



BIOLOGY

COURSE SYLLABUS

GRADE LEVEL: 9

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SCHOOL YEAR: 2023-24

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COURSE DESCRIPTION:

In this course, we will examine the endlessly fascinating and unique properties of life and how they arise. Topics will be presented from the simplest to the most complex levels of organization, and we will continually build upon previously learned material. This enables students to become aware of the 'big picture' when they think about living things around them. All forms of life on Earth are tied together. We are 'one' on the molecular level. We are 'one' ecologically with the rest of life on Earth.

This course is structured around the US Next Generation Science Standards (NGSS) for High School Life Sciences. In the meantime, the school's mission and our ESLRS, D'Torch, have also been considered and integrated into the curriculum. The teaching session consists of 5 periods of 45 minutes per week. This framework calls for a vision of science proficiency based on a body of knowledge and an evidence-based, model- and theory-building enterprise that continually extends, refines, and revises knowledge.

COURSE OBJECTIVES:

In Grade 9 students continue working to meet the NGSS performance expectations, which integrates disciplinary core ideas with science and engineering practices and crosscutting concepts. The standards for each sub-topic are described below:

The student should be able to:

Structure and Function

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Matter and Energy in Organisms and Ecosystems

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use a mathematical representation to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Interdependent Relationships in Ecosystems

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Inheritance and Variation of Traits

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Natural Selection & Adaptation / Evolution

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

ASSESSMENT:

Assessment is an essential component of the learning process. It is also the key to unlock what students have actually learned. Classroom formative assessment will be given to students throughout the year to collect feedback on how well they are learning. Students also will be assigned outside classroom reading. Section or chapter tests will be given to students to evaluate their knowledge and ability to apply science concepts, and to cultivate critical thinking. Summative exams conducted quarterly aim to assess students' learning and to structure their academic efforts.

Assessment strategies for this course are in accordance with the school's assessment policy. It includes homework, seatwork, and projects (30%), quizzes and tests (30%), quarter exam (30%), and participation (10%). All formative assessments, including lab investigation reports, essays, presentations or projects, would be returned with either oral or written feedback. Multiple assessments address different learning styles and the results are aligned to NGSS to evaluate pupil's progress, wherever applicable. All the students' attainments are carefully recorded and data entered on the schoolwide gradebook system for tracking and evaluation.

Academic Dishonesty means employing a method or technique or engaging in conduct in an academic endeavor that contravenes the standards of ethical integrity expected at DIS. Academic dishonesty includes but is not limited to, the following:

1. Purposely incorporating the ideas, words of sentences, paragraphs, or parts thereof without appropriate acknowledgement and representing the product as one's own work.
2. Representing another's intellectual work such as photographs, paintings, drawings, sculpture, or research or the like as one's own, including failure to attribute content to an AI.
3. Employing a tutor, making use of Artificial Intelligence without acknowledgement, getting a parent to write a paper or do an assignment, paying for an essay to be written by someone else and presented as the student's own work.
4. Committing any act that a reasonable person would conclude, when informed of the evidence, to be a dishonest means of obtaining or attempting to obtain credit for academic work.

Any act of plagiarism will result in an automatic zero on the entire assignment.

PRIMARY TEXTBOOK & OTHER RESOURCES:

The main reference in this course and its accompanying website is as followed:

Miller, K. and Levine, J. (2017) *Biology*. Boston, MA: Pearson Education, Inc.
<https://www.savvasrealize.com/>

There are also other accompanying materials, such as worksheets, PowerPoint files, case studies, concept maps, laboratory manuals, and quiz sheets.

Google Classroom offers the web-based platform for effective instructional communications and formative feedback. It is accessible not only for pupils, but also for parents and the school. Other resources, such as video clips, interactive learning programs as well as some web-based learning tools, such as PhET interactive simulations, are also used to facilitate and stimulate learning.

ADDITIONAL INFORMATION – Please see Google Classroom for more information.

Schedule of Instruction

SUBJECT: G9 BIOLOGY

1st QUARTER – TENTATIVE COURSE CONTENT

(NB: Depending on time and interest, the teacher may delete and/or add other selections.)	
Week / Date	Topic / <i>Projects</i> / <i>Assessments</i>
Week 1 Aug 10th to 11th <u>2 Days of Class</u> <i>10 ~ First Day / Orientation Day</i>	Course Overview / Welcome to Biology Lab Safety The Science of Biology 1.1 What is Science?
Week 2 Aug 14th to 18th <i>15 ~ Opening Mass</i>	The Science of Biology 1.2 Science in context 1.3 Studying Life
Week 3 Aug 21st to 25th	The Chemistry of Life 2.1 The Nature of Matter
Week 4 Aug 28th to Sep 1st	The Chemistry of Life 2.3 Carbon Compounds
Week 5 Sep 4th to 8th <i>8 ~ Holy Mass & Birthday of Mother Mary</i>	The Chemistry of Life 2.4 Chemical Reactions and Enzymes <i>Enzyme lab</i> <i>Biochemistry Test</i>
Week 6 Sep 11th to 15th <i>12-14 ~ Pre-Exam Days</i>	The Biosphere 3.1 What is Ecology? 3.2 Energy, Producers and Consumers 3.3 Energy Flow in Ecosystems 3.4 Cycles of Matter <i>Begin 'Design an Ecosystem' Project</i>
Week 7 Sep 18th to 22nd	Ecosystems & Communities 4.2 Niches and Community Interactions 4.3 Succession Populations 5.1 How Populations grow 5.2 Limiting Factors <i>Mid Quarter Test</i>
Week 8 Sep 25th to 29th <u>No Classes</u> <i>25-28 ~ Teacher's Conference</i> <i>29 ~ Moon Festival Holiday</i>	<i>Design An Ecosystem Project Poster Due</i>
Week 9 Oct 2nd to 6th <u>3 Days of Class</u> <i>5-6 ~ Q1 Exams</i>	<i>Test – Ecology</i> <i>Quarter Exam</i>

2nd QUARTER – TENTATIVE COURSE CONTENT

<i>(NB: Depending on time and interest, the teacher may delete and/or add other selections.)</i>	
Week / Date	Topic / <i>Projects</i> / <i>Assessments</i>
Week 1 (10) Oct 9th to 13th 3 Days of Class <i>9-10 – Double 10 Holiday</i>	<u>Q1 Review & Reflect</u>
Week 2 (11) Oct 16th to 20th	Cell Structure & Function 7.1 Life is Cellular
Week 3 (12) Oct 23rd to 27th	Cell Structure & Function 7.2 Cell structure
Week 4 (13) Oct 30th to Nov 3rd <i>1 ~ All Saint's Day Mass</i>	Cell Structure & Function 7.3 Cell Transport <i>Cells Test</i>
Week 5 (14) Nov 6th to 10th	Photosynthesis 8.1 Energy and Life 8.2 Photosynthesis Overview
Week 6 (15) Nov 13th to 17th	Respiration & Fermentation 9.1 Cellular Respiration: An Overview <i>Quiz - Photosynthesis & ATP</i>
Week 7 (16) Nov 20th to 24th	Respiration & Fermentation 9.3 Fermentation <i>Begin Fermentation Investigation</i>
Week 8 (17) Nov 27th to Dec 1st <i>28-30 ~ Pre-Exam Days</i> <i>27 - Gr.12 Q2 Exams</i>	The Chemistry of Life 2.2 Properties of Water (p.40,41 only) <i>Quiz - Respiration & Fermentation</i>
Week 9 (18) Dec 4th to 8th <i>8 ~ Foundation Day Celebrations</i>	Plant Structure & Function 23.5 Transport in Plants & Plant Structure Introduction to Plants 22.1 (p634-636 only) What is a Plant? Plant Classification 22.4 Flowering Plants <i>Transport in Plants Timed Essay</i>
Week 10 (19) Dec 11th to 15th 3 Days of Class <i>14-15 ~ Q2 Exams</i>	<i>Fermentation Investigation Due</i> <i>Quiz - Properties of Water</i> <i>Quarter Exam</i>
Dec 18th to Jan 1st	Christmas Holiday

3rd QUARTER – TENTATIVE COURSE CONTENT

<i>(NB: Depending on time and interest, the teacher may delete and/or add other selections.)</i>	
Week / Date	Topic / <i>Projects</i> / <i>Assessments</i>
Week 1 (20) Jan 3rd to 5th <u>3 Days of Class</u> <i>4 ~ New Year Mass</i>	<u>Q2 Review & Reflect</u>
Week 2 (21) Jan 8th to 12th	DNA 12.2 The Structure of DNA <i>Begin DNA Project</i>
Week 3 (22) Jan 15th to 19th	DNA 12.3 DNA Replication Cell Growth and Division 10.1 Cell growth, Division and Reproduction <i>Quiz - DNA</i>
Week 4 (23) Jan 22th to Jan 26th	Cell Growth and Division 10.2 The Process of Cell Division 10.3 Regulating the Cell Cycle
Week 5 (24) Jan 29th to Feb 2nd	Cell Growth and Division 10.4 Cell Differentiation
Week 6 (25) Feb 5th to 9th <u>3 Days of Class</u> <i>8-9 – CNY Holiday</i>	Introduction to genetics 11.4 Meiosis <i>Quiz - Mitosis / Meiosis</i>
Feb 8th to 16th	Chinese New Year Holiday
Week 7 (26) Feb 19th to 23rd <i>19 ~ Lenten Mass</i> <i>20-22 ~ Pre-Exam Days</i>	RNA & Protein synthesis 13.1 RNA 13.2 Ribosomes and Protein Synthesis 13.3 Mutations <i>Quiz - Transcription/Translation/Point Mutation</i> <i>Mutations Seatwork Assessment</i>
Week 8 (27) Feb 26th to March 1st <u>4 Days of Class</u> <i>28 – Memorial Day Holiday</i>	Introduction to Genetics 11.1 The Work of Gregor Mendel 11.2 Applying Mendel's Principles 11.3 Other patterns of inheritance Human Heredity 14.1 Human Chromosomes 14.2 Human Genetic Disorders
Week 9 (28) Mar 4th to 8th <u>4 Days of Class</u> <i>8 ~ Q3 Exams</i>	<i>Protein Synthesis Test</i> <i>DNA Project due</i> <i>Quarter Exam</i>

4th QUARTER – TENTATIVE COURSE CONTENT

(NB: Depending on time and interest, the teacher may delete and/or add other selections.)

Week / Date	Topic / <i>Projects</i> / <i>Assessments</i>
Week 1 (29) Mar 11th to 15th <u>4 Days of Class</u> <i>11 ~ Q3 Exams; 12 ~ Q4 Begins</i>	<u>Q3 Review & Reflect</u>
Week 2 (30) Mar 18th to 22nd <i>18-21 ~ Fire Drill</i>	Darwin's theory of Evolution 16.1 Darwin's Voyage 16.2 Ideas That Shaped Darwin's Thinking 16.3 Darwin Presents His Case <i>Begin "Darwin's Theory of Natural Selection" Project</i> <i>Genetics Problems Test</i>
Mar 25th to Apr 5th	Easter Holiday
Week 3 (31) Apr 8th to 12th <i>10 ~ Easter Mass</i>	Darwin's theory of Evolution 16.4 Evidence for Evolution <i>Evidence for Evolution Seatwork Assessment</i>
Week 4 (33) Apr 15th to 19th	Evolution of Populations 17.3 The Process of Speciation Classification 18.1 Finding the Order in Diversity 18.2 Modern Evolutionary Classification 18.3 Building the Tree of Life <i>Quiz - Evolution</i>
Week 5 (34) Apr 22nd to 26th <i>22-26 ~ AP Mock Exams</i>	Cell Structure and Function 7.4 Homeostasis and Cells Digestive & Excretory systems 30.1 Organization of Human Body 30.3 The Digestive System
Week 6 (35) Apr 29th to May 3rd <i>1-2 ~ Pre-Exam Days</i> <i>1-10 ~ Final Exams (K, 5, 8, 12 only)</i> <i>4/29 – 5/10 ~ AP Exams</i>	Digestive & Excretory systems 30.4 The Excretory System <i>Quiz - Digestive and Excretory Systems</i>
Week 7 (36) May 6th to 10th <i>1-10 ~ Final Exams (K, 5, 8, 12 only)</i> <i>4/29 – 5/10 ~ AP Exams</i>	Circulatory and Respiratory Systems 33.1 The Circulatory System 33.3 The Respiratory System <i>Heart Rate Investigation</i>
Week 8 (37) May 13th to 17th <u>2 Days of Class</u> <i>15-16 ~ Q4 Exams; 17 ~ Record Day</i>	<i>Quarter Exam</i>
Week 9 (38) May 20nd to 24th <i>ACTIVITIES: Double check the school calendar and emails from the administration.</i>	End-of-Year School Activities
Week 10 (39) May 27th to 31st <u>4 Days of Class</u> <i>30 ~ Students Last Day</i> <i>31 ~ Teachers/Staff Meeting</i>	End-of-Year School Activities

