GRANDE PRAIRIE REGIONAL COLLEGE

BIOLOGY 0120

COURSE OUTLINE

2001 / 2002

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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)

Course Intent: This course is designed to be equivalent to the Alberta Learning Biology 20 curriculum, and is listed as such in the Alberta Transfer Guide. All colleges and universities within the Province of Alberta recognize this course in lieu of Biology 20. Modifications have been made to the content to adjust for adult learners and for a shorter semester.

Course Goals: The BI0120 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 two themes: the flow of energy and the recycling of matter. Ecology, and human anatomy and physiology of selected systems are explored.

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:
Lab reports and assignments 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	75%
Labs	20%
Assignments	5%

Tests: There are 4 unit tests. All unit tests are weighted equally
Labs: There are approximately 9 labs.
Assignments: A cumulative average will be used to determine your assignment grade.

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

C:\MyFiles\New Courses\New Biology 0120\course outline.wpd

Unit 1: Circulatory and Respiratory Systems

The human organisms circulatory system transports energy and matter to maintain the equilibrium among the body systems as well as between the organism and its external environment.

1. Identify the functions of the circulatory system.

2. Label the parts of the heart and its major vessels. (242 - 243)

3. Trace the path of blood into and out of the heart. (243)

4. Discuss cardiac output. (243)

5. Relate the structures of the heart to their functions. (243)

6. Describe the structure and function of arteries, arterioles, capillaries, venules, and veins. (240 - 241)

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

8. Discuss heart beat, cardiac cycle, and control of heart beat. (244)

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

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

11. List main cellular and noncellular components of the human immune system and describe their role; e.g. macrophage, T cells and B cells (268 - 273)

The human organism's respiratory system exchanges energy and matter with the environment.

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. Label the above parts on a diagram of the respiratory system. (284 - 287)

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

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

5. Discuss how breathing is controlled. (290)

Unit 2: Digestive and Excretory Systems

The human organism's digestive system exchanges energy and matter within the environment

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

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

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

4. Define metabolism and metabolic pathway. Categorize reactions into two groups - anabolic and catabolic. (106 and 108)

5. Differentiate between synthesis and hydrolysis.

6. Identify carbohydrates, in general, and monosaccharides, disaccharides, and polysaccharides specifically. (32 - 33)

7. Identify glycerol, fatty acids, and lipids (34 - 35).

8. Identify amino acids, dipeptides, polypeptides, and proteins. (37 - 39)

9. Describe the structure and function of the mouth and its accessory organs in digestion.
(214 - 216 and 224)

10. Describe the structure and function of the esophagus in digestion. (217)

11. Describe the structure and function of the stomach in digestion. (218 and 224)

12. Describe the structure and function of the small intestine and its accessory organs in digestion. (219, 220 and 224 - 225)

13. Discuss the maintenance of alkaline pH in the small intestine.

The human organism's excretory system exchanges energy and matter with the environment.

1. List the various excretory organs and their contribution to the excretory system. 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. (304)

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

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

5. Draw and fully label the nephron and its circulatory pattern. (308 - 309)
6. Outline the process of urine formation in the kidney by discussing the role of each part of the nephron. Indicate the composition of urine. (305 and 309 - 311)

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

Unit 3: The Biosphere

Energy and matter cycle through the biotic components of the biosphere.

1. Define ecology. (688, 670)

2. Distinguish between abiotic and biotic factors. (688)

3. Define and give examples of each of the following: population, community, ecosystem and biosphere. (688)

4. Define and give examples of autotrophs and heterotrophs. (744)

5. Classify heterotrophs according to the way they get their food: herbivores, carnivores, omnivores. (744)

6. Draw and interpret trophic levels, food chains and food webs. Include terms such as: producers; consumers; first, second, and third trophic levels; primary, secondary and tertiary consumers; predator and prey; detritus feeders. (745 - 747)

7. Draw and explain three ecological pyramids: numbers, biomass, and energy. (747 - 748)

8. Define and give examples of biological magnification.

The cycling of matter through the biosphere perpetuates its steady state equilibrium

1. Explain how water is cycled through the biosphere. (749)

2. Identify the properties of water and explain their relevance to the hydrologic cycle. (26 - 27)

3. Summarize the carbon cycle and discuss the impact of human activities on this cycle. (750 - 751)

4. Summarize the nitrogen cycle and discuss the impact of human activities on this cycle. (752 - 753)

5. Summarize the phosphorous cycle and discuss the impact of human activities on this cycle. (754 - 755)

6. Determine your personal impact on the environment.

The biosphere is composed of a diversity of biomes each with distinctive biotic and abiotic factors.

1. Summarize the distribution of solar energy as it strikes the earth. (136 - 137)

2. Suggest reasons why the distribution of solar energy is not equally distributed across the whole surface of the earth. (718 - 719)

3. Discuss the importance of an intact ozone layer. (756)

4. Define albedo effect and predict possible consequences of changing environmental conditions on the albedo effect and how these changes in turn affect environmental conditions.

5. Define biome. (721)

6. Name seven terrestrial biomes, state their approximate locations and give their predominant abiotic and biotic factors. (722 - 730)

7. Name two types of aquatic biomes.. Differentiate between eutrophic and oligotrophic lakes. (731)

8. Discuss the characteristics of lakes and ponds in terms of their biotic and abiotic components. (732 - 733)

UNIT 4: Energy Flows and Cellular Matter

The energy currency of living things is ATP.

1. State the full name for ATP. Draw and explain the ATP cycle. (107)

2. Define oxidation and reduction. Illustrate and explain the oxidation and reduction cycles for NADP. (112)

Photosynthesis stores energy in organic compounds.

1. Identify photosynthesis as a metabolic pathway but state the general equation for photosynthesis in both words and chemical formulas. (112)

2. Discuss the structure of chloroplasts, and explain how the pigments in the chloroplasts absorb light. (137- 139)

3. Identify the two main steps of photosynthesis and state generally what happens in each of the steps and indicate where each of the steps occur in the chloroplast. (138 - 139)

4. Outline the steps of the non-cyclic, light-dependent reactions of photosynthesis. (140 - 141)

5. Outline the steps of the light-independent reactions (Calvin-Benson cycle) of photosynthesis. (143 - 145)

6. State two functions of PGAL. (143)

Respiration releases potential energy from organic compounds

1. Illustrate the NAD, and FAD oxidation and reduction cycles. (120)

2. Identify respiration as a metabolic pathway but state the general equation for respiration in both words and chemical formulas. (112 and 118)

3. Name the four main steps of aerobic respiration and indicate where each of these four steps occurs. (118)

4. 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, and give the gross and net ATP produced. (120)

5. Give the equation for transition in words and indicate the number of carbon atoms in the substrate and product. (122)

6. Draw the Krebs cycle and indicate the compounds involved in the cycle. Indicate the number of carbons in each part of the 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. (123)

7. Discuss the electron transport system. Indicate the number of ATP produced by one molecule of $NADH_2$ and one molecule of $FADH_2$. (124)

8. Prove the general equation for aerobic respiration. (126)

9. Summarize anaerobic respiration.

10. Compare anaerobic respiration in plants to anaerobic respiration in animals.

11. Compare aerobic and anaerobic respiration.

Photosynthesis and Respiration processes are linked.

1. Indicate the linkages between photosynthesis and respiration. (147)

2. Predict what impact the destruction of rainforest may have on this linkage. (757)

3. Compare photosynthesis and respiration. (113)