CARSON GRAHAM SECONDARY
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At Carson Graham Secondary School we strive for excellence in all endeavors, encourage personal and social responsibility, value diversity, and work to develop a life-long commitment to learning.

IB Biology HL/SL Ms. C. Pena 604-903-3555 cpena@nvsd44.bc.ca

Course Description

The purpose of this course is to provide students with an understanding of the important underlying biological themes through a focus on acquiring a limited body of factual knowledge. Four basic biological concepts run through this body of knowledge: the relationship between structure and function; universality versus diversity; equilibrium within living and non-living systems; and evolution. At all levels of complexity, structures permit some functions while limiting other functions. The second theme is universality versus diversity. Some molecules (e.g., enzymes, amino acids, nucleic acids and ATP), processes and structures are ubiquitous in living organisms. However, these universal features exist in an enormous variety and diversity of organisms. Next is the occurrence of equilibrium within living and non-living systems. Checks and balances exist both within living organisms, using homeostasis, and within ecosystems, using feedback loops. The state of dynamic equilibrium is essential for the continuity of life. Finally, evolution is an underlying concept for understanding life on Earth. Evolution is a process in which random changes in life forms lead to adaptation within the constraints of varied environments. These adaptations occur in structure and function, leading to greater diversity.

Students will have opportunities to develop their natural curiosity about the world around us and, through their practical work, to explore ideas of their own. Effective communication is a fundamental tenant of modern scientific study. It is only through the sharing of knowledge that scientists can build on each other's work. Throughout this course students will have opportunities to read articles from working scientists and to communicate their own ideas, in a variety of formats, with other students and, where possible, with working scientists.

There are three broad objectives for this course: the international context of scientific knowledge; interpersonal skills; and manipulative skills. The first objective is to challenge students to think about how biology and emerging biological technologies exist within a global context. Emerging technologies are forcing societies to make complex moral choices that involve scientific, religious and ethical issues. In this course students will have opportunities to understand the scientific developments leading to these debates and explore the myriad of issues surrounding the technologies. Ecological and environmental changes also have global ramifications and solutions requiring a broad understanding of the underlying biology and the social and political context within which these decisions are made.

The second objective of the course is to provide students with opportunities to work together, to not only deepen their understanding of the scientific concepts, but also to develop the interpersonal skills of co-operation, perseverance and responsibility that are so highly valued in today's society.

The final objective is to structure lab work to allow students to develop the manipulative skills necessary to carry out scientific investigations. During this practical work, students will need to take

risks as they face unfamiliar situations and must structure parts of the learning experience themselves. These broad goals will be achieved through a combination of lecture, lab work, self-directed study and group work. Assessment in this course will follow the prescribed IB external and internal assessment model and, as well, include various non-IB formative assessment tools.

Syllabus Topics

The following is an outline of the planned order of topics for this course. Some possible labs are indicated for each topic. The line shows the break between years one and two. As we move through the course there could be changes to this order.

		Lab Hours	Teaching Hours
1.	Chemistry of Life (core)		15
2.	Cell Functioning		33
I.	Cells (core)	6	(12)
a)	Osmosis Lab		
b)	Cell models		
c)	Cells Alive web activity		
d)	Membrane Structure web activity		
e)	Microscopy		
II.	Nucleic Acids and Proteins (AHL)	5	(11)
a)	DNA Electrophoresis web activity		
b)	DNA Electrophoresis		
c)	Protein Synthesis Simulation		
d)	DNA Modeling web activities		
III.	Cell Respiration and Photosynthesis (AHL)	5	(10)
a)	Plant Pigments and Photosynthesis Lab		
b)	Cellular Respiration Lab		
c)	Visible Light Spectrum and Plant Growth		
3.	Genetics (core and AHL)	4	21
a)	Human Karyotype Lab		
b)	Hybrid Corn Phenotyping Lab		
4.	Ecology and Evolution (core)	4	16
a)	Species Distribution in various ecosystems		
5.	Evolution (option)	5	22
a)	Pepper Moth activity		
b)	Virtual Tour of Galapagos Islands		
6.	Plant Science (AHL)	8	11
a)	Comparative Microscopy		
b)	Monocot/Dicot Lab		
c)	Root Growth Lab		
d)	Seed Growth Lab		
e)	Leaf Stomata Lab		
7.	Human Health and Physiology (core & AHL)	7	37
a)	Fetal Pig Lab (4 hours)		
b)	Blood Pressure Lab		

8.	Ecology and Conservation (option)	6	22
	a) Visit to Lynn Canyon Ecology Centre		
	b) Visit to the North Vancouver Outdoor School		

Woven throughout the content: Statistical Analysis (core) 2

Assessment

External Assessment – makes up 76% of final mark.

Paper #1	20% - 60 minutes; 40 multiple choice questions on core and AHL material
Paper #2	36% - 135 minutes; data-based, short answer and extended answer questions
Paper #3	20% - 75 minutes; short answer and extended answer on the options studied

Internal Assessment – makes up 24% of final mark.
Lab work will be assessed on five criteria:

- Design (D)
- Data collection and processing (DCP)
- Conclusion and evaluation (CE)
- Manipulative skills (MS)
- Personal skills (PS)

D, DCP and CE will be formally assessed at least twice while students will be given an overall mark for MS demonstrated throughout the course.

PS is assessed formally during the group 4 project.

Each criterion will be awarded a score of 2 (complete), 1 (partial) or 0 (not at all). For each student, a personal scheme of work will be used to collect and summarize his or her internal assessment.

Non IB Assessment – Ministry reporting and student progress during the course.

Throughout the course students work will be assessed based on a variety of assessment types as follows:

Tests	40%
Quizzes	10%
Labs	25%
Assignments/Projects	25%

Criteria:

Aspect \ Grade	7	6	5	4	3	2	1
Knowledge of factual information	Comprehensive	Very broad	Broad	Reasonable	Limited	Little	Fragments
Application of relevant information	Wide variety of contexts	Most contexts	Some contexts	Limited ability	Weak ability	Little ability	Very little ability
Analysis and Evaluation	Thorough	High level	Competent	Some	Weak	Little	Very little
Problem Solving	Proficient at all levels	Solves basic and most new	Solves most basic and some new	Solves some basic but limited new	Solves some basic	Little ability to solve	Very little ability
Communicating	Logical, concise and shows insight	Effective, occasional insight	Clearly	Adequate	Lacks clarity	Incomplete or irrelevant	Very little understanding

Lab work will be assessed using the IB internal assessment criteria and given a mark out of 18 for each lab composed of 6 possible marks for each category: data collection and processing, conclusion and evaluation and manipulative skills. Marks will be assigned as follows:

Data Collection

Aspect \ Grade	2	1	0
Recording raw data	Appropriate quantitative and qualitative data, includes units and uncertainties	Appropriate quantitative and qualitative data, some mistakes or omissions	Appropriate quantitative and qualitative data missing or incomprehensible
Processing raw data	Correctly	Some mistakes and/or omissions	No processing or major mistakes are made
Presenting processed data	Appropriately. Includes errors and uncertainties	Appropriately but with some mistakes or omissions	Inappropriately or incomprehensibly

Conclusion and evaluation

Aspect \ Grade	2	1	0
Concluding	States a conclusion, with justification, based on a reasonable interpretation of the data	States a conclusion, based on a reasonable interpretation of the data	States no conclusion, or is based on an unreasonable interpretation of the data
Evaluating procedure	Evaluates weaknesses and limitations	Identifies some weaknesses & limitations, but evaluation is weak or missing	Identifies irrelevant weaknesses & limitations.
Improving the investigation	Suggests realistic improvements based on identified weaknesses and limitations	Suggests superficial improvements	Suggests unrealistic improvements

Manipulative skills

Aspect \ Grade	2	1	0
Following instructions	Follows accurately, adapting to new circumstances	Follows instructions but requires assistance	Rarely follows instructions or requires constant supervision
Carrying out techniques	Competent & methodical in use of a range of techniques & equipment	Usually competent & methodical in use of a range of techniques & equipment	Rarely competent & methodical in use of a range of techniques & equipment
Working safely	Pays attention to safety issues	Usually pays attention to safety issues	Rarely pays attention to safety issues

This modeling of the IB Assessment criteria within the course will allow students and parents to monitor progress throughout the course and set realistic personal goals over the span of the course.

<u>Expectations</u>

Students are expected to attend each class. In the event of sickness or other legitimate reason, it is the student's responsibility to contact Ms. Pena to keep up with the assigned work. Late assignments will be accepted within reason but students are expected to plan ahead for projects, labs and tests. Students can find out about assignments and projects on Ms. Pena's website in the *Staff Sites* section of the Carson Graham webpage (www.carsongraham.com) in the top navigation bar.

Resources

Students are expected to provide the following resources:

- ✓ Binder with dividers
- ✓ Lined, unlined and graph paper
- ✓ Calculator
- ✓ Pens and pencils