



BIOLOGY

COURSE SYLLABUS

GRADE LEVEL: 9

TEACHER: Sophia Lin

SCHOOL YEAR: 2024-25

EMAIL: slin@dishs.tp.edu.tw

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:

National Geographic (2022). *Biology*. National Geographic Learning.

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 12th to 16th <i>12 ~ First Day / Orientation Day</i> <i>15 ~ Opening Mass</i>	Course Overview / Welcome to Biology Lab Safety Introduction to Biology 1.1 The Study of Life 1.2 Constructing Explanations About the Natural World 1.3 Using Biology to Develop Solutions
Week 2 Aug 19th to 23rd	Molecules in Living Systems 5.1 Elements and Compounds 5.2 Water
Week 3 Aug 26th to 30th <i>26 ~ St. Dominic Feast Day Celebration</i>	Molecules in Living Systems 5.3 Carbon -Based Molecules <i>Biochemistry Test</i>
Week 4 Sep 2nd to 6th	Energy and Matter in Ecosystems 2.1 Ecological Systems 2.2 Modeling the Transfer of Energy and Matter <i>Begin 'Design an Ecosystem' Project</i>
Week 5 Sep 9th to 13th <i>9 ~ Holy Mass & Birthday of Mother Mary</i>	Energy and Matter in Ecosystems 2.3 Modeling Energy and Matter Distribution 2.4 Cycling of Matter
Week 6 Sep 16th to 20th <u>1 Day of Class</u> <i>17 – Moon Festival Holiday</i> <i>18-20 ~ Teacher's Conference</i>	Energy and Matter in Ecosystems 2.4 Cycling of Matter
Week 7 Sep 23rd to 27th <i>24-26 ~ Pre-Exam Days</i>	Biodiversity and Ecosystem Stability 3.1 Ecological Relationships 3.2 Biodiversity 3.3 Ecosystem Stability and Change <i>Ecology Test</i>
Week 8 Sep 30th to Oct 4th	Population Measurement and Growth 4.2 Modeling Population Growth Patterns 4.3 Factors that Limit Populations Growth
Week 9 Oct 7th to 11th <u>1 Day of Class</u> <i>8-9 ~ Q1 Exams</i> <i>10 – Double Ten Holiday</i> <i>11 ~ Record Day</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 14th to 18th <i>14 ~ Q2 Begins</i>	<u>Q1 Review & Reflect</u>
Week 2 (11) Oct 21st to 25th <i>25 ~ Masquerade Night</i>	Molecules in Living Systems 5.4 Chemical Reactions <i>Enzyme lab</i>
Week 3 (12) Oct 28th to Nov 1st <i>1 ~ All Saint's Day Mass</i>	Cell Structure and Function 6.1 Cell Structures <i>Microscopy lab</i>
Week 4 (13) Nov 4th to Nov 8th	Cell Structure and Function 6.2 Cell Membranes <i>Cells Test</i>
Week 5 (14) Nov 11th to 15th	Cell Structure and Function 6.3 Photosynthesis and Cellular Respiration
Week 6 (15) Nov 18th to 22nd <i>22 ~ Gr.12 Q2 Exams</i>	Cell Structure and Function 6.3 Photosynthesis and Cellular Respiration <i>Quiz - Photosynthesis & ATP</i>
Week 7 (16) Nov 25th to 29th <i>25 ~ Gr.12 Q2 Exams</i> <i>26-28 ~ Pre-Exam Days</i>	Cell Structure and Function 6.3 Photosynthesis and Cellular Respiration <i>Begin Fermentation Investigation</i>
Week 8 (17) Dec 2nd to Dec 6th <i>6 ~ Foundation Day Celebrations</i>	Cell Structure and Function 6.3 Photosynthesis and Cellular Respiration <i>Quiz - Respiration & Fermentation</i>
Week 9 (18) Dec 9th to 13th <u>3 Days of Class</u> <i>12-13 ~ Q2 Exams</i>	<i>Quarter Exam</i>
Dec 16th to Jan 3rd	Christmas Holiday

3rd 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 (19) Jan 6th to 10th 4 Days of Class <i>6 ~ Record Day</i> <i>7 ~ Q3 Begins</i> <i>10 ~ New Year Mass</i>	<u>Q2 Review & Reflect</u>
Week 2 (20) Jan 13th to 17th	Cell Growth 7.1 Cell Cycles 7.2 Mitosis
Week 3 (21) Jan 20th to 24th <i>20 ~ Feast Day of St. Thomas Aquinas</i>	Cell Growth 7.3 Cell Differentiation
Jan 27th to Jan 31st	Chinese New Year Holiday
Week 4 (22) Feb 3rd to 7th	Genetic Variation and Heredity 12.1 Meiosis <i>Quiz - Mitosis / Meiosis</i>
Week 5 (23) Feb 10th to 14th	Genetic Variation and Heredity 12.3 Mendelian Inheritance 12.4 Other Patterns of Inheritance <i>Genetics Problems Test</i>
Week 6 (24) Feb 17th to 21st	DNA, RNA, and Proteins 11.1 Genetic Information <i>Begin DNA Project</i> <i>Quiz - DNA</i>
Week 7 (25) Feb 24th to 28th 4 Days of Class <i>25-27 ~ Pre-Exam Days</i> <i>27 ~ Lenten Mass</i> <i>28 ~ Memorial Day Holiday</i>	DNA, RNA, and Proteins 11.2 Replication, Transcription, and Translation
Week 8 (26) March 3rd to 7th <i>5 ~ Ash Wednesday</i>	Genetic Variation and Heredity 12.2 Mutations <i>Quiz - Transcription/Translation/Point Mutation</i>
Week 9 (27) March 10th to 14th 4 Days of Class <i>14 ~ Q3 Exams</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 (28) Mar 17th to 21st <u>4 Days of Class</u> <i>17 ~ Q3 Exams</i> <i>18 ~ Q4 Begins</i> <i>19 ~ Feast of St. Joseph</i>	<u>Q3 Review & Reflect</u>
Week 2 (29) March 24th to 28th <i>24-28 ~ Fire Drill</i>	The Theory of Evolution 15.1 Developing the Theory of Evolution <i>Begin “Darwin’s Theory of Natural Selection” Project</i>
Week 3 (30) March 31st to April 4th <u>4 Days of Class</u> <i>4 – Children’s Day Holiday</i>	The Theory of Evolution 15.2 Evolution in Populations
Week 4 (31) Apr 7th to 11th	Evidence for Evolution 14.1 Lines of Evidence 14.2 Fossil and Geological Evidence <i>Evidence for Evolution Seatwork Assessment</i>
April 14th to April 18th	Easter Holiday
Week 5 (32) Apr 21st to 25th <i>23 ~ Easter Mass</i> <i>21-25 ~ AP Mock Exams</i> <i>26 ~ Spring Fair</i>	Evidence for Evolution 14.3 Developmental, Anatomical, and Genetic Evidence <i>Quiz - Evolution</i>
Week 6 (33) Apr 28th to May 2nd <i>4/29-5/1 ~ Pre-Exam Days</i> <i>1-9 ~ Final Exams (K, 5, 8, 12 only)</i>	Survival in Changing Environments 16.1 Speciation 16.2 Extinction
Week 7 (34) May 5th to 9th <i>1-9 ~ Final Exams (K, 5, 8, 12 only)</i> <i>5-16 ~ AP Exams</i>	Survival in Changing Environments 16.3 Human Impact on the Environment 16.4 Reducing Human Impact on the Environment
Week 8 (35) May 12th to 16th <u>2 Days of Class</u> <i>5-16 ~ AP Exams</i> <i>14-15 ~ Q4 Exams</i> <i>16 ~ Record Day</i>	<i>Quarter Exam</i>
Week 9 (36) May 19th to 23rd <i>19-23 ~ Student Clearance</i> <i>19 ~ Baccalaureate Mass</i> <i>23 ~ Gr. 8 Graduation</i>	End-of-Year School Activities
Week 10 (37) May 26th to 30th <u>4 Days of Class</u> <i>27 ~ Gr. 12 Graduation</i> <i>29 ~ Students Last Day</i> <i>30 ~ Teachers/Staff Meeting</i>	End-of-Year School Activities