



IMMACULATE CONCEPTION HIGH SCHOOL

SCIENCE DEPARTMENT

2024-2025

Course Outline

Grade Level: 11

Title of Course: CSEC Biology

Duration: September 2024 - April 2025

Teachers:

Course Description:

This course is designed to fulfill the requirements for topics under sections B (Life Processes and Disease) and C (Continuity and Variation) of the CSEC Biology syllabus. The course covers respiration, excretion, movement, and homeostasis, focusing on how organisms maintain life processes and respond to environmental changes. Students will explore growth, reproduction, and the perpetuation of life, alongside the significance of disease control. Students will be introduced to the concepts of species, speciation, and genetic variation, and examine the molecular basis of heredity and the mechanisms driving biological evolution. Additionally, the social and ethical implications of genetic engineering are considered, preparing students for both academic success and informed citizenship in the life sciences. This course aims to equip students with the knowledge and skills necessary to excel in the external CSEC Biology examination.

Course Prerequisites:

- Successful completion of Grade 10 CSEC Biology
- Concurrent study of CSEC Mathematics or its equivalent and CSEC English A (English Language) or its equivalent.

Course Objectives:

Upon completion of this course, students will have the ability to:

- Answer scientific questions by a process of making observations, asking questions, doing experiments, and analyzing and interpreting data.
- Understand that respiration is how energy is made available for carrying out life processes.
- Understand the processes by which living organisms get rid of metabolic waste and regulate body fluid concentration.
- Understand the mechanisms of movement and appreciate its role(s) in living organisms.
- Understand that organisms detect and respond to changes in their external and internal environment.
- Understand that organisms increase in mass, size, and complexity during their lives.
- Understand the processes by which life is perpetuated.

- Appreciate the social and economic importance of disease control in plants and animals.
- Understand the “species” concept and the two major forms of speciation.
- Understand the importance of genetic variation in species.
- Understand the concept of the gene as it pertains to DNA, chromosomes, and alleles.
- Understand the role of genes and heredity in determining how traits can be altered and inherited by asexual and sexual means.
- Understand natural selection, mutation, gene flow, and genetic drift as mechanisms for biological evolution.
- Understand the evidence for biological evolution and the importance and applications of biological evolution in terms of healthcare, food technology, forensic science, and conservation biology.
- Appreciate the social and ethical implications of genetic engineering.

Student Learning Outcomes:

Students will be able to:

1. ***Respiration and Energy***- Explain how respiration is the process by which energy is produced and utilized in living organisms for vital life processes.
2. ***Excretion and Homeostasis***- Describe the various processes by which living organisms excrete metabolic waste and maintain fluid and electrolyte balance within their bodies.
3. ***Mechanisms of Movement***- Illustrate the mechanisms that enable movement in various organisms and discuss the significance of movement in survival and adaptation.
4. ***Response to Stimuli (Irritability)*** - Analyze how organisms detect and respond to changes in their internal and external environments, ensuring survival and maintaining homeostasis.
5. ***Growth and Development***- Describe the processes of growth in organisms, focusing on how they increase in mass, size, and complexity through cellular division and differentiation.
6. ***Reproduction and Life Perpetuation*** - Explain the different modes of reproduction in organisms and the importance of these processes in the perpetuation of species.

7. ***Disease Control***- Discuss the importance of controlling diseases in plants and animals from both social and economic perspectives, and describe methods of disease management.
8. ***Species and Speciation***- Define the concept of a species and explain speciation, highlighting their roles in biodiversity and evolution.
9. ***Genetic Variation***- Evaluate the importance of genetic variation within species and its implications for adaptation and survival in changing environments.
10. ***Gene Concept and Heredity*** - Describe the structure and function of genes, including their roles in DNA, chromosomes, and alleles, and explain how they govern heredity and trait inheritance.
11. ***Asexual and Sexual Reproduction***- Compare and contrast asexual and sexual reproduction, and discuss how these processes contribute to genetic diversity and species continuity.
12. ***Mechanisms of Evolution***- Analyze the mechanisms of evolution, including natural selection, gene flow, genetic drift, and mutation, and their roles in shaping the genetic makeup of populations.
13. ***Applications of Biological Evolution***- Assess the evidence supporting biological evolution and its applications in healthcare, food technology, forensic science, and conservation biology.
14. ***Genetic Engineering***- Evaluate the social and ethical implications of genetic engineering, considering both the potential benefits and the challenges it poses.

**Course objectives and Learning outcomes adapted from the CXC CSEC Biology syllabus **

Topical Outline of the Course Content:

Topic	Content
Respiration	<ul style="list-style-type: none"> <input type="checkbox"/> Definition of respiration <input type="checkbox"/> Process of aerobic respiration and difference <input type="checkbox"/> between aerobic and anaerobic respiration

	<ul style="list-style-type: none"> <input type="checkbox"/> Description of the breathing mechanism in humans and gaseous exchange in flowering plants. <input type="checkbox"/> Characteristics common to gaseous exchange surfaces <input type="checkbox"/> Effects of smoking
Homeostasis and Excretion	<ul style="list-style-type: none"> <input type="checkbox"/> Difference between excretion and egestion <input type="checkbox"/> Importance of excretion in living organisms <input type="checkbox"/> Mode of excretion in plants and animals <input type="checkbox"/> Structure, role, and functions of the kidneys
Movement	<ul style="list-style-type: none"> <input type="checkbox"/> Growth movement vs Locomotion <input type="checkbox"/> Importance of Locomotion in animals <input type="checkbox"/> Structure and function of the human skeletal system <input type="checkbox"/> Mechanism of the movement of the human forelimb
Irritability	<ul style="list-style-type: none"> <input type="checkbox"/> Stimulus and Response definitions <input type="checkbox"/> Response of green plants and invertebrates to stimuli <input type="checkbox"/> Importance of irritability for the survival of living organisms <input type="checkbox"/> The coordinating function of the brain and spinal cord and the roles of sensory and motor neurons. <input type="checkbox"/> Functions of the main regions of the human brain

	<ul style="list-style-type: none"> <input type="checkbox"/> Reflex actions <input type="checkbox"/> Physiological, social, and economic effects of drug abuse <input type="checkbox"/> Structure and function of the human eye as a sense organ <input type="checkbox"/> Accommodation and sight defects <input type="checkbox"/> Structure and function of the skin in protection and temperature regulation
Growth	<ul style="list-style-type: none"> <input type="checkbox"/> Comparison of growth in plants vs animals <input type="checkbox"/> Seed function and structure of a dicotyledonous seed <input type="checkbox"/> Germination
Reproduction	<ul style="list-style-type: none"> <input type="checkbox"/> Sexual vs Asexual reproduction <input type="checkbox"/> Structure and function of human reproductive systems <input type="checkbox"/> Menstrual cycle <input type="checkbox"/> Fertilization and embryo development in humans <input type="checkbox"/> Contraceptives and STIs <input type="checkbox"/> Functions of the parts of a flower <input type="checkbox"/> Pollination – definition, wind vs insect pollination <input type="checkbox"/> Fertilization in plants, fruit, and seed formation
Disease	<ul style="list-style-type: none"> <input type="checkbox"/> Groups of diseases: pathogenic, deficiency, hereditary and physiological diseases <input type="checkbox"/> Treatment and control of the four main groups of diseases

	<ul style="list-style-type: none"> ❑ Lifecycle of the mosquito and its role as a vector in transmitting malaria, dengue, and yellow fever ❑ Methods of vector control ❑ Social, environmental, and economic implications of diseases in plants and animals
<p>Continuity and Variation</p>	<ul style="list-style-type: none"> ❑ Definitions of the terms: DNA, chromosomes, genes, alleles, dominant trait, recessive trait, codominance, genotype, phenotype, homozygous and heterozygous ❑ Mitosis- its role in asexual reproduction and genetically identical organisms ❑ Meiosis and its role in gamete formation and sexual reproduction ❑ Inheritance of traits ❑ Using genetic diagrams (Punnet square, pedigree charts, etc.) to predict offspring ❑ Sex-linked diseases inheritance in humans (hemophilia and color-blindness) ❑ Genetic variation, types of variation (continuous and discontinuous), and importance of genetic variation ❑ Species and speciation ❑ Natural and artificial selection ❑ Genetic engineering description and advantages and disadvantages of

genetic engineering including social, ethical, and ecological implications.

More detailed objectives can be found in the CXC CSEC Biology syllabus

Guidelines/Suggestions for Teaching Methods and Student Learning Activities:

- o Lectures: Provide contextual background and detailed analysis of each topic.
- o Group Discussions: Facilitate discussions on key concepts and biological phenomena.
- o Document Analysis: Students analyze scientific documents, case studies, and research related to the course topics.
- o Research Projects: Assign research on specific biological processes, species, or genetic concepts.
- o Video Presentations: Use visual aids to help students grasp complex biological processes.
- o Field Trips Visits to laboratories, nature reserves, or science museums, where applicable.
- o Differentiated Instruction: Tailor instruction to meet the needs, strengths, and interests of each student.
- o Lecture-Demonstration: Combine lectures with demonstrations to enhance understanding through verbal and visual learning.
- o Peer Teaching: Encourage students to teach their peers to reinforce their learning.
- o Socratic Method: Use thought-provoking questions to challenge assumptions and encourage critical thinking.
- o Past Paper Question practice - Students are given CSEC Biology past paper questions based on the topic being covered which they will be guided in answering

Guidelines/Suggestions for Methods of Student Evaluation:

- o Quizzes and Tests: Regular assessments to check understanding of key concepts.
- o Online Quizzes and Exam: Digital tests to assess understanding in a flexible setting.

- o Classwork: Assignments completed during class to monitor ongoing student progress.
- o Homework Assignments: Tasks assigned for completion outside of class to reinforce concepts.
- o Research Papers: In-depth analysis of a specific biological concept or theme.
- o Class Participation: Assessment based on engagement in discussions and activities.
- o Presentations: Students present their research findings to the class.
- o Mock Exam: A comprehensive exam covering all course material including content covered in Grade 10.
- o Group Projects: Team assignments that assess collaborative and interpersonal skills.
- o Peer Reviews: Students evaluate each other's work, providing feedback and gaining insights from peers.
- o Experiments: Assessment both during and after completion based on technical skills including the use of laboratory equipment and techniques.

Suggested Readings, Texts, and Objects of Study:

- Biology for CSEC by Nelson Thorne
- CXC CSEC Biology Syllabus
- Grade 10-11 Biology Laboratory Manual

Additional Readings:

- Collins Concise Revision Course - CSEC Biology by Anne Tindale
- Biology for CSEC – A Caribbean Examinations Council Study Guide by Nelson Thorne
- Caribbean Environmental Outlook Report
http://hqweb.unep.org/geo/pdfs/Caribbean_EO_final.pdf
- Understanding Evolution – University of California, Berkeley
<http://evolution.berkeley.edu/>

- National Evolutionary Synthesis Center (NESCENT)
<http://www.nescent.org/eog/archivednews.php>
- Khan Academy: <https://www.khanacademy.org/science>
- CK-12 Foundation: <https://www.ck12.org/student/>
- Amoeba sisters: <https://www.youtube.com/@AmoebaSisters>

Bibliography of Supportive Texts and Other Materials:

Caribbean Examinations Council (Ed.). (2017). *CSEC Biology Syllabus, Specimen Paper Mark Scheme, Subject Reports*. Macmillan Education.

Morrison, K., Kirby, P.-G., & Madhosingh, L. (2014). *Biology for CSEC*. Nelson Thornes.

Tindale, A. (2015). *Collins biology workbook for CSEC*. Collins.

Tindale, A. (2016). *CSEC Biology: Concise Revision course*. Collins.

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