insoluble, balanced diet, oesophagus, peristalsis, bile, hydrochloric acid, villi, microvilli, anaemia, kwashiorkor, scurvy, rickets, aerobic respiration, anaerobic respiration, ATP, thorax, alveolus, capillary bed, oxygen debt, coronary heart disease, artery, vein, platelets, haemoglobin, phagocytes, lymphocytes, vaccination, adrenaline, photosynthesis, chlorophyll, stomata, xylem, phloem, transpiration, translocation, compensation point, biodiversity, ecosystem, community, population, distribution, abundance, habitat, species, producer, decomposer, consumer, biotic factor, abiotic factor, competition, pollution, acidification, eutrophication, greenhouse effect, global warming, deforestation. Practical skills key words: accuracy, reliability, validity, precision, concordance, control variable, independent variable, dependent variable, control experiment.	
Super-curricular enrichment and scholarly extension	**Read:** Entangled Life (Merlin Sheldrake), The Immortal Life of Henrietta Lacks (Rebecca Skloot), The Diversity of Life (Edward O. Wilson), The Soul of an Octopus (Sy Montgomery), Lab Girl (Hope Jahren), Biomimicry: Innovation Inspired by Nature (Janine M. Benyus), I Contain Multitudes (Ed Yong). **Watch:** Planet Earth I & II (David Attenborough, BBC), The Private Life of Plants (David Attenborough, BBC), Fantastic Fungi (Apple TV, Netflix), Pain, Pus & Poison (old Channel 4 show, YouTube), Royal Institution Lectures (YouTube), Inside Nature's Giants (old Channel 4 show, YouTube), The Hunt (TV series, not the horror film! Amazon prime, YouTube), The Genius of Britain (YouTube), The Hidden Lives of Pets (Netflix), My Octopus Teacher (Netflix), Chimp Empire (Netflix), Life in Colour (David Attenborough, Netflix), Human – The World Within (Netflix). **Listen:** Science Vs. (Spotify& others), The Naked Scientists (Spotify & others), Ologies (Spotify & others), Stuff You Should Know (Spotify & others). **Visit:** Natural History and Science Museums, Kew Gardens, The Grant Museum of Zoology, Hunterian Museum, London Wetland Centre, ZSL London Zoo.	
Useful websites	Websites for revision/catch up are all linked onto the topic checklists (on SharePoint).	
Who can I contact?	**Head of Department**	**Mrs Annie Plumb, amp@forest.org.uk**
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