4.1.1 Communicable diseases, disease prevention and the immune system

(a) the different types of pathogen that can cause communicable diseases in plants and animals

To include,
- bacteria – tuberculosis (TB), bacterial meningitis, ring rot (potatoes, tomatoes)
- virus – HIV/AIDS (human), influenza (animals), Tobacco Mosaic Virus (plants)
- protoctista – malaria, potato/tomato late blight,
- fungi – black sigatoka (bananas), ring worm (cattle), athlete’s foot (humans).

(b) the means of transmission of animal and plant communicable pathogens

To include direct and indirect transmission, reference to vectors, spores and living conditions – e.g. climate, social factors (no detail of the symptoms of specific diseases is required).

M0.1, M0.2, M0.3, M1.1, M1.2, M1.3, M1.5, M1.7, M3.1, M3.2, HSW1, HSW2, HSW3, HSW5, HSW6, HSW7, HSW8, HSW11, HSW12

(c) plant defences against pathogens

To include production of chemicals AND plant responses that limit the spread of the pathogen (e.g. callose deposition).

HSW2, HSW8

(d) the primary non-specific defences against pathogens in animals

Non-specific defences to include skin, blood clotting, wound repair, inflammation, expulsive reflexes and mucous membranes (no detail of skin structure is required).

HSW2, HSW8

(e) (i) the structure and mode of action of phagocytes
(ii) examination and drawing of cells observed in blood smears

To include neutrophils and antigen-presenting cells AND the roles of cytokines, opsonins, phagosomes and lysosomes.

PAG1 HSW8

(f) the structure, different roles and modes of action of B and T lymphocytes in the specific immune response

To include the significance of cell signalling (reference to interleukins), clonal selection and clonal expansion, plasma cells, T helper cells, T killer cells and T regulator cells.

HSW8

(g) the primary and secondary immune responses

To include T memory cells and B memory cells.

M1.3 HSW2

(h) the structure and general functions of antibodies

To include the general structure of an antibody molecule.
4.1.1 Communicable diseases, disease prevention and the immune system

(i) an outline of the action of opsonins, agglutinins and anti-toxins

(j) the differences between active and passive immunity, and between natural and artificial immunity

To include examples of each type of immunity.

(k) autoimmune diseases

To include an appreciation of the term *autoimmune disease* and a named example e.g. arthritis, lupus.

(l) the principles of vaccination and the role of vaccination programmes in the prevention of epidemics

To include routine vaccinations **AND** reasons for changes to vaccines and vaccination programmes (including global issues).

**M0.1, M0.2, M0.3, M1.1, M1.2, M1.3, M1.5, M1.7, M3.1, M3.2 HSW1, HSW2, HSW3, HSW5, HSW6, HSW7, HSW8, HSW9, HSW11, HSW12**

(m) possible sources of medicines

To include examples of microorganisms and plants (and so the need to maintain biodiversity) **AND** the potential for personalised medicines and synthetic biology.

**HSW7, HSW9, HSW11, HSW12**

(n) the benefits and risks of using antibiotics to manage bacterial infection.

To include the wide use of antibiotics following the discovery of penicillin in the mid-20th century **AND** the increase in bacterial resistance to antibiotics (examples to include *Clostridium difficile* and MRSA) and its implications.

**HSW2, HSW5, HSW9, HSW12**