

**Biology 30 Course Outline**  
Peace River High School 2011/12

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**Welcome to Biology 30!**

**Introduction/Philosophy**

*The Alberta Learning Biology 20-30 Program of Studies identifies Biology 30 as an academic course that allows students to explore interests and prepare for further education and careers. Students graduating from Alberta schools require the scientific and related technological knowledge and skills that will enable them to understand and interpret their world. They also need to develop attitudes that will motivate them to use their knowledge and skills in a responsible manner.*

*To ensure relevance to students as well as to societal needs, the Biology 20-30 program presents science in a meaningful context—providing opportunities for students to explore the process of science, its applications and implications, and to examine related technological problems and issues. By doing so, students become aware of the role of science in responding to social and cultural change and in meeting needs for a sustainable environment, economy and society.*

**General Objectives**

- To develop an understanding of the interconnecting ideas and principles that unifies the natural sciences.
- To enhance the student's scientific world view
- To increase the student's scientific awareness

These goals will be achieved through learning specific material from the perspective of the six basic themes of Science.

***Change:*** How all-natural entities are modified over time

***Diversity:*** The array of living and nonliving forms of matter

***Energy:*** The capacity for doing work that drives much of what occurs in the universe

***Equilibrium:*** The static or dynamic balance of opposing forces

***Matter:*** The parts and states of material in the physical world

***Systems:*** The interrelated groups of things or events that can be defined by their boundaries

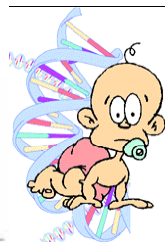
## Course Materials

- ◆ Textbook - *Inquiry Into Biology* (Other handouts and materials will be distributed as needed to enhance the course)
- ◆ Binder with lined paper (or coil notebook and duotang)
- ◆ Pens, pencils and eraser
- ◆ Calculator, graph paper, ruler, coloured pencils/pens will be required for certain classes.

## Tentative Schedule

Unit	Chapters	Dates	Topics
<b>Nervous and Endocrine Systems</b>	11,12,13	Sept 1 - Sept 30  (~25%)	<ul style="list-style-type: none"> <li>➤ Homeostasis</li> <li>➤ Nervous system</li> <li>➤ Sensory systems (eye, ear)</li> <li>➤ Endocrine system</li> </ul>
<b>Reproduction &amp; Development</b>	14,15	Oct 3 - Oct 28  (~20%)	<ul style="list-style-type: none"> <li>➤ Anatomy and physiology of male and female reproductive systems</li> <li>➤ The menstrual cycle</li> <li>➤ Hormones regulating reproductive processes</li> <li>➤ Pregnancy and gestational development</li> <li>➤ The influence of environmental factors on embryonic and fetal development</li> <li>➤ Reproductive technologies</li> </ul>
<b>Cell Division, Genetics and Molecular Biology</b>	16,17,18	Oct 31 - Dec 14  (~40%)	<ul style="list-style-type: none"> <li>➤ Cell division (mitosis and meiosis)</li> <li>➤ Mendelian genetics</li> <li>➤ Human and applied genetics (incl. pedigree and chromosome analysis)</li> <li>➤ Molecular biology: basic structure of DNA, its role in protein synthesis and the impact of mutation</li> </ul>
<b>Population and Community Dynamics</b>	19,20	Dec 15 - Jan 10  (~15%)	<ul style="list-style-type: none"> <li>➤ Population structure and dynamics</li> <li>➤ Natural selection and evolution</li> <li>➤ Hardy-Weinberg Principle</li> <li>➤ Interactions among members of communities</li> <li>➤ Succession</li> </ul>

- ★ The Alberta Program of Studies is followed for all topics
- ★ A more detailed unit overview will be presented before each unit is studied.



## Evaluation

Evaluation		Course Evaluation	
Chapter learning packs	5%	Course work	45%
Major Assignments and projects	15%	Midterm	5%
Quizzes	20%	Diploma Exam	50%
Unit Tests	60%		<b>Total: 100%</b>

\* This is a 30-level course and as such 50% of your final overall course grade will come from a Government of Alberta diploma exam written on the scheduled examination day in January

\* **Chapter learning packs:** These will be handed out at the beginning of each chapter and will include things such as textbook question assignments, labs, worksheets. These will be handed in upon completion of the chapter material, on an assigned date. A few select assignments within each chapter pack will be marked for correctness.

\* There will be **one major assignment/project per unit of study**. This will relate directly to the STS outcomes of the curriculum. There will be limited class time to work on these projects; most of the work will have to be done on your own time.

\* There will be approximately 1 **quiz** per chapter and will consist of multiple choice, numerical, and/or written response questions.

\* **Unit tests** will occur at the end of each unit and will include a combination of multiple choice, numerical response, and written response questions. All unit exams will be composed of previous diploma exam questions.

\* The **midterm** exam will be held on **November 8<sup>th</sup>**.

\* There will be many opportunities throughout the course for hands-on investigation, including dissections.

\* Marks are cumulative; they are a running tally of the students' achievement throughout the semester.

\* Evaluation will be objective -based. Assessments will be determined by the course outcomes outlined in the Alberta Program of Studies.

## Extra Help

- Be sure to ask questions to clarify concepts. Please do not hesitate to make an appointment with me to obtain any extra help you may need throughout the course.

## Cheating and Plagiarism Policy

- Cheating on a quiz or exam will not be tolerated and will result in a grade of zero on the quiz or exam. Peace River High School plagiarism policy will be strictly enforced in this course.

## General Expectations; Requirements for Success in Biology 30

- **Attendance** is one of the most important factors for academic success. It is expected that you come to class every day, on time, with the materials you require for class. Peace High attendance policy applies.
- **All notes, handouts, readings, assignments missed due to absence are your responsibility.** Please make arrangements with myself or with a classmate to obtain missed materials. Should a quiz, lab or exam be missed due an excused absence, you will be allowed to make it up on your own time.
- **Homework** assignments are due at the **beginning of class; on or before the due date.**
- Biology 30 is an in depth course that is to adequately prepare you for post-secondary courses in human biology. The requirements and expectations for this course are therefore rigorous. Hard work, **regular review, and study of course material** at home are essential.
- Mature and considerate behavior is expected in class. Safe and efficient laboratory practices are also mandatory. Working cooperatively with others is essential.

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### Acceptable Standard

Students who achieve the *acceptable standard* in Biology 30 will receive a **final course mark of 50% or higher**. Students who achieve the acceptable standard demonstrate a basic understanding of the nature of scientific inquiry by designing, observing, and interpreting simple investigations. They can readily interpret data that are represented in simple graphs and tables and can translate symbolic representations into written descriptions. These students are able to recognize and provide definitions for simple biological terms. They demonstrate a basic understanding of equilibrium and the control of homeostasis in the human body. They solve simple, quantitative genetic and ecological problems. Through their understanding of some key biological concepts and technologies, these students can interpret short reports of current biological issues. They identify scientific, technological, and societal components of biological problems.

### Standard of Excellence

Students who achieve the *standard of excellence* in Biology 30 will receive a **final course mark of 80% or higher**. In addition to meeting the expectations for the *acceptable standard* of performance, these students also demonstrate their aptitude and interest in biology and feel confident about their abilities. They analyze and evaluate experimental designs. They readily interpret interrelated sets of data such as complex diagrams, graphs, and tables. These students provide specific and comprehensive explanations of concepts. They simultaneously apply two or more biological concepts that cross major themes. They demonstrate a thorough understanding of quantitative relationships and solve multistep numerical problems. When presenting scientific data, they select the most appropriate form. They analyze complex, unique, and open-ended issues, including those related to current research. These students are aware of a variety of viewpoints relating to environmental and ethical issues in the field of science and technology. They communicate clearly and concisely, using appropriate scientific vocabulary.

## Mathematics and Science Directing Words

**Discuss** The word "discuss" **will not** be used as a directing word on math and science diploma examinations because it is not used consistently to mean a single activity.

*The following words are specific in meaning.*

<b>Algebraically</b>	Using mathematical procedures that involve letters or symbols to represent numbers
<b>Analyze</b>	To make a mathematical, chemical, or methodical examination of parts to determine the nature, proportion, function, interrelationship, etc. of the whole
<b>Compare</b>	Examine the character or qualities of two things by providing characteristics of both that point out their <i>similarities</i> and <i>differences</i>
<b>Conclude</b>	State a logical end based on reasoning and/or evidence
<b>Contrast/Distinguish</b>	Point out the <i>differences</i> between two things that have similar or comparable natures
<b>Criticize</b>	Point out the <i>demerits</i> of an item or issue
<b>Define</b>	Provide the essential qualities or meaning of a word or concept; make distinct and clear by marking out the limits
<b>Describe</b>	Give a written account or represent the characteristics of something by a figure, model, or picture
<b>Design/Plan</b>	Construct a plan; i.e, a detailed sequence of actions for a specific purpose
<b>Determine</b>	Find a solution, to a specified degree of accuracy, to a problem by showing appropriate formulas, procedures, and calculations
<b>Enumerate</b>	Specify one by one or list in concise form and according to some order
<b>Evaluate</b>	Give the significance or worth of something by identifying the good and bad points or the advantages and disadvantages
<b>Explain</b>	Make clear what is not immediately obvious or entirely known; give the cause of or reason for; make known in detail
<b>Graphically</b>	Using a drawing that is produced electronically or by hand and that shows a relation between certain sets of numbers
<b>How</b>	Show in what manner or way, with what meaning

<b>Hypothesize</b>	Form a tentative proposition intended as a possible explanation for an observed phenomenon; i.e., a possible cause for a specific effect. The proposition should be testable logically and/or empirically
<b>Identify</b>	Recognize and select as having the characteristics of something
<b>Illustrate</b>	Make clear by giving an example. The form of the example must be specified in the question; i.e., word description, sketch, or diagram
<b>Infer</b>	Form a generalization from sample data; arrive at a conclusion by reasoning from evidence
<b>Interpret</b>	Tell the meaning of something; present information in a new form that adds meaning to the original data
<b>Justify/Show How</b>	Show reasons for or give facts that support a position
<b>Model</b>	Find a model (in mathematics, a model of a situation is a pattern that is supposed to represent or set a standard for a real situation) that does a good job of representing a situation
<b>Outline</b>	Give, in an organized fashion, the essential parts of something. The form of the outline must be specified in the question; i.e., list, flow chart, concept map
<b>Predict</b>	Tell in advance on the basis of empirical evidence and/or logic
<b>Prove</b>	Establish the truth or validity of a statement for the general case by giving factual evidence or logical argument
<b>Relate</b>	Show logical or causal connection between things
<b>Sketch</b>	Provide a drawing that represents the key features of an object or graph
<b>Solve</b>	Give a solution for a problem; i.e., explanation in words and/or numbers
<b>Summarize</b>	Give a brief account of the main points
<b>Trace</b>	Give a step-by-step description of the development
<b>Verify</b>	Establish, by substitution for a particular case or by geometric comparison, the truth of a statement
<b>Why</b>	Show the cause, reason, or purpose

## Science Process Words

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- Hypothesis:** A single proposition intended as a possible explanation for an observed phenomenon; e.g., a possible cause for a specific effect
- Conclusion:** A proposition that summarizes the extent to which a hypothesis and/or a theory has been supported or contradicted by the evidence
- Experiment:** A set of manipulations and/or specific observations of nature that allow the testing of hypotheses and/or generalizations
- Variables:** Conditions that can change in an experiment. Variables in experiments are categorized as:
- *manipulated variables* (independent variables)  
—conditions that were deliberately changed by the experimenter
  - *controlled variables* (fixed or restrained variables) —conditions that could have changed but did not, because of the intervention of the experimenter
  - *responding variables* (dependent variables)  
—conditions that changed in response to the change in the manipulated variables
- Technology:** The development of our understanding of science is directly related to the development of technology. The meaning of technology has many facets, but in general, technology refers to a method or process for handling a specific practical problem. This includes the development of tools and new techniques for solving problems. It also includes ideas and their organization for achieving practical purposes. In the context of an examination question, technology includes both these facets of meaning. That is, a technological explanation should include not only identification and descriptions of equipment (tools, products) but also explanations of procedures.

## Guidelines for Significant Digits, Manipulation of Data, and Rounding for Science Diploma Examinations

### Significant Digits (measured values)

1. For all non-logarithmic values, regardless of decimal position, any of the digits 1 to 9 is a significant digit; 0 may be significant. For example:

123   0.123   0.00230    $2.30 \times 10^3$    2.03  
all have 3 significant digits

2. Leading zeros are not significant. For example:

0.12 and 0.012 each have two significant digits

3. **The Learner Assessment Branch considers all trailing zeros to be significant.** For example:

200 has three significant digits  
0.123 00 and 20.000 each have five significant digits

### Manipulation of Data

1. When adding or subtracting measured quantities, the calculated answer should be rounded to the same degree of precision as that of the least precise number used in the computation if **this is the only operation**. For example in the following addition:

12.3 (least precise)  
  0.12  
12.34  
24.76

The answer should be rounded to 24.8.

2. When multiplying or dividing measured quantities, the calculated answer should be rounded to the same number of significant digits as are contained in the quantity with the fewest number of significant digits if **this is the only operation**. For example:

$(1.23)(54.321) = 66.81483$

The answer should be rounded to 66.8.

3. When a series of calculations is performed, each interim value should not be rounded before carrying out the next calculation. The final answer should then be rounded to the same number of significant digits as are contained in the quantity in the **original data** with the fewest number of significant digits. For example:

In determining the value of  $(1.23)(4.321) \div (3.45 - 3.21)$ , three calculations are required:

- a.  $3.45 - 3.21 = 0.24$
- b.  $(1.23)(4.321) = 5.31483$
- c.  $5.31483 \div 0.24 = 22.145125$   
[Not  $5.31 \div 0.24 = 22.125$ ]

The value should be rounded to 22.1.

Note: In the example given, steps *a* and *b* yield interim values. These values should not be used in determining the number of significant digits.

4. When calculations involve exact numbers (counted and defined values) the calculated answer should be rounded based upon the precision of the measured value(s). For example:

$$12 \text{ eggs} \div 52.3 \text{ g/egg} = 627.6 \text{ g}$$

or

$$5 \text{ mol} \div 32.06 \text{ g/mol} = 160.30 \text{ g}$$

or

$$1 \text{ mol} (-1095.8 \text{ kJ/mol}) + 2 \text{ mol} (40.8 \text{ kJ/mol}) = -1014.2 \text{ kJ}$$

### Rounding

1. When the first digit to be dropped is less than or equal to 4, the last digit retained should not be changed. For example:

1.2345 rounded to three digits is 1.23

2. When the first digit to be dropped is greater than or equal to 5, the last digit retained should be increased by one. For example:

12.25 rounded to three digits is 12.3