GRANDE PRAIRIE REGIONAL COLLEGE

BIOLOGY 0130

COURSE OUTLINE

August 21, 2000

INSTRUCTOR: Gordon Pellerin

OFFICE: C310

PHONE: 539 - 2088

OFFICE HOURS: As posted on office door, or by appointment

TEXTBOOK: Inquiry into Life, Mader, ninth edition

SUPPLIES: binder, loose leaf paper, plain white paper, pencil, stapler, lab coat (optional), lab manual (on loan to student).

COURSE GOALS: This course is designed to provide the student with an understanding of biological concepts, principles, biology related social issues, and to develop laboratory and other scientific skills. This course deals with cell structure and function, and human anatomy and physiology.

ATTENDANCE: Regular attendance is expected from all students and is essential for passing the course. If you must be absent, please contact your instructor. Please do not be late as it disrupts the class.

TESTS, QUIZZES AND EXAMS:

There will be several tests and quizzes throughout the term. Absence from tests, quizzes or exams will result in a mark of zero. You will NOT be permitted to have a makeup test unless you have called and either talked with me or left a message on my answering machine BEFORE the test. Absence from the midterm, final exam, or lab final requires a doctor's certificate.

LABS AND LAB REPORTS

Developing lab skills is essential in a Biology course. There are 9 labs during the course and a final practical laboratory exam. Some lab reports will be submitted to me at the end of the lab period; some lab reports will be handed in at a later date announced during the lab period. It is essential that you come to the lab prepared and that your lab reports are submitted on time. I will NOT accept late labs after I have returned marked labs. Late labs will receive -10% per day late.

EVALUATION:

Tests and Quizzes 30%
Labs..... 15%
Midterm Exam 15%
Lab Final 10%
Final Exam 30%

GRANDE PRAIRIE REGIONAL COLLEGE GRADING PROCEDURES

9 point scale	percentage equivalence	designation
9	90 - 100	excellent
8	80 - 89	excellent
7	72 - 79	good
6	65 -71	good
5	57 - 64	good
4	50 - 56	pass
3	45 - 49	fail
2	26 - 44	fail
1	0 -25	fail (You will receive this grade if you drop the course and do not complete the required documentation.)

BIOLOGY 0130 COURSE OBJECTIVES

UNIT 1: MICROSCOPY

This unit will be covered as a review as it is assumed that you already know this material from previous biology classes. If you need further help, see Cate in the Learning centre for the microscopy module.

1. Define light microscope, simple microscope, compound microscope, resolving power, magnification, electron microscope, scanning electron microscope, transmission electron microscope, photomicrograph, electromicrograph. (p. 46 & 47)

2. Differentiate between the light microscope and the electron microscope. Examine selected figures (pictures) in your textbook. Determine the types of microscopes utilized to take those pictures.

3. Label the following parts on a diagram of a light microscope: oculars, eye width adjustment, diopter adjustment, binocular viewing tube, revolving nose piece, objectives, arm, stage, mechanical stage, condenser, diaphragm, coarse adjustment knob, fine adjustment knob, lamp, base. State the function(s) of each of the above parts.

4. Perform calculations to determine drawing magnifications.

UNIT 2: CELL STRUCTURE AND FUNCTION

Objectives 1, 2, and 4 will NOT be covered in this class since you have already learned the concepts in previous classes. You are expected to know the objectives and will be tested on them. If you need further help, see Cate in the Learning centre for the module on Cell Structure and Function.

1. Summarize the cell theory. (p. 46)

2. Describe the structure and function of the following cell organelles: cell

membrane, cytoplasm, nucleus, mitochondria, lysosomes, endoplasmic reticulum, cytoskeleton, vacuoles, vesicles, ribosomes, Golgi apparatus, nucleoplasm, chromatin, chromosomes, protoplasm, nucleoli, cell wall, centriole, chloroplasts, cilia, flagella. (p. 49 - 61)

Label the above cell parts on a diagram, photomicrograph or electron micrograph.

3. Draw and label detailed pictures of the cell membrane and mitochondria (p. 68 - 70)

4. Differentiate between prokaryotic and eukaryotic cells.

Compare plant and animal cells.

5. Define diffusion. Give examples of diffusion. State and explain the factors affecting diffusion. (p. 72 -73)

6. Define osmosis, hypotonic, hypertonic and isotonic solutions, crenation, lysis, plasmolysis and turgor pressure. (p. 74 and 75)

Predict the results of placing cells in solutions of various tonicities.

7. Explain other methods of cell membrane transport: transport with carriers (active and passive), bulk transport (pinocytosis and phagocytosis) (p. 76 - 79).

UNIT 3: ENZYMES

1. Define enzyme, substrate, product, energy of activation, and coenzyme. (p. 108)

2. Identify two theories of enzymatic function - lock and key, and induced fit. Discuss and illustrate the lock and key theory. (p. 109)

3. Relate how concentration, competitive inhibition and denaturation affect enzyme action. (p. 109 - 111)

4. Define metabolism and metabolic pathway. Categorize reactions into two

groups - anabolic and catabolic. (p.106 and 108)

5. Discuss ATP and ADP structure. Illustrate the ADP - ATP cycle. Give examples of ATP to ADP conversion and ADP to ATP conversion. (p. 106 and 107)

6. Illustrate the NAD - $NADH_2$ cycle, and the FAD - $FADH_2$ cycle. (p. 107)

UNIT 4: CELLULAR RESPIRATION

1. State the importance of cellular respiration.

   Identify cellular respiration as a metabolic pathway.

   Write the general equation for aerobic cellular respiration in both words and chemical formulas. (p.118 and 119)

2. Name the four main steps of aerobic respiration. (p.119)

   Indicate where each of these four steps occur.

3. Give the equation for glycolysis in words.

   Indicate the number of carbons in the substrate and product.

   State the number of ATP needed to start the reaction.

   Give the gross number of ATP produced, and the net number of ATP produced. (p.120)

4. Give the equation for transition in words. (p.122)

   Indicate the number of carbons in the substrate and product.

5. Draw the Krebs cycle and indicate the compounds involved in the Krebs cycle. (p.123)

   Indicate the number of carbons in each cycle.

   Show the placements of ATP, $NADH_2$, $FADH_2$ and CO_2 production.

   Indicate the number of times the Krebs cycle must turn for each glucose molecule.

6. Discuss the electron transport system. (p. 124 and 125)

   Indicate the number of ATP produced by one molecule of $NADH_2$ and $FADH_2$.

7. Prove the general equation for aerobic respiration. (p. 126)

8. Determine that metabolites other than glucose can also be used to produce ATP. (p. 127)

9. State the steps for anaerobic respiration. (p. 129)

   Differentiate between plant and animal cellular respiration.

10. Compare aerobic and anaerobic respiration.

UNIT 5: HUMAN ORGANIZATION

1. Distinguish between the different levels of biological organization: cell, tissue, organ, organ system, organism.

2. Describe the structure and function of the four basic tissue types: epithelial, connective, muscle, and nervous. (p. 194 - 200)

3. Name the major organ systems and state the functions of each system.

   Name and locate the major body organs and cavities. List the major organs found in these cavities. (p. 201 - 203)

4. Define homeostasis, and negative feedback. Explain the importance of homeostasis for living organisms. (p. 203 & 205, and 208 & 209)

UNIT 6: DIGESTIVE SYSTEM

1. Differentiate between synthesis and hydrolysis.
2. Identify carbohydrates, in general, and monosaccharides, disaccharides, and polysaccharides specifically. (p. 32 - 33)
3. Identify glycerol, fatty acids, and lipids. (p. 34 - 35)
4. Identify amino acids, dipeptides, polypeptides, and proteins. (p. 37 - 39)
5. Describe the structure and function of the mouth and its accessory organs in digestion. (p. 214 - 216 and 224)
6. Describe the structure and function of the esophagus in digestion. (p. 217)
7. Describe the structure and function of the stomach in digestion. (p 218 and 224)
8. Describe the structure and function of the small intestine and its accessory organs in digestion. (p. 219, 220, and 224 - 225)
9. Discuss the maintenance of alkaline pH in the small intestine.
10. Draw and label a villus.
11. Describe the structure and function of the large intestine in digestion. (p. 220 and 221)
12. Describe some common ailments or disorders of the digestive system. (p. 234 - 235)

UNIT 7: CIRCULATORY SYSTEM

1. Identify the functions of the circulatory system.
2. Label the parts of the heart and its major vessels. (p. 242 - 243)

3. Trace the path of blood into and out of the heart. Discuss cardiac output. (p. 243 - 244)

4. Relate the structures of the heart to their functions.

5. Describe the structure and function of arteries, arterioles, capillaries, venules, and veins. (p. 240, 241 and 248)

6. Trace the path of blood through the pulmonary system, and the various portions of the systemic system. (p. 246 and 247)

7. Discuss heart beat, cardiac cycle, and control of heart beat. (p. 244 and 245)

8. Indicate normal blood pressure, factors affecting blood pressure, and causes of hypertension. (p. 248)

9. Describe the function of various components of blood: plasma, erythrocytes, leukocytes, and platelets. (p. 249 - 254)

10. Identify the structure and function of the lymphatic system. (p. 255 and 264 - 265)

11. List, and briefly describe some common circulatory disorders. (p. 256 - 259)

UNIT 8: RESPIRATORY SYSTEM

1. State the general functions of the respiratory system.

2. Discuss the structure and function of the following respiratory structures: nostril, nasal cavity, pharynx, epiglottis, larynx, trachea, bronchi, bronchioles, alveoli, lungs, pleural membrane. (p.284 - 287)

   Label the above parts on a diagram of the respiratory system.

3. Describe the mechanism of breathing (inspiration and expiration). (p.288-291)

4. Discuss external and internal respiration and the transport of respiratory gases in the circulatory system. (p 292 - 294)

5. Discuss how breathing is controlled. (p.290)

6. List and briefly describe some respiratory diseases and disorders. (295 - 298)

UNIT 9 EXCRETORY SYSTEM

1. List the various excretory organs and their contribution to the excretory system. (p. 288 and 289)

   State the functions and importance of the excretory system.

2. Indicate the functions of each of the following urinary tract structures: kidneys, ureters, bladder, urethra. Label the parts on a diagram. (p 304)

3. Describe the following macroscopic kidney structures: cortex, medulla, pyramids, renal pelvis, renal artery, and renal vein. Label the parts on a diagram. (p. 307)

4. Draw and fully label the nephron and its circulatory pattern. (p 308 - 309)

5. Outline the process of urine formation in the kidney by discussing the role of each part of the nephron. (p.309 - 311)

   Indicate the composition of urine.

6. Describe how the kidney maintains blood volume and blood pH. (p. 312 - 315)

7. Discuss some excretory diseases and disorders. (p. 314)

UNIT 10 NERVOUS SYSTEM

1. Summarize the functions of the nervous system. (p. 322)

2. 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. (p. 322 and 323)

3. Differentiate between the structures and functions of the three types of neurons: sensory neuron, interneuron, and motor neuron. (p. 323)

4. Explain the mechanism of a nerve impulse by defining action potential, upswing, downswing and repolarization. (p. 324 and 325)

   Define refractory period, reaction time and "all or none response".

5. Discuss the transmission of a nerve impulse across a synapse. (p. 326 -327)

6. Trace the pathway of a nerve impulse through the reflex arc. (p. 329)

7. Differentiate between the peripheral nervous system and the central nervous system. (p 328 and 332)

8. Describe the structure and function of the autonomic nervous system and its two divisions, the sympathetic and the parasympathetic nervous system. (p. 330 and 331)

9. 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. (p. 334 - 337)

UNIT 11 ENDOCRINE SYSTEM

1. Compare the operations of the nervous system with the endocrine system.

2. Differentiate between endocrine glands and exocrine glands. (p. 399)

3. Differentiate between steroid hormones and protein hormones. Indicate their modes of action. (p. 397)

4. Discuss the role of negative feedback in regulation of hormone levels. Illustrate negative feedback by discussing regulation of glucose levels and the regulation of thyroxine levels in the body. (p. 408)

5. Name the hormones and their functions of the pituitary gland, thyroid gland, parathyroid gland, adrenal glands and the pancreas. Label the glands on a diagram. (p. 399)