Curriculum Map: Year 12 Biology Spring Term

Spring		
	Teacher 1	**Teacher 2**
Content Declarative knowledge 'I Know'	**Module 3: Exchange and Transport** **3.1.1 Exchange surfaces** Know the need for specialised exchange surfaces. Know the features of an efficient exchange surface. Know the structures and functions of the components of the mammalian gaseous exchange system. Know the mechanism of ventilation in mammals. Know the relationship between vital capacity, tidal volume, breathing rate and oxygen uptake. Know the mechanisms of ventilation and gas exchange in bony fish and insects. **3.1.2 Transport in animals** Know the need for transport systems in multicellular animals. Know the different types of circulatory systems. Know the structure and functions of arteries, arterioles, capillaries, venules and veins. Know the external and internal structure of the mammalian heart. Know the stages of the cardiac cycle. Know the role of haemoglobin in transporting oxygen and carbon dioxide. of water in their environment. Know the mechanism of translocation.	**Module 4: Biodiversity, Evolution and Disease** **4.1.1 Communicable disease, disease prevention and the immune system** Know the different types of pathogen that can cause communicable diseases in plants and animals. Know the means of transmission of animal and plant communicable pathogens. Know plant defences against pathogens. Know the primary non-specific defences against pathogens in animals. Know the structure and mode of action of phagocytes. Know the structure, different roles and modes of action of B and T lymphocytes in the specific immune response. Know the primary and secondary immune responses. Know the structure and general functions of antibodies. Know an outline of the action of opsonins, agglutinins and anti-toxins. Know the differences between active and passive immunity and between natural and artificial immunity. Know about autoimmune disease. Know the principles of vaccination and the role of vaccination programmes in the prevention of epidemics. Know possible sources of medicines. Know the benefits and risks of using antibiotics to manage bacterial infection. **4.2.2 Classification and evolution** Know the biological classification of species. Know the binomial system of naming species and the advantage of such a system. Know the features used to classify organisms into the five kingdoms: prokaryotae, Protoctista, fungi, plantae, animalia. Know the evidence that has led to new classification systems, such as the 3 domains of life, which clarifies relationships. Know the relationship between classification and phylogeny. Know the evidence for the theory of evolution by natural selection. Know the different types of variation. Know the mechanism by which natural selection can affect the characteristics of a population over time.
Skills Procedural Knowledge	Know how to carry out the dissection, examination and drawing of the gaseous exchange system of a bony fish. Know how to examine microscope slides to show the histology of exchange surfaces.	Know how to examine and draw cells observed in blood smears. Know how evolution in some species has implications for human populations.

'I know how to'	Know how tissue fluid is formed from plasma. **PAG 2.1: Dissection of the mammalian heart** Know how to safely and correctly use a range of practical equipment and materials. Know how to keep appropriate records of experimental activities. Know how to present information and data in a scientific way. Know how to use a wide range of experimental and practical instruments, equipment and techniques appropriate to the knowledge and understanding included in the specification. Know how to produce scientific drawings from observations with annotations. Know how to safely use instruments for dissection of an animal and plant organ. Know how heart action is initiated and coordinated. Know how to use and interpret electrocardiogram traces. Know how to interpret the oxygen dissociation curve for foetal and adult haemoglobin.	
Strategies Conditional Knowledge 'I know when to'	Use theories, models and ideas to develop scientific explanations. Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas. Understand that scientific knowledge and understanding develops over time.	Understand that evolution in some species has implications for human populations, to include the evolution of pesticide resistance in insects and drug resistance in microorganisms. Evaluate methodology, evidence and data, and resolve conflicting evidence. Know that scientific knowledge and understanding develops over time. Communicate information and ideas in appropriate ways using appropriate terminology. Consider applications and implications of science and evaluate their associated benefits and risks. Evaluate the role of the scientific community in validating new knowledge and ensuring integrity. Evaluate the ways in which society uses science to inform decision making.
Key Questions	What are the features of a specialised gaseous exchange surface? What is the structure and function of the components of a mammalian gas exchange surface? What is the mechanism of ventilation in mammals, bony fish and insects? Why do multicellular organisms need transport systems? What is the structure and function of the mammalian circulatory system?	What are the different pathogens that can cause communicable disease? How are diseases transmitted and how can this transmission be prevented? How does the mammalian immune system protect the body from pathogens? How can vaccination programmes help to contain epidemics? What are the benefits and risks of using antibiotics to fight infections? How are modern techniques used to classify organisms according to evolutionary relationships? What is evolution by natural selection?
Assessment topics	Module 3 test: 3.1.1 Exchange surfaces and 3.1.2 Transport in animals (55 minutes) at end of term. Module 4 test: 4.1.1 Communicable disease and 4.2.2 Classification and evolution (55 minutes) at end of term.	
Cross curricular links/Character Education	**PE:** Cardiac cycle and circulatory system, vital capacity, tidal volume, breathing rate and oxygen uptake. **Maths:** Recognise and make use of appropriate units in calculations, recognise and use expressions in decimal and standard form, use ratios, fractions and percentages, estimate results, use an appropriate number of significant figures, find arithmetic means, construct and interpret frequency tables and diagrams, bar charts and histograms, understand the terms mean, median and mode, identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined, use a scatter diagram to identify a correlation between two variables, select and use a statistical test, understand measures of dispersion,	

	including standard deviation and range, understand and use the symbols: =,1, «, », 2, \, +, solve algebraic equations, translate information between graphical, numerical and algebraic forms, plot two variables from experimental or other data, understand that $y = mx + c$ represents a linear relationship, calculate rate of change from a graph showing a linear relationship, draw and use the slope of a tangent to a curve as a measure of rate of change, calculate the circumferences, surface areas and volumes of regular shapes. **Character education:** Understanding that evolution in some species has implications for human populations.