

# GRANDE PRAIRIE REGIONAL COLLEGE

## BIOLOGY 0130

### COURSE OUTLINE

SEP. 18 2001

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2001 / 2002

**Instructor:** Nancy Campbell  
**Office:** C310  
**Phone:** 539-2088  
**Email:** campbell@gprc.ab.ca  
**Office hours:** As posted on my office door, or by appointment  
**Textbook:** Mader, Inquiry into Life, ninth edition  
**Supplies:** binder, lined paper, unlined white paper, pencil, staple, lab coat (optional)

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**Course Intent:** This course is designed to be equivalent to the Alberta Learning Biology 30 curriculum, and is listed as such in the Alberta Transfer Guide. You may choose to use this course toward a Grande Prairie Regional College High School Equivalency Diploma, however, it may not be used toward the Alberta Learning High School diploma. All colleges and universities within the Province of Alberta recognize this course in lieu of Biology 30. Modifications have been made to the content to adjust for adult learners and for a shorter semester.

**Course Goals:** The BI0130 course has been designed to provide you with an understanding of biological concepts, principles, and social issues. The program of studies has biology lab and computer lab components to help build your skills in the use of scientific equipment and computers. The course has several themes: homeostasis within the human body, human reproduction, genetics, and homeostasis within the environment.

**Attendance:** Regular attendance is required and is essential for passing the course. If you must be absent, please contact me for assistance in acquiring missed material. Please be on time for class. When you are late, you disturb the rest of the class and you miss valuable information presented at the beginning of each class.

**Tests:** There are four tests scheduled throughout the term. Tests are written after each unit. Tests are not cumulative. An absence from a test requires a **doctor's certificate** to qualify for a different writing date. If you know you will be missing a test, please contact me.

**Assignments and Lab Reports:**

Papers, assignments, and lab reports are due on the dates announced in class. On most occasions you will have one week from the time a lab was performed in the lab and its due date. A **penalty of 10%** per day will be imposed for late submissions. Once a set of labs or assignments has been returned to students, you will not be permitted to submit your late work for grading. If you miss a lab, you will not be able to make it up as most labs require group work. Your papers, assignments and lab reports **must be your own work.**

**Evaluation:**

Tests .....	60%
Labs .....	15%
Assignments .....	10%
Papers .....	10%
Computer Assignments .....	5%

**Tests:** There are 4 unit tests. Each unit test is worth 15% of the final grade.

**Labs:** There are 5 labs. Each lab is worth 3% of the final grade.

**Assignments:** A cumulative average will be used to determine your assignment grade.

**Paper:** You will be given 6 topics. You will select 5 topics and write a 1 - 2 page paper on each of those 5 topics. Each paper is worth 2% of the final grade.

**Computer Assignments:** There are 13 Plato modules identified. You will master 10 of the 13 modules to get full marks for this section.

*Please review Grande Prairie Regional College's calendar which outlines student rights and responsibilities.*

# GRANDE PRAIRIE REGIONAL COLLEGE

## BIOLOGY 0130

### COURSE SYLLABUS

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#### Unit I: Populations

*Communities are made up of populations that consist of pools of genes from the individuals of a species.*

1. Define the following terms: evolution, mutation and natural selection. ( 551, 559, 562)
2. List seven conditions that must exist for evolution not to occur in a population.(558)
3. Define random genetic drift, gene migration, and differential reproduction.(559, 562)
4. Explain how random genetic drift, gene migration, and differential reproduction affect the evolution of populations.(559, 562)
5. Describe in words, and by its equation the Hardy-Weinberg principle. (556 - 558)
6. Apply quantitatively the Hardy- Weinberg principle to published data.(557)
7. Explain the importance of the Hardy-Weinberg principle to population gene pool stability. (556 - 558)

*There is interaction between members of a population and between members of other populations.*

1. Define the following terms: symbiosis, commensalism, mutualism, parasitism, intraspecific competition, interspecific competition. (710 - 711)
2. Match examples of symbolic relationships with their correct term: commensalism, mutualism, parasitism, and interspecific, and intraspecific competition.
3. Predict the consequence of adding a foreign species into a population.

*Population types change over time.*

1. Define the following terms: succession, primary succession, secondary succession and climax communities. (712)
2. In a lab experiment where you analyze a sample plot: identify the vegetation type and the amount of each vegetation type in the plot; analyze the data collected and determine the type of succession that is present in your designated area; and predict the vegetation type and amount that will be present in your designated area twenty years from now if this area is left undisturbed by man.

*Population numbers change over time.*

1. Explain how mortality, natality, immigration, and emigration influence population growth. (Notes)
2. Define biotic potential and carrying capacity, and blow-out. (690 - 691)
3. Graph and interpret the following growth patterns: S and J curves.
4. Define and classify density-dependent and density-independent factors affecting populations. (692)
5. In a lab experiment, use a hemocytometre to determine the number of yeast cells growing in seven different cultures incubated for varying amounts of time; illustrate in the form of a graph the relationship between time and the number of yeast cells; categorize the growth pattern and evaluate why this growth pattern occurred.
6. Demonstrate your increased concern for the exponential growth of the human population. (695 - 698)

**Unit 2: Cells, Chromosomes, and DNA**

*Cells divide to increase in number but must reduce their chromosome number before combining at fertilization.*

1. Define the following terms: chromosome, gene, and allele. (84 - 91)
2. Outline, illustrate, and discuss the steps of the cell cycle (mitosis) using a thin-slice onion tip mount. Include: interphase, (G1, S, G2); prophase; metaphase; anaphase; and telophase. (84 - 91)
3. Differentiate between plant and animal mitosis. (84 - 91)

4. Outline and discuss the steps of meiosis including meiosis I and meiosis II. (92 - 95)
5. Differentiate between spermatogenesis and oogenesis (92 - 95)
6. Compare and contrast mitosis and meiosis. (96 - 97)

*Laws can explain how traits are handed down from one generation to the next*

1. State and explain the three Mendel's Laws of heredity (470 - 471)
2. Define each of the following genetic terms: genotype, phenotype, homozygous, heterozygous, alleles (470 - 471)
3. Predict the offspring and determine the probability of inheritance resulting from monohybrid and test crosses by using Punnet squares. (472 - 475)
4. Predict the offspring and determine the probability of inheritance resulting from dihybrid crosses by using Punnet squares. (475 - 477)
5. Predict the offspring and determine the probability of inheritance resulting from sex-linked crosses by using Punnet squares. (496 - 497)
6. Predict the offspring from the following types of crosses: co-dominance, and incomplete dominance. (482 - 483)
7. Draw and interpret pedigree charts. (497)

*Classical genetics can be explained at the molecular level.*

1. Discuss the historical findings of the structure of DNA by Watson and Crick. (507)
2. Label a diagram of a DNA model. (508)
3. Outline the steps of DNA replication and state where and when it occurs. (509)
4. Discuss protein synthesis and the role of transcription and translation. (510 - 516)
5. Compare DNA and RNA. (510 - 516)
6. Predict the mRNA strands, anticodons, and amino acid sequences (510 - 516)
7. Distinguish between the different types of codons: initiator codon, terminator codon. (511)

8. Distinguish between different types of genes: regulator genes, oncogene. (525)
9. Determine the impact of mutations, restriction enzymes and ligases on the DNA molecule. (538 - 540)
10. Define genome and gene therapy. (539 - 540)
11. Suggest and elaborate upon events that result in normal and abnormal genetic variation. (93)
12. Determine the correct sequence of genes on a chromosome. (Class notes)
13. Select and discuss a topic that will demonstrate your increased awareness of the impact of genetic research on society.

### **Unit 3: Homeostasis**

*The human organism regulates physiological process, using electrochemical control systems.*

1. Define homeostasis. State why mechanisms that regulate homeostasis are important. (208)
2. Summarize the functions of the nervous system (322)
3. Draw a neuron, and indicate the following parts: axon, soma, nucleus, dendrite, axon bulbs, myelin sheath, and nodes of Ranvier. State the functions of each of the parts. (323)
4. Explain the mechanism of a nerve impulse by defining action potential in terms of its component parts: upswing, downswing, and repolarization. (324 - 325)
5. Define the following: refractory period; correct "stimulus"; the "all-or-none response"; and threshold. (Class notes)
6. Discuss the transmission of a nerve impulse across a synapse. Include in your discussion the names of the neurotransmitters, and the enzymes that destroy those neurotransmitters (326 - 327)
7. Trace the pathway of a nerve impulse through the reflex arc. State the functions of each of the following: sensory receptor, sensory neuron, interneuron, motor neuron, and effector. (329)
8. For each of the following receptors state their stimulus, and the information provided: taste, smell pressure, proprioceptors, balance, outer ear, eye, and thermoregulators. (348 - 349)

9. Define a nerve. Differentiate between a neuron and a nerve. State the structure and functions of each of the following nerves: mixed, sensory, and motor (328)
10. Differentiate between the peripheral nervous system and the central nervous system. (328 - 329)
11. Describe the structure and function of the autonomic nervous system and its two divisions: the sympathetic nervous system, and the parasympathetic nervous system (330 - 331)
12. State the functions of each of the following brain parts, and label on a diagram: medulla oblongata, pons, cerebellum, hypothalamus, thalamus, cerebrum, and pituitary gland. (334 - 337)

*The human organism has sensory organs to relay external environmental information to the organism.*

1. Label the following parts on a diagram of the eye: sclera, choroid, retina, vitreous humor, aqueous humor, cornea, lens, iris, fovea, and optic nerve. State the functions of each of the parts. (354 - 359)
2. Label the following parts of the ear: outer ear consisting of the pinna and auditory canal, the middle ear consisting of the tympanic membrane, malleus, incus, and stapes; and the inner ear consisting of the organ of Corti, auditory nerve, utricle, saccule, and semicircular canal. State the function of each part (362 - 365)

*The human organism regulates physiological process, using chemical control systems.*

1. Illustrate and explain a model of a negative feedback mechanism. (208 - 209)
2. Label the following glands on a diagram of a human body: hypothalamus, pituitary, thyroid, pancreas, adrenal. (399)
3. Indicate where each of the following hormones are produced, their target tissues, and state their functions: TSH, thyroxine, ACTH, cortisol, glucagon, insulin, HGH (growth), and ADH (water regulation). (398)
4. Compare the antagonistic functions of insulin and glucagon and illustrate how these two hormones regulate blood sugar levels. (408)
5. Compare the endocrine and the nervous systems, and indicate how they function together. (Class notes)
6. Given a case study of a hormone imbalance examine it to determine the hormone involved and the direction of the imbalance.

#### **Unit 4: Human Reproduction**

*Humans and other organisms have complex reproductive systems that ensure the survival of the species.*

- 1 State the functions of each of the following male reproductive structures: testes, epididymis, vas deferens, seminal vesicles, prostate gland, Cowper gland, seminiferous tubules. (420 - 423)
- 2 Label the above parts of the male anatomy on a diagram. (420)
- 3 Outline where and how sperm are produced and the journey it travels to the outside environment. (408 - 410)
- 4 State the functions of each of the following female reproductive structures: myometrium, endometrium, ovaries, fallopian tubes, uterus, cervix, vagina. (424 - 425)
- 5 Label the above parts of the female anatomy on a diagram. (424)
- 6 Outline where and how eggs are produced and their journey to the uterus. (426)
- 7 Differentiate between primary and secondary sexual characteristics in both the male and the female. (423, 427)
- 8 Differentiate between egg production and sperm production. (422, 426)
- 9 Discuss how sexually transmitted diseases can cause infertility. (435 - 440)

*Reproductive success of organisms is regulated by chemical control systems.*

- 1 State the site of production, the target organ(s) and the functions of each of the following male hormones: testosterone, luteinizing hormone, and follicle stimulating hormone. (423)
- 2 Draw a negative feedback loop illustrating the control mechanism of male hormones. (423)
- 3 State the site of production, the target organ(s) and the functions of each of the following female hormones: estrogen, progesterone, luteinizing hormone, follicle stimulating hormone, prolactin and oxytocin. (427 - 428)
- 4 Given a graph illustrating the fluctuations of female hormones through a normal cycle interpret the graph as to the physiological events that are occurring. (428)
- 5 Draw a negative feedback loop illustrating the control mechanism of female hormones. (427)



- 6 Discuss the impact of natural aging on the male and female reproductive systems. (430)

*Cell differentiation and development in the human organism are regulated by a combination of genetic, endocrine and environmental influences.*

- 1 Discuss fertilization, and implantation. (429)
- 2 Outline the role of hormones in sustaining a pregnancy. (429)
- 3 Name the three cell membranes that arise from the developing blastocyst and state each of their functions. (451)
- 4 State the purpose of the placenta and the umbilical cord. (455)
- 5 List the three stages of pregnancy and outline the changes in fetal development in each stage. (452 - 459)
- 6 Explain the role of oxytocin and prolactin in lactation. (461 - 462)
- 7 Discuss the moral and ethical issues involving in vitro fertilization. (434)

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