



Grande Prairie Regional College

School of Business

Department: Academic Upgrading

COURSE OUTLINE – WINTER 2006

BI 0130 - Biology Grade 12 Equivalent 5 (5-0-1.5) HS

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Jan 4 – Feb 17, M-F, 2:30 – 3:10

Office Hours Feb 27 – Apr 13, M-F, 1:00 – 2:00

Prerequisite(s)/corequisite(s):

BI0120 or equivalent and EN0130 placement

Required Text/Resource Materials:

Krogh, *Biology A Guide to a Natural World*, third edition

Other supplies:

Other supplies you will need include a binder, lined paper, unlined white paper, computer paper, pencil, calculator, stapler, and lab coat (optional).

Many resources for this course, including the lab manual, are accessed through Blackboard, a computer-based course management system. You may access Blackboard via any computer with an Internet link. If you do not have a personal computer, you may sign in to use the computers in A205 during daytime hours or in the library during evening and weekend hours.

Description:

This course will introduce the student to the human nervous system as well as reproduction and development. Basic genetics and ecology will also be discussed.

Delivery Mode(s):

BI0130 is lecture-based. Furthermore, the course has a lab component. The course is supplemented with resource material offered on Blackboard.

Credit/Contact Hours:

BI0130 is a 5-credit course including 5 hours of class, and 1.5 hours of lab per week.

Session Details:

January 4, 2006 – April 13, 2006

A final exam is scheduled by the Registrar's office and could be scheduled anytime, up to and including April 25, 2006.

Course Schedule: Dates for tests, exams, labs, and assignments will be announced in class and entered into the calendar in Blackboard

Lecture Schedule: M, F: 10:00am – 11:20am, Room: E305
T, R: 10:00 am – 10:50am, Room: E305

Lab Schedule: Thursday, 11:00am – 12:50pm, Room: J130
Note: Labs are not held each week, however, when scheduled they each require 2 hours.

Objectives:

The course has several themes: homeostasis within the human body; human reproduction; genetics; and homeostasis within the environment. These themes are divided into four units:

- Unit 1:*** Homeostasis: The Nervous and Endocrine Systems
- Unit 2:*** Human Reproduction
- Unit 3:*** Cells, Chromosomes, and DNA
- Unit 4:*** Populations

A course syllabus, which lists all the course objectives, is attached.

Transferability:

This course is equivalent to the Alberta Learning Biology 30 curriculum, and is listed as such in the Alberta Transfer Guide.

Grading Criteria:

Dates for tests, exams, labs, and assignments will be announced in class and entered on the calendar in Blackboard.

Evaluation:	Tests	40%
	Labs	10%
	Assignments.....	5%
	Midterm	20%
	Final	25%

Tests: At the end of each unit is a unit test. Each test is worth 10%.

Exams: A **midterm exam** will be written at the end of Unit 2. It will cover the content discussed in Units 1 & 2. A **final exam** will be scheduled during the final exam time. It will cover the content discussed in Units 3 and 4. If you are absent from an exam, you **MUST** provide a doctor's certificate that explains your absence for that particular time. Only then will an alternate time be scheduled for you to write a **different** exam.

Assignments and Lab Reports:

All labs are weighted equally.
Final assignment grade is calculated using raw scores.

If you are late for a lab, you might not be permitted to do the lab as important safety concerns are always addressed at the beginning of each lab period. If you miss a lab, you will not have the opportunity for a make-up lab. You automatically receive a grade of 0 for that lab.

Statement on Plagiarism and Cheating:

The instructor reserves the right to use electronic plagiarism detection services. Although you work together in pairs in the lab, you are to write separate reports, which are your own work. Electronic devices, other than simple calculators, are not allowed into tests or exams.

Grades will be assigned on the Letter Grading System.

(I also provide the Registrar's office with your percentage grade. Contact the Registrar's office if you need the percentage grade for admittance to another institution.)

**Academic Upgrading Department
Grading Conversion Chart**

Alpha Grade	4-point Equivalent	Percentage Guidelines	Designation
A ⁺	4	90 – 100	EXCELLENT
A	4	85 – 89	
A ⁻	3.7	80 – 84	FIRST CLASS STANDING
B ⁺	3.3	76 – 79	
B	3	73 – 75	GOOD
B ⁻	2.7	70 – 72	
C ⁺	2.3	67 – 69	SATISFACTORY
C	2	64 – 66	
C ⁻	1.7	60 – 63	
D ⁺	1.3	55 – 59	MINIMAL PASS
D	1	50 – 54	
F	0	0 – 49	FAIL

Classroom Department:

AUD STUDENT CLASSROOM DEPARTMENT GUIDELINES

Philosophy: This is an adult education environment; students are expected to show respect for others. Students are also learning skills to prepare them for the work environment.

Preamble: Even though the department is empathetic to the needs of our students, we have determined over the years that certain activities are not conducive to an atmosphere of learning. Therefore, we ask the cooperation of all of our students in several areas of classroom department.

The following guidelines assist all of us in maintaining an adult learning environment with “respect for the rights of other members of the College community” (from the Student Rights and Responsibilities of the College calendar).

1. Please refrain from unnecessary talking in class (“visiting”, social discussions). Please ask your instructor for information or clarification when you have a question. Other students do not necessarily have the correct information.
2. Turn off your cell phone during class time. Parents who are expecting phone calls from the day care or from schools should see Lani in the main office and complete a form. Lani will then find you in class if any calls come in.

In case of other emergencies, students can use a phone that vibrates, but does not ring. However, please leave the class before answering the phone. The loud talking in class is disruptive to other students.

3. Do not bring children to class with you. This is an adult learning environment and it is not an appropriate setting for children.
4. Eating, drinking coffee, etc are allowed only on a limited basis and if the following are observed:
 - If you must bring food or drink to class, purchase it during your break so that you are coming to class on time and staying for the duration of the class
 - Clean up all garbage, crumbs, etc. from the area where you were eating/drinking
 - Your eating or drinking should not disrupt your learning activities and progress or the learning activities and progress of others in the class
5. As per the student responsibilities section in the College Calendar, you are expected to “arrive on time and remain for the duration of scheduled classes and related activities.”

AUD EXAM/ATTENDANCE POLICIES

As per the College calendar, students are responsible to “write tests and final examinations at the times scheduled by the instructor or the Office of the Registrar”.

Attendance

If you miss more than 15% of classes per semester in any course, you may be debarred from the final exam for that course.

Late Exams

1. In order to be given the opportunity to write an exam after the due date, the student must phone the instructor on the morning of the absence and be given permission to write the test at a later date. If the instructor is unavailable, the student should leave his/her home phone number or the number where the instructor can reach the student. This requirement also applies to quizzes and assignments.
2. If permission to write a late exam is given, the late exam (or quiz or assignment) will be docked a minimum of 10 percentage points per day of lateness. (This means 10 or more points off the mark the student achieves on the test/assignment.)
3. Once the test/quiz/assignment has been handed back to the class, there is no opportunity for a late write or hand-in. The student will be assigned a grade of ‘0’ for that test/quiz/assignment.

Biology 0130

Course Syllabus for the 2006 Winter Semester

PART I

Introduction: (1 day)

1. Outline the hierarchy of life, and define each of the levels.
2. Review cell structures and functions: cell membrane, cell wall, nucleus, nuclear envelope, nucleolus, cytoplasm, ribosome, mitochondria, chromatin, chromosome, centrioles, cytoskeleton, Golgi apparatus, vacuoles, vesicles, chloroplasts, smooth and rough endoplasmic reticulum
3. Review cellular transport: osmosis, diffusion, facilitated diffusion, and active transport.
4. Review cellular respiration and ATP as the currency of biological systems.

Unit 1: Homeostasis: The Nervous and Endocrine Systems (12 days)

The human organism regulates physiological process, using electrochemical control systems.
(Chapter 26, pages 558 – 571)

1. Define homeostasis. State why mechanisms that regulate homeostasis are important. Relate the concepts of homeostasis to all hierarchy levels.
2. Summarize the functions of the nervous system
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.
4. Explain the mechanism of a nerve impulse by defining action potential in terms of its component parts: upswing, downswing, and repolarization.
5. Define the following: refractory period; correct “stimulus”; the “all-or-none response”; and threshold.
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.
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.
8. For each of the following receptors state their stimulus, and the information provided: taste,

smell pressure, proprioceptors, balance, outer ear, eye, and thermo regulators.

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.
10. Differentiate between the peripheral nervous system and the central nervous system.
11. Describe the structure and function of the autonomic nervous system and its two divisions: the sympathetic nervous system, and the parasympathetic nervous system.
12. State the functions of each of the following brain parts, and label on a diagram: medulla oblongata, pons, cerebellum, hypothalamus, thalamus, cerebrum, pituitary gland, parietal lobe, frontal lobe, occipital lobe, temporal lobe, meninges, corpus callosum

The human organism has sensory organs to relay external environmental information to the organism. (Chapter 26, pages 571– 580)

1. Label the following parts on a diagram of the eye: sclera, choroid, retina, vitreous humor, aqueous humor, cornea, lens, iris, fovea centralis, pupil, ciliary body, and optic nerve. State the functions of each of the parts.
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, stapes, Eustachian tube, and oval window; and the inner ear consisting of the auditory tube, vestibule, cochlea (organ of Corti), auditory nerve, and semicircular canal. State the functions of each part. Differentiate between static and dynamic equilibrium.

The human organism regulates physiological process, using chemical control systems. (Chapter 25, pages 580 – 585)

1. Differentiate between endocrine and exocrine glands.
2. Illustrate and explain models of negative feedback mechanisms, and positive feedback mechanisms.
3. Illustrate and explain models of action of protein hormones, and steroid hormones.
4. Label the following glands on a diagram of a human body: hypothalamus, pituitary, thyroid, pancreas, and adrenal.

5. Indicate where each of the following hormones are produced; their target tissues; full names and abbreviations. Furthermore state their functions and how they are controlled. These include: TSH, thyroxine, ACTH, cortisol, glucagon, insulin, HGH (GH), ADH, prolactin, oxytocin, and parathyroid hormone.
6. Identify where insulin and glucagon are produced. Compare the antagonistic functions of insulin and glucagon and illustrate how these two hormones regulate blood sugar levels.
7. Compare the endocrine and the nervous systems, and indicate how they function together especially in dealing with stressful situations. Relate these functions to the concepts of cellular respiration.

Unit 1: Evaluation Activities		
Activity	Date	Grade
Sensory Receptors Lab		
Unit 1 Test		

Unit 2: Human Reproduction (9 days)

Humans and other organisms have complex reproductive systems that ensure the survival of the species. (Chapter 30, pages 651 – 662)

1. State the functions of each of the following male reproductive structures: testes, epididymis, vas deferens, seminal vesicles (Sertoli cells, and interstitial cells), prostate gland, Cowper gland, seminiferous tubules and urethra.
2. Label the above parts of the male anatomy on a diagram.
3. Outline where and how sperm are produced and the journey it travels to the outside environment.
4. State the functions of each of the following female reproductive structures: myometrium, perimetrium, and endometrium, ovaries, fallopian tubes, uterus, cervix, vagina.
5. Label the above parts of the female anatomy on a diagram.
6. Outline where and how eggs are produced, and their journey to the uterus.
7. Differentiate between primary and secondary sexual characteristics in both the male and the female.
8. Differentiate between egg production and sperm production.

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.
2. Draw a negative feedback loop illustrating the control mechanism of male hormones.
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.
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.
5. Draw a negative feedback loop illustrating the control mechanism of female hormones.
6. Discuss the impact of natural aging on the male and female reproductive systems.

Cell differentiation and development in the human organism are regulated by a combination of genetic, endocrine and environmental influences. (Chapter 30, pages 663 – 668)

1. Discuss fertilization, and implantation.
2. Outline the role of hormones in sustaining a pregnancy.
3. Name the three cell membranes that arise from the developing blastocyst and state each of their functions.
4. State the purpose of the placenta and the umbilical cord.
5. List the three stages of pregnancy and outline the changes in fetal development in each stage.
6. Explain the role of oxytocin and prolactin in lactation.

Unit 2: Evaluation Activities		
Activity	Date	Grade
Fetal Pig Lab		
Unit 2 Test		

MIDTERM EXAM

PART II:

Introduction: (1 day)

1. Review the parts of the microscope and state their functions. Identify steps to use, and store the microscope in a safe manner.
2. Calculate both macroscopic and microscopic drawing magnifications.

Unit 3: Cells, Chromosomes, and DNA (20 days)

Cells divide to increase in number but must reduce their chromosome number before combining at fertilization. (Chapter 9, pages 171 –187; Chapter 10 pages 190 – 203)

1. Define the following terms: chromosome, gene, and allele, haploid, diploid, gamete, somatic cell.
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.
3. Differentiate between plant and animal mitosis.
4. Outline and discuss the steps of meiosis including meiosis I and meiosis II.
5. Illustrate and discuss how crossing over and independent assortment can lead to genetic variation
6. Differentiate between spermatogenesis and oogenesis
7. Compare and contrast mitosis and meiosis.

Laws can explain how traits are handed down from one generation to the next. (Chapter 11, pages 206 – 227; Chapter 12, pages 230 –249)

1. State and explain the three Mendel's Laws of heredity.
2. Define each of the following genetic terms: genotype, phenotype, homozygous, heterozygous, alleles.

3. Predict the offspring and determine the probability of inheritance resulting from monohybrid and testcrosses by using Punnett squares.
4. Predict the offspring and determine the probability of inheritance resulting from dihybrid crosses by using Punnett squares.
5. Predict the offspring and determine the probability of inheritance resulting from sex-linked crosses by using Punnett squares.
6. Predict the offspring from the following types of crosses: co-dominance, and incomplete dominance.
7. Draw and interpret pedigree charts.

Classical genetics can be explained at the molecular level. (Chapter 13, pages 250 – 261; Chapter 14, pages 263 – 275)

1. Discuss the historical findings of the structure of DNA by Watson and Crick.
2. Label a diagram of a DNA model.
3. Outline the steps of DNA replication and state where and when it occurs.
4. Discuss protein synthesis and the role of transcription and translation.
5. Compare DNA and RNA.
6. Predict the mRNA strands, anticodons, and amino acid sequences.
7. Distinguish between the different types of codons: initiator codon, terminator codon.
8. Distinguish between different types of genes: regulator genes, oncogene.
9. Define genome and gene therapy.
10. Suggest and elaborate upon events that result in normal and abnormal genetic variation.
11. Determine the correct sequence of genes on a chromosome.

Unit 3: Evaluation Activities		
Activity	Date	Grade
Microscope Assignment		
Genetics Problems Assignment		
DNA Assignment		
Mitosis Lab (2 lab periods)		
Mendelian Genetics Lab		
Unit 3 Test		

Unit 4: Populations (10 days)

Communities are made up of populations that consist of pools of genes from the individuals of a species. (Chapter 16, pages 309 – 322; Chapter 17, pages 327- 341)

1. Define the following terms: micro and macroevolution, mutation and natural selection.
2. List five conditions that must exist for evolution to occur in a population.
3. Define random genetic drift, gene migration, and non-random mating.
4. Explain how random genetic drift, gene migration, and non-random mating affect the evolution of populations.
5. Describe in words, and by its equation the Hardy-Weinberg principle.
6. Apply quantitatively the Hardy - Weinberg principle to published data.
7. Define stabilizing, directional and disruptive selection and speciation.
8. Explain the importance of the Hardy-Weinberg principle to population gene pool stability.

There is interaction between members of a population and between members of other populations. (Chapter 31, pages 692– 699)

1. Define the following terms: symbiosis, commensalism, mutualism, parasitism, intraspecific competition, and interspecific competition.
2. Match examples of symbolic relationships with their correct term: commensalism, mutualism, parasitism, and interspecific, and intraspecific competition.

Population types change over time. (Chapter 31, pages 699 – 705)

1. Define the following terms: succession, primary succession, secondary succession and climax communities.
2. Outline the stages including pioneer species, seral communities and climax species in both primary and secondary succession.
3. Compare primary and secondary succession.
4. List the stages of pond succession.

Population numbers change over time. (Chapter 31, pages 679 – 692)

1. Explain how mortality, natality, immigration, and emigration influence population growth.
2. Perform calculations including: density, percent change in density, change in population size, percent change in population size, and growth rate.
3. Define biotic potential and carrying capacity, and blowout.
4. Graph and interpret the following growth patterns: S, and J.
5. Determine from data if a population has had a blow out. If so, state some possible reasons for that blow out.
6. Define: biotic potential, lag phase, exponential growth phase, and carrying capacity
7. Define and classify density-dependent and density -independent factors affecting populations.
8. Demonstrate your increased concern for the exponential growth of the human population.
9. Differentiate between K-selected, and r-selected populations.

Unit 4: Evaluation Activities		
Activity	Date	Grade
Hardy-Weinberg Assignment		
Population Assignment		
Yeast Population Lab		
Breeding Bunnies Lab		
Unit 4 Test		

FINAL EXAM (Units 3 and 4 only)