IB Biology Y2: Responding to the Environment Unit

Teacher(s)	IB Biology PLC	**Subject group and course**	Group 4/IB Biology Y2 SL		
Course part and topic	Unit 6: Responding to the Environment Unit Focus: Topic 6.3, 6.5, and 6.6 Y1 Review: Unit 5 Y2 Review: Unit 1	**SL or HL/Year 1 or 2**	SL Y2	**Dates**	5 weeks
Unit description and texts		**DP assessment(s) for unit**			
Pearson IB Biology Textbook Topic 6 Phenomenon: A person with uncontrolled diabetes eats a sandwich with white bread and goes into shock. Alternative Phenomenon: Zika virus and microcephaly - An arbovirus as an emerging threat to developmental neurobiology and reproductive endocrinology. Design Lab: Oscilloscope factors impacting the action potential of a neuron		• Unit Summative assessment • Projects/Practicals • Formative/Summative assessment quizzes per subtopic to check for understanding			

INQUIRY: Establishing the purpose of the unit

Unit Statement of Inquiry: The physiology of the immune, endocrine, and nervous systems allow humans to maintain homeostasis in a changing environment.

Essential Ideas/Inquiry Statements per Subtopic:
The human body has structures and processes that resist the continuous threat of invasion by pathogens.
Neurons transmit the message, synapses modulate the message.
Hormones are used when signals need to be widely distributed.

Core Ideas: Cell Signaling and Regulation/Hormones/Nervous System and Impulses/Immune system/Clotting
Phenomenon: A person with uncontrolled diabetes eats a sandwich with white bread and goes into shock.
Alternative Phenomenon: Zika virus and microcephaly - An arbovirus as an emerging threat to developmental neurobiology and reproductive endocrinology.
Crosscutting Concepts- Cause and Effect/Structure and Function/Systems and Systems Models

ACTION: teaching and learning through inquiry

Content/skills/concepts—essential understandings **U = Understandings** **NOS = Nature of Science** **A = Applications** **S = Skills**	**Learning process** Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.
Students will know the following content/Students will grasp the following concepts: 6.3 Defense Against Infectious Disease Understandings: • The skin and mucous membranes form a primary defense against pathogens that cause infectious disease. • Cuts in the skin are sealed by blood clotting. • Clotting factors are released from platelets. • The cascade results in the rapid conversion of fibrinogen to fibrin by thrombin. • Ingestion of pathogens by phagocytic white blood cells gives non-specific immunity to diseases. • Production of antibodies by lymphocytes in response to particular pathogens gives specific immunity. • Antibiotics block processes that occur in prokaryotic cells but not in eukaryotic cells. • Viruses lack a metabolism and cannot therefore be treated with antibiotics. Some strains of bacteria have evolved with genes that confer resistance to antibiotics and some strains of bacteria have multiple resistance. Applications and skills: • Application: Causes and consequences of blood clot formation in coronary arteries. • Application: Florey and Chain's experiments to test penicillin on bacterial infections in mice. • Application: Effects of HIV on the immune system and methods of transmission. 6.5 Neurons and Synapses Understandings: Utilization: • Neurons transmit electrical impulses. • The myelination of nerve fibers allows for saltatory conduction. • Neurons pump sodium and potassium ions across their membranes to generate a resting potential. • An action potential consists of depolarization and repolarization of the neuron. • Nerve impulses are action potentials propagated along the axons of neurons. • Propagation of nerve impulses is the result of local currents that cause each successive part of the axon to reach the threshold potential. • Synapses are junctions between neurons and between neurons and receptor or effector cells.	Learning experiences and strategies/planning for self-supporting learning: ☐ Lecture ☐ Socratic Seminar ✓ Small Group/Pair Work ✓ PowerPoint Lecture Notes ☐ Individual Presentations ✓ Group Presentations ✓ Student Lecture/Leading the class ☐ Interdisciplinary Learning ☑ Lab Activities Details: Modeling, Think/Pair/Share, CER, Writing Prompts, Videos, etc. Accommodations: SWD/504 – Accommodations Provided ELL – Reading & Vocabulary Support Intervention Support Extensions – Enrichment Tasks and Project Guidance:

• When presynaptic neurons are depolarized they release a neurotransmitter into the synapse. • A nerve impulse is only initiated if the threshold potential is reached. Applications and skills: • Application: Causes and consequences of lung cancer. • Application: Causes and consequences of emphysema. • Application: External and internal intercostal muscles, and diaphragm and abdominal muscles as examples of antagonistic muscle action. • Skill: Monitoring of ventilation in humans at rest and after mild and vigorous exercise. (Practical 6) 6.6 Hormones, Homeostasis, and Reproduction Understandings: • Insulin and glucagon are secreted by β and α cells of the pancreas respectively to control blood glucose concentration. • Thyroxin is secreted by the thyroid gland to regulate the metabolic rate and help control body temperature. • Leptin is secreted by cells in adipose tissue and acts on the hypothalamus of the brain to inhibit appetite. • Melatonin is secreted by the pineal gland to control circadian rhythms. • A gene on the Y chromosome causes embryonic gonads to develop as testes and secrete testosterone. • Testosterone causes prenatal development of male genitalia and both sperm • production and development of male secondary sexual characteristics during puberty. • Estrogen and progesterone cause prenatal development of female reproductive organs and female secondary sexual characteristics during puberty. • The menstrual cycle is controlled by negative and positive feedback mechanisms involving ovarian and pituitary hormones. Applications and skills: • Application: Causes and treatment of Type I and Type II diabetes. • Application: Testing of leptin on patients with clinical obesity and reasons for the failure to control the disease. • Application: Causes of jet lag and use of melatonin to alleviate it. • Application: The use in IVF of drugs to suspend the normal secretion of hormones, followed by the use of artificial doses of hormones to induce superovulation and establish a pregnancy. • Application: William Harvey's investigation of sexual reproduction in deer. • Skill: Annotate diagrams of the male and female reproductive system to show names of structures and their functions. NOS Risks associated with scientific research—Florey and Chain's tests on the safety of penicillin would not be compliant with current protocol on testing. (4.8) Cooperation and collaboration between groups of scientists—biologists are contributing to research into memory	• Diagrams of skin are not required. • Subgroups of phagocyte and lymphocyte are not required but students should be aware that some lymphocytes act as memory cells and can quickly reproduce to form a clone of plasma cells if a pathogen carrying a specific antigen is re-encountered. • The effects of HIV on the immune system should be limited to a reduction in the number of active lymphocytes and a loss of the ability to produce antibodies, leading to the development of AIDS. • The details of the structure of different types of neurons are not needed. • Only chemical synapses are required, not electrical, and they can simply be referred to as synapses. • The roles of FSH, LH, estrogen and progesterone in the menstrual cycle are expected. • William Harvey failed to solve the mystery of sexual reproduction because effective microscopes were not available when he was working, so fusion of gametes and subsequent embryo development remained undiscovered.

and learning. (4.3) Developments in scientific research follow improvements in apparatus—William Harvey was hampered in his observational research into reproduction by lack of equipment. The microscope was invented 17 years after his death. (1.8)	
Students will be assessed daily with classwork, discussions, group work, and reflections using a variety of formats with a focus on the applications and skills provided in the syllabus.	**Formative assessment:** ✓ Quiz/Test ✓ Project/Model ✓ CER/Reflection ✓ Essay/Writing Assignment ✓ Lab Data Collection and Analysis

Students will be assessed per subtopic and then at the end of the unit (Topic) to ensure understanding using IB exam style questions, modeling, reflection, lab reports, and writing prompts	**Summative assessment:** ✓ Quiz/Test ✓ Project/Model ✓ CER/Reflection ☐ Essay/Writing Assignment ☑ Lab Data Collection and Analysis
Students may be aware of many of the concepts within this unit, so building on prior knowledge using scaffolding techniques to aid students in a deeper understanding and extending learning to ensure that students can meet the goals set by the unit.	Differentiation: ❏ Affirm Identity - build self-esteem ✓ Value Prior Knowledge ✓ Scaffold Learning ✓ Extend Learning Details: Many concepts may be familiar to the students and others will need more scaffolding and extension.

Approaches to learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

- ✓ Thinking - Asking questions and defining problems
- ✓ Social Communication- Constructing Explanations/Engaging in Argument from Evidence
- ✓ Self-management - Carrying out Investigations
- ❏ Research- Developing and using models

Language and learning Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.	**TOK connections** Check the boxes for any explicit TOK connections made during the unit	**CAS connections** Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.
✓ Activating Background Knowledge ✓ Scaffolding for new learning ✓ Acquisition of new learning through practice ✓ Demonstrating proficiency	✓ Personal and Shared Knowledge ❑ Ways of Knowing ✓ Areas of Knowledge ❑ The Knowledge Framework Details: Our current understanding is that emotions are the product of activity in the brain rather than the heart. Is knowledge based on science more valid than knowledge based on intuition?	❑ Creativity ❑ Activity ❑ Service Details: Modeling and active participation in the learning process. Creating materials to aid their fellow classmates in understanding a particular concept through peer interaction and team/group activities.

International Mindedness/Aims:

International Mindedness: (Research/Reflections/Writing) - Good Place to go back over Corona Virus (COVID 19)
The spread and containment of diseases such as bird flu require international coordination and communication.

Aims: (Practicals/Activities/Student Reflections/CER Activities)
Aim 8: The social as well as the economic benefits of the control of bacterial
Aim 8: The social effects of the abuse of psychoactive drugs could be considered, as could the use of the neurotoxin Botox for cosmetic treatments.
Aim 9: Science has limited means in the fight against pathogens, as shown by the spread of new diseases and antibiotic-resistant bacteria.
Aim 8: Scientists are aware that the drugs women take in fertility treatment pose potential risks to health. Should scientific knowledge override compassionate considerations in treating infertile couples?

Resources

Damon, A.; McGonegal, R.; Tosto, P.; Ward, W. Standard level biology; Pearson Education Limited: Harlow, Essex, 2014.
Greenwood, T.; Pryor, K.; Bainbridge-Smith, L.; Allan, R. Environmental science: student workbook; Biozone International: Hamilton, New Zealand, 2013.
Van de Lagemaat, R. www.inthinking.net: Andorra la Vella, Andorra, 2019.
IB Biology Schoology Course

Stage 3: Reflection—considering the planning, process and impact of the inquiry

What worked well List the portions of the unit (content, assessment, planning) that were successful	**What didn't work well** List the portions of the unit (content, assessment, planning) that were not as successful as hoped	**Notes/changes/suggestions:** List any notes, suggestions, or considerations for the future teaching of this unit