BIOLOGY 120 COURSE OUTLINE

GPRC Fall 1991

INSTRUCTOR: Keith Roscoe OFFICE: C 213

PHONE: 539-2095 (office)
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OFFICE HOURS: MW 11:00-12:00, 14:00-15:00
TR 14:30-1530

CLASS MEETS: *Regular classes:* MWF 13:00-13:50, H211; *Lab:* F 11:00-12:50, J130

TEXTBOOK: Modern Biology, by A. Towle (1989 Edition)
(Please bring your text book to every class.)

REQUIRED SUPPLIES: (1) lab coat—available at bookstore (2) stapler—for stapling labs and assignments (3) three-ring binder.

ABOUT THE COURSE:

The course is intended to provide students with opportunities to understand and apply some basic biological principles : *interdependence, energy relationships, reproduction and inheritance, evolution and adaptation.* The course will concentrate on ecological relationships, heredity and genetics, and evolution. Content will be selected for its relevance to everyday life and important science-society issues, as well as for its interest value.

In this course "learning biology" means understanding and applying knowledge of biological concepts and principles in a variety of situations, not just memorization of facts and names. The lab component of the course will give students a chance to learn by "hands-on" activities and to develop biology lab skills and scientific skills.

LABS:

There will be nine labs during the course, starting in the second week of the semester. Attendance is compulsory for all labs, and wearing a lab coat is strongly advised. Absence from a lab will result in a mark of 0 for that lab unless the absence is for medical or other legitimate reason. There will be no make-up labs. A lab report is required for each lab and students must hand in a minimum of eight out of nine labs to pass the course. For dates of labs see course schedule on page 2.

TESTS AND EXAMS:

There will be a fifty minute test about every two weeks on mondays— a total of four tests for the course (see course schedule for dates). Five or so "quickie quizzes" (5-10 min.) will be given at intervals between tests. Absence from tests, quizzes, or exams will result in a mark of zero for that test or exam unless a previous arrangement is made with the instructor for medical or other legitimate reasons. In the case of an emergency, failure to phone and leave a message with the college switchboard within a short time of a missed test will disqualify the student from a make-up test.

GPRC Fall 1991 Semester Schedule
Biology 120

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	**Sept 2**	3	4	5	6 √ *First Class*
2	9 √	10	11 √	12	13 √ *Lab Intro*
3	16 √ Quiz # 1	17	18 √	19	20 √ *Lab # 1*
4	23 √ **Test # 1**	24	25 √	26	27 √ *Lab # 2*
5	30 √ Quiz # 2	**Oct** 1	2 √	3	4 √ *Lab # 3*
6	7 √ **Test # 2**	8	9 √	10	11 √ *Lab # 4*
7	14 *THANKSGIVING*	15	16 √ Quiz # 3	17	18 √ *Lab # 5*
8	21 √	22	23 √	24	25 √ **Midterm Exam**
9	28 √	29	30 √	31	**Nov 1** √ *Lab # 6*
10	4 √ **Test # 3**	5	6 √	7	8 √ *Lab # 7*
11	11 *REMEMBRANCE DAY*	12	13 √ Quiz # 4	14	15 √ *Lab # 8*
12	18 √ **Test # 4**	19	20 √	21	22 √
13	25 √ Quiz # 5	26	27 √	28	29 √ *Lab # 9*
14	**Dec 2** √ **Test # 5**	3	4 √	5	6 √
15	9 √	10	11 √ *Last Class*	12	13

PROJECT:

A project is an opportunity for students to learn in different ways and to pursue individual interests. Students will have a choice of several types of project: a written research paper, an oral presentation, taking part in a panel, debate, or role-play, or teaching a class. Details of each type of project will be supplied. Students may devise their own project, as long as it involves research and the presentation of a product to the instructor or class. The project will be worth 10% of the total mark.

EVALUATION:

Tests and Quizzes	25%
Project	10%
Assignments & Labs	20%
Midterm Exam	15%
Final Exam	30%

STUDENT RESPONSIBILITIES:

Here are some of your responsibilities as a student, from page 26 of the GPRC calendar:
• *arrive on time and remain for the duration of scheduled classes or related activities.*
(Regular attendance is expected, and attendance is taken. Students who miss more than 20% of classes may be barred from writing the final exam. Classes will start on time, so please arrive a few minutes early.)
• *respect instructor's right to set deadlines for assigned work, to expect assignments to be submitted at the times specified, and to establish penalities for failure to comply with deadlines.*
(failure to submit assignments and reports on time will result in late penalties:
1 day late= -25%; 2 days late= -50%, 3 days late= -100%)
• *respect an instructor's right to expect assignments to be neatly presented with appropriate identification.* (submit lab reports and any assignments following the required format)
• *respect an instructor's right to expect that any work submitted by the student is original, and to know what plagiarism and other forms of cheating are.*
• *respect an instructor's right to appropriate classroom behaviour...should a student be disruptive the instructor has the right to take action to exclude a student from learning activities .*
• *write tests and examinations at times scheduled by instructor.*
• *assume responsibility for course work and assignments missed when absent.*

COURSE CONTENT:

The "objectives" listed below provide a guide to what you are expected to know in this course. Use this as a guide for reading the text and studying for tests, quizzes and exams. Some objectives may be omitted, or material may be added to this list.

Unit 1: The Structure of Ecosystems (CH 1, pp 6-10; CH 49, pp. 765-766; CH 50, pp. 781-791)

1. Explain four biological themes:
(1) interdependence of organisms; interdependence of organisms and environment
(2) energy relationships

(3) the continuity of life: reproduction and inheritance
(4) change over time: evolution and adaptation.

2. Define and apply the following terms: ecology, ecosystem, biosphere, population, community.

3. Distinguish between abiotic and biotic factors in an ecosystem; give examples of ways in which abiotic and biotic factors interact in ecosystems.

4. Distinguish between habitat and niche.

5. Describe, in general, the flow of energy in ecosystems.

6. Define: trophic level, producer, consumer, decomposer.

7. Explain the role of producers, consumers and decomposers in an ecosystem.

8. Describe energy flow in food chains.

9. Distinguish between food chains and food webs, giving examples of each.

10. Describe and explain energy loss in ecological pyramids.

11. Describe the biological functions of photosynthesis and respiration; give word equations for photosynthesis and respiration. (Ch 7, pp. 93-94)

12. Distinguish between autotrophs and heterotrophs.(Ch 7, pp.93-94)

13. Trace the cycling of water between earth and atmosphere.

14. Expain the carbon-oxygen cycle.

15. Discuss the effects of human activity on the carbon-oxygen cycle.

Unit 2: Ecological Relationships (Ch 51, pp. 797-799, 803-806; Ch 52, 811-816)

1. Define competition.

2. Distinguish between competition within a species, and competition between species.

3. Describe the importance of predation in ecosystems.

4. Define symbiosis, and distinguish between the three types of symbiosis, giving examples (parasitism, commensalism, and mutualism).

5. Define primary and secondary succession, giving an example of each.

6. Define pioneer, seral and climax communities.

7. Describe and locate the ecological zones (biomes) of Alberta: grassland, parkland, boreal forest, alpine.

8. Define: population growth, population growth rate, biotic potential, carrying capacity..

9. Describe and explain J-shaped and S-shaped population growth curves.

10. Describe the limits to population growth.

11. Describe human population growth and the factors which have affected human population growth.

12. Discuss the impact of human population growth on the environment and on resource consumption.

Unit 3: Cells and Chromosomes (Ch 9, 131-138)

1. Describe the structure of a chromosome, and identify the relationship between DNA and chromosomes.

2. Describe, in general, the events of the cell cycle.

3. Distinguish between mitosis and cytokinesis (cell division).

4. Describe, in general, the reduction of the chromosome number in meiosis.

5. Compare and contrast mitosis and meiosis.

6. Define: haploid, diploid, crossing-over, homologous chromosomes, tetrad.

7. Compare and contrast asexual and sexual reproduction.

8. Explain the importance of meiosis to sexual reproduction and to the survival of a species.

Unit 4: Heredity (Ch 10, pp. 147-158; Ch 11, pp.163-176)

1. Describe Mendel's experiments, results, and conclusions.

2. State and explain Mendel's three principles of genetics (dominance/recessiveness, segregation, independent assortment).

3. State the chromosome theory; relate Mendel's principles to current knowledge of chromosomes and meiosis.

4. Discuss the role of chance and probability in inheritance.

5. Define: genotype, phenotype, homozygous, heterozygous, monohybrid cross, dihybrid cross, testcross.

6. Use punnet squares to predict the results of monohybrid and dihybrid crosses.

7. Define mutation, and describe three types of mutation.

8. Identify causes of mutations.

9. Explain sex determination in humans and other organisms.

10. Distinguish between single allele traits, multiple-allele traits, polygenic traits, and sex-linked traits in humans.

11. Describe the causes and nature of common human genetic disorders.

12. Define: pedigree, carrier, karyotype.

13. Construct pedigree charts for selected human traits, and interpret pedigree charts.

14. Discuss the ethics of the use of foetal diagnostic methods for gene disorders and sex determination.

Unit 5: The Molecular Basis of Inheritance (Ch 8, pp. 113-117; Ch 13, pp. 193-196))

1. Decribe the function and structure of DNA.

2. Summarise the process of replication; explain why DNA replication is necessary..

3. Compare and contrast DNA and RNA.

4. Name and describe the three types of RNA.

5. Summarize transcription and translation (protein synthesis).

6. Define: genetic code, codon, anticodon.

7. Describe how genetic engineering is used to manipulate genes (induced mutation, gene isolation, gene splicing, cloning).

8. Evaluate the use of genetic engineering to produce genetically altered organisms.

Unit 6: Change Over Time: Evolution (Ch 15, pp. 219-232; Ch 16, pp. 237-249)

1. Explain what is meant by "evolution".

2. Summarize the evidence for evolution: the fossil record, comparitive anatomy, homologous structures, vestigial organs, biochemistry, embryology.

3. Summarize and apply Darwin's theory of natural selection; explain how natural selection acts on variability within populations to cause evolution.

4. Explain genetic equilibrium and the Hardy-Weinberg Law.

5. Describe aspects of the modern theory of evolution: how mutation, migration, genetic drift, and natural selection disrupt genetic equilibrium.

6. Explain the formation of new species: geographic and reproductive isolation.