



COURSE OVERVIEW

Biology is the study of life. Although mass extinctions have occurred in the past there are over 8 million different species on the planet today as a result of reproduction and natural selection. This diversity makes the study of biology an important and fascinating one for humans as the world around us is undergoing a rapid change. Increases in population and changes in climate have placed extreme pressures on food and water supplies as well as habitats of other species. Biology is a young science and is undergoing exponential growth as technologies improve. Biologists study the relationships between different species, their different habitats and how they interact with each other. Through the application of the scientific method and an array of different technologies biologist are piecing together a greater understanding of the world, as we know it.

This course will focus on 6 major topics, one option, a compulsory Group 4 Project, an ecology trip and practical work. The distribution of time devoted to each portion of this course is defined below:

- Curriculum time: 240(HL) or 150(SL) hours
- Option: 25(HL) or 15(SL) hours
- Practical Work: 60(HL) or 40(SL) hours (includes practical work, internal assessment and Group 4 Project).

LEARNING OUTCOMES

Through studying Biology students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes these subjects.

The aims enable students, through the overarching theme of the Nature of science, to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science
8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

UNIT OVERVIEWS

Unit 1 – Cell Biology

Approximate Length: 3 Weeks

Unit description: This unit focuses on the basics of cell biology, how molecules move into and out of cells and how cells divide.

Key concepts: The evolution of multicellular organisms allowed cell specialization and cell replacement.

Learning outcomes:

Introduction to cells, ultrastructure of cells, membrane structure, membrane transport, the origin of cells, cell division.

Unit 2 – Molecular Biology

Approximate Length: 4 Weeks

Unit description: This unit focuses on the different biological molecules and their importance to a cell. It also looks at the structure and function of DNA and RNA. Cell respiration and photosynthesis are also looked at (more in depth for higher level in unit 8).

Key concepts: Living organisms control their composition by a complex web of chemical reactions.

Learning outcomes:

Molecules to metabolism, water, carbohydrates and lipids, proteins, enzymes, structure of DNA and RNA, DNA replication, transcription and translation, cell respiration, photosynthesis.

Unit 3 – Genetics**Approximate Length:** 3 Weeks

Unit description: This unit focuses on inheritance and how traits are inherited from one generation to the next. It also looks at how genetic modification can be used in industry.

Key concepts: Every living organism inherits a blueprint for life from its parents.

Learning outcomes:

Genes, chromosomes, meiosis, inheritance, genetic modification and biotechnology.

Unit 4 – Ecology**Approximate Length:** 3 Weeks

Unit description: This unit focuses on ecosystems and the flow of energy, how carbon is cycled and climate change.

Key concepts: The continued survival of living organisms including humans depends on sustainable communities.

Learning outcomes:

Species, communities and ecosystems, energy flow, carbon cycling, climate change.

Unit 5 – Evolution and Biodiversity**Approximate Length:** 3 Weeks

Unit description: This unit focuses on

Key concepts: There is overwhelming evidence for the evolution of life on earth.

Learning outcomes:

Evidence for evolution, natural selection, classification of biodiversity, cladistics.

Unit 6 – Human Physiology**Approximate Length:** 6 weeks

Unit description: This unit focuses on a number of different body systems.

Key concepts: The human body has well adapted structures that enable systems to work efficiently.

Learning outcomes:

Digestion and absorption, the blood system, defense against infectious disease, gas exchange, neurons and synapses, hormones, homeostasis and reproduction.

Unit 7 – Nucleic Acids (HL ONLY)**Approximate Length:** 3 weeks

Unit description: This unit focuses on a more in-depth look at respiration and photosynthesis and cell metabolism and how it can be affected by inhibitors.

Key concepts: Metabolic reactions are regulated in response to the cells needs.

Learning outcomes:

Metabolism, Cell respiration, photosynthesis.

Unit 8 – Metabolism, cell respiration and photosynthesis (HL ONLY)**Approximate Length:** 4 weeks

Unit description: This unit focuses on a more in-depth look at respiration and photosynthesis and cell metabolism and how it can be affected by inhibitors.

Key concepts: Metabolic reactions are regulated in response to the cells needs.

Learning outcomes:

Metabolism, Cell respiration, photosynthesis.

Unit 9– Plant Biology (HL ONLY)**Approximate Length:** 3 weeks

Unit description: This unit focuses on looking at transport of sugars and water in a plant and how plants grow and reproduce.

Key concepts: The structures in a plant are well adapted to suit their function.

Learning outcomes:

transport in xylem of plants, transport in phloem of plants, growth in plants, reproduction in plants

Unit 10 – Metabolism, cell respiration and photosynthesis (HL ONLY)**Approximate Length:** 4 weeks

Unit description: This unit focuses on a more in-depth look at how traits are inherited and what can affect gene pools.

Key concepts: Genes may be linked and unlinked and are inherited accordingly.

Learning outcomes:

Meiosis, inheritance, gene pools and speciation.

Unit 11– Animal Physiology (HL ONLY)**Approximate Length: 5 weeks**

Unit description: This unit focuses on how the body deals with infection, how muscles work, how the body regulates its water content and sexual reproduction in humans.

Key concepts: The human body is well adapted to protect and regulate the internal environment.

Learning outcomes:

Antibody production and vaccination, movement, kidney and osmoregulation, sexual reproduction.

Option Topic – Topic D (Human Physiology)**Approximate Length: 4 weeks**

Unit description: This unit focuses on the essentials vitamins and minerals needed by the body and their roles. It also looks at the role the liver plays in the body, the heart and looking at ECG traces. HL looks in depth at the role a number of hormones have of parts of the body and how gases for and from respiration are transported around the body.

Key concepts: Internal and external factors affect our health.

Learning outcomes:

Human nutrition, digestion, functions of the liver, the heart, hormones & metabolism and transport & respiratory gases. (HL ONLY)

ASSESSMENT

Students will be evaluated using formative and summative assessments. The purpose of formative assessments and homework is to prepare students for summative assessments. Formative assessments will take many forms with the goal of scaffolding the knowledge, skills and the critical thinking required to successfully complete summative assessments. All summative assessments will be graded on the 1-7 IB scale. All reports will reflect the IB 1-7 grading scale and will be based the best-fit approach to assessment

Grade Boundaries for each summative will be published to students by the teacher after the summative assessments are graded.

The assessment objectives for Biology reflect those parts of the aims that will be formally assessed either internally or externally. These assessments will centre upon the nature of science. It is the intention of these courses that students are able to fulfill the following assessment objectives:

1. Demonstrate knowledge and understanding of:
 - a. facts, concepts, and terminology
 - b. methodologies and techniques
 - c. communicating scientific information.
2. Apply:
 - a. facts, concepts, and terminology
 - b. methodologies and techniques
 - c. methods of communicating scientific information.
3. Formulate, analyse and evaluate:
 - a. hypotheses, research questions and predictions
 - b. methodologies and techniques
 - c. primary and secondary data
 - d. scientific explanations.
4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

Students will be evaluated using formative and summative assessments.

Formative assessment is used to inform both teaching and learning. It is concerned with providing accurate and helpful feedback to students and teachers on the kind of learning taking place and the nature of students' strengths and weaknesses in order to help develop students' understanding and capabilities. Formative assessment can also help to improve teaching quality, as it can provide information to monitor progress towards meeting the course aims and objectives. Formative assessments will take many forms with the goal of scaffolding the knowledge, skills and the critical thinking required to successfully complete summative assessments.

Summative assessment gives an overview of previous learning and is concerned with measuring student achievement. All summative assessments will be graded on the 1-7 IB scale. All reports will reflect the IB 1-7 grading scale and will be based the best-fit approach to assessment. The Internal Assessment [IA] task will be one major investigation or scientific exploration and will be worth 20% of the overall assessment. There will also be 3 internal examinations in June of DP1 and January for DP1 and DP2. Paper 1 will consist of multiple choice questions, Paper 2 structured longer answer questions and Paper 3 will be the Options and data analysis examination.

Paper 1

40(HL) or 30(SL) Multiple choice questions on core material.
It has a weighting of 20% of the final IB grade.
The questions on paper 1 test assessment objectives 1,2 and 3.
No use of calculators is permitted.
No marks are deducted for incorrect answers.
Duration: 1hr (HL) or ¾ hr (SL).

Paper 2

Data-based questions, short answer and extended response questions on core material.
The questions on paper 2 test assessment objectives 1,2 and 3.
It has a weighting of 36%(HL) or 40% (SL) of the final IB grade for Biology.
The use of calculators is permitted.
Duration: 2¼ hr(HL) or 1¼ hr (SL).

Paper 3

This paper will have questions on core and option material.
It has a weighting of 20% (SL) or 24%(HL) of the final IB grade for Biology.
Section A: candidates answer all of the questions.
Section B: short answer and extended response questions from one option. (D)
The questions on paper 3 test assessment objectives 1,2 and 3.
Duration: 1 hr (SL) or 1¼ hr (HL).

Internal Assessment

Internal Assessment (IA): Individual Investigation

All students will design, and perform an individual investigation as a part of their Biology coursework. They will demonstrate knowledge and understanding of scientific methodologies and terminology. They will apply facts, concepts and techniques for communicating scientific information. They will formulate, analyze and evaluate their own work. They will demonstrate the appropriate research, experimental, and personal skills to carry out an insightful investigation. The IA has a weighting of 20% of the final IB grade for Biology.

Group 4 Project

There is a compulsory Group 4 project where all students studying science will work together collaboratively. All DP Chemistry students must participate in this collaborative project as part of the syllabus. Participation at GWA consists of learning the Experimental Sciences from new perspectives in a real-life setting. There will be an **off campus** trip during November of Grade 11. The Group 4 Project is assessed internally by a Digital Story Submission by each group in November.

Course Grade Descriptors

While we will look carefully at the grades students have achieved on the various assessments, ultimately, quarterly grades as well as predicted grades will be based on the following grade descriptors.

Grade 7

Displays comprehensive knowledge of factual information in the syllabus and a thorough command of concepts and principles. Selects and applies relevant information, concepts and principles in a wide variety of contexts. Analyses and evaluates quantitative and/or qualitative data thoroughly. Constructs detailed explanations of complex phenomena and makes appropriate predictions. Solves most quantitative and/or qualitative problems proficiently. Communicates logically and concisely using appropriate terminology and conventions. Shows insight or originality.

Demonstrates personal skills, perseverance and responsibility in a wide variety of investigative activities in a very consistent manner. Works very well within a team and approaches investigations in an ethical manner, paying full attention to environmental impact. Displays competence in a wide range of investigative techniques, pays considerable attention to safety, and is fully capable of working independently.

Grade 6

Displays very broad knowledge of factual information in the syllabus and a thorough understanding of concepts and principles. Selects and applies relevant information, concepts and principles in most contexts. Analyses and evaluates quantitative and/or qualitative data with a high level of competence. Constructs explanations of complex phenomena and makes appropriate predictions. Solves basic or familiar problems and most new or difficult quantitative and/or qualitative problems. Communicates effectively using appropriate terminology and conventions. Shows occasional insight or originality.

Demonstrates personal skills, perseverance and responsibility in a wide variety of investigative activities in a very consistent manner. Works well within a team and approaches investigations in an ethical manner, paying due attention to environmental impact. Displays competence in a wide range of investigative techniques, pays due attention to safety and is generally capable of working independently.

Grade 5

Displays broad knowledge of factual information in the syllabus. Shows sound understanding of most concepts and principles and applies them in some contexts. Analyses and evaluates quantitative and/or qualitative data competently. Constructs explanations of simple phenomena. Solves most basic or familiar problems and some new or difficult quantitative and/or qualitative problems. Communicates clearly with little or no irrelevant material.

Demonstrates personal skills, perseverance and responsibility in a variety of investigative activities in a fairly consistent manner. Generally works well within a team and approaches investigations in an ethical manner, paying attention to environmental impact. Displays competence in a range of investigative techniques, pays attention to safety and is sometimes capable of working independently.

Grade 4

Displays reasonable knowledge of factual information in the syllabus, though possibly with some gaps. Shows adequate comprehension of most basic concepts and principles but with limited ability to apply them. Demonstrates some analysis or evaluation of quantitative or qualitative data. Solves some basic or routine problems but shows limited ability to deal with new or difficult situations. Communicates adequately although responses may lack clarity and include some repetitive or irrelevant material.

Demonstrates personal skills, perseverance and responsibility in a variety of investigative activities, although displays some inconsistency. Works within a team and generally approaches investigations in an ethical manner, with some attention to environmental impact. Displays competence in a range of investigative techniques, pays some attention to safety although requires some close supervision.

STUDENTS RESPONSIBILITIES

Academic Honesty

Protocol For In-School Malpractice

The following steps will be followed in cases of malpractice:

1. Teachers will advise students of suspicion of misconduct
2. A record of the incident will be forwarded to the Diploma Programme Coordinator
3. The Diploma Programme Coordinator will discuss the incident with the teacher
4. The Diploma Programme Coordinator will interview the student involved
5. The Diploma Programme Coordinator will action appropriate disciplinary measures commensurate to the offense making note of the incident in the SIS which will in turn prompt a communication with parents.

Malpractice on Assessments to be Submitted to the IB

According to the Academic Honesty (2009) document, in cases of malpractice on assessments or exam that are intended for submission to the IB, the following protocol has been put in place.

Once a candidate has submitted his or her work to a teacher (or the coordinator) for external or internal assessment together with the coversheet signed (or authenticated electronically) to the effect that it is the final version of the work, neither the work nor the coversheet can be retracted by the candidate. If the candidate is subsequently suspected of plagiarism or collusion, it is no defense to claim that the incorrect version of the work was submitted for assessment.

After a candidate has signed and dated the coversheet (or authenticated electronically) to the effect that his or her work is authentic and constitutes the final version of that work, the candidate's teacher (or supervisor in the case of an extended essay) must also sign and date the coversheet to the effect that to the best of his or her knowledge it is the authentic work of the candidate. Any suspicion of malpractice that arises after the candidate has signed the coversheet must be reported to the coordinator help desk at IB Cardiff for investigation. However, if there is no tangible evidence of malpractice (such as the source of plagiarism) the candidate must be given the benefit of any doubt and the coversheet must be signed by the teacher/supervisor. It is not acceptable for the teacher to:

- delete the declaration and then sign the coversheet
- submit the work for assessment without his or her signature

- sign the declaration and then write comments on the work or coversheet that raise doubts about the work's authenticity.
- In the above circumstances the IB will not accept the work for assessment (or moderation) unless confirmation is received from the school that the candidate's work is authentic.

If a teacher is unwilling to sign a coversheet owing to a suspicion of malpractice, the matter must be resolved within the school. The coordinator has the option of informing the coordinator help desk that the work will not be submitted on behalf of the candidate (resulting in no grade being awarded for the subject or diploma requirement).

Malpractice in Testing Situations:

Students may not:

- take unauthorized material into an examination room (see below)
- leave and/or access unauthorized material in a bathroom/restroom that may be visited during a test
- pass on information to another student about the content of an examination, this includes facilitating the exchange information between other students in any way
- steal examination papers
- using an unauthorized calculator during an examination

Students must not have unauthorized material (for example, own rough paper, notes, a mobile/cell phone or an electronic device other than a permitted calculator) in their possession during a testing situation. "In their possession" may be taken to mean on the person of the student, in the student's immediate proximity (such as on the floor or desk) or placed somewhere (such as a bathroom/restroom) for access during the test. It is very important to note that guilt will be confirmed by the school administration regardless of whether this material is used, was or was not intended for use or contains information relevant or potentially relevant to the test. The actual possession of unauthorized material constitutes malpractice; the school administration is not required to establish whether the student used or intended to use the material. No leniency is shown to a candidate who claims that they were unaware the material was in their possession.

Late Assessment Policy

Late Assessments:

Should a student not complete a summative assessment on time (this includes summative drafts) teachers will:

- Speak with the student to find out why the assessment has not been submitted.
- An email home will be sent to parents detailing the missed assessment and the student will be asked to stay in school until it is completed.
- If the assessment is pending, once received, they log the infraction in the "reward and conduct" tab in iSAMS regarding the tardiness of the assessment.
- If a student does not attend after school to work on the assessment, the teacher will confer with the student and, if necessary, refer the incident to the Grade Leader. The Grade Leader will discuss the situation with the student to see if support is required or consequences need to be imposed. The Grade Leader will subsequently record the incident in iSAMS. Further incidents of truancy will be escalated to the Secondary School Administration.
- If there is a second incident of a late submission of an assessment, the teacher will report it in an email to the Grade Leader who may contact parents for a meeting where you may be included. The Grade Leader will record their actions in iSAMS.
- Further incidents of late assessments will be reported to Grade Leaders who will forward the incident(s) to the Secondary School administration who, if warranted, will initiate an in-school suspension where students will complete the assessment until it is completed to standard. A record of the suspension will be recorded in iSAMS and prompt a communication with parents.
- Any subsequent incidents of late assessments will necessitate a parent meeting with a member of the Secondary School Administration to determine the best way forward.

Tests Absenteeism

- In cases where students are not in school on a test day, a communication from parents will be required.
- The student will need to present their teacher with a doctor's note upon their return to class if the test is to be administered with no consequence.
- Should an authorized absence not be received, the student may not be permitted to write the test and an "NA" representing an "incomplete" will appear on the next quarterly report.
- If this incident reoccurs, the issue will be escalated to the Head of Senior School and will receive a 'O'.
- Aside from school activities, all test absences will be recorded in iSAMS by the teacher with a note in the "record description" whether the test absence was authorized or not. The Grade Level Leader may follow-up with the student, if necessary.

Teacher Assessment Commitments***All teachers will:***

- Provide feedback on all formative assessments within one calendar week of receipt.
- Post on Managebac any formative assessment (including homework) no later than 5:00PM the day it is assigned. If the formative assessment is not posted by this time there is no expectation that the assessment will be completed for the next day.
- Discuss with students prior to posting summative assessments and provide at least one calendar week lead time for students to prepare. Summative assessments will be posted on Managebac at least one week in advance of the due date.
- Work collaboratively with their teacher colleagues and coordinator to work toward the goal of students having no more than 2 summative assessments on a given day.
- Return summative assessments to students with feedback no later than three calendar weeks after the due date.
- Update Managebac immediately upon completion of marking/feedback.
- Communicate, in a timely fashion, with colleagues and administration about students who are turning in late formative and summative tasks in order to implement late assessment procedures, as outlined in the Assessment Policy. Late assessment procedures are outlined below.
- Communicate with parents when assignments/assessments are not turned in on the due date and clearly articulate the next steps for the student.