

**Red Deer College - BIOLOGY 201 Concepts in Biology
COURSE OUTLINE - Fall 2014**

Class Time: 9:00 – 9:50 a.m. Tues, Thursday, Friday
Room: 819
Instructor: Sandra MacDougall
Office: 1612
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Phone: 314-2492
Office Hours: 10:00 a.m – 11:00 a.m. Tuesday and Friday
Prerequisites: Biology 30 or equivalent.
Credit Hours: 4

COURSE DESCRIPTION: A brief introduction to the philosophy of biology. Exploration of unifying principals including unity and diversity, complementary of structure and function, homeostasis, genetics and evolution, ecology and the biological basis of behavior. Interrelationship of biology and society. Development of skills in comprehension, synthesis, analysis and application.

LEARNING OUTCOMES: By the end of this course I expect you to have a command of the following basic concepts and related facts:

- I. Properties of living organisms.
- II. Paradigms of modern biology. Discovery Science, the hypothetico-deductive method, and systems science
- III. Properties of water: bonds and emergent properties
- IV. Unifying Principles of Biology: (1) unity and diversity (common characteristics at the molecular, cellular, physiological and anatomical level of organization), (2) how form fits function from molecules to organisms, (3) Genetics (DNA and replication), (4) Evolution (microevolution, speciation, macroevolution, human evolution), (5) Ecology (biomes, density and dispersal, niches, chemical cycles, food webs, energy pyramids, population trends), (6) homeostasis and regulation (entropy, membrane function, metabolic feedback loops, enzyme regulation), (7) Differentiation and integration.
- V. Biology and Society. The interrelationship of values and priorities.

TEXT:

Reece, J. et al. 2014. *Biology*. 10th Ed. Redwood City, CA: Benjamin/ Cummings. **The ebook subscription is available at the College bookstore OR online from numerous websites (CourseSmart, Amazon, Barnes and Noble). You can also use the 8th or 9th edition of this textbook.**

Biology 201 Manual. Available on Blackboard.

MARK DISTRIBUTION

Assignments and Quizzes	10 %
Midterm Exam 1	15%
Midterm Exam 2	15%
Final exam	30 %
Laboratory	30 %

Note: The final lecture exam is cumulative. Percentage grades will be reported for assignments and exams written throughout the semester. A final average will then be calculated and converted to a letter grade based on relative performance within the class and the instructor's overall assessment of that particular class. Thus, there is no direct correspondence between a percentage grade and final letter grade.

Grade	Grade Point	Description
A/A+	4.0	Excellent
A-	3.7	
B+	3.3	Good
B	3.0	
B-	2.7	
C+	2.3	Satisfactory
C	2.0	
C-	1.7	
D+	1.3	Pass
D	1.0	
F	0.0	Fail

ATTENDANCE: Attendance may take many forms. Lack of attendance may impact the students' ability to successfully complete the course. You are strongly encouraged to attend all sessions. However, if you do miss a class or lab, you should arrange to borrow notes from other students, because you are still responsible for all information covered. Absence from quizzes or exams is generally excused only when a valid medical reason is submitted. An alternative written or oral examination may then be administered, or credit may be reassigned at the discretion of the instructor and agreement of the student. Late assignments may be accepted depending on the circumstances, but may be docked marks.

LAB SCHEDULE AND FEES: A lab schedule will be handed out in the lab. There is a *materials fee* of \$30.00 associated with BIOL 201 to cover costs for the laboratory. Please note that since you have already paid this fee with your tuition, informing you now of the fee's existence serves no purpose except to meet the RDC policy requirement for such a notice in this course outline.

MIDTERM FEEDBACK: Midterm feedback for this course will be available from the instructor following marking of the first midterm examination.

Other Notes....

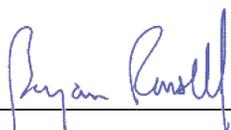
- Assignments are due in class two lectures following the one in which they were assigned.
- It is the student's responsibility to be familiar with the information contained in the Course Outline and to clarify any areas of concern with the instructor.
- Students should refer to the [Formal](#) and [Informal](#) Student Appeal Policies and Standard Practice should they have questions or concerns about the Course Outline that cannot be resolved with the instructor.

- Please be familiar with what constitutes [academic misconduct](#), as well as the consequences. Plagiarism involves submitting work in a course as if it were the student's own work. Plagiarism may involve the act of submitting work in which some or all of the phrasing, ideas, or line of reasoning are alleged to be the submitter's own but in fact were created by someone else.
- The [Final Examinations Policy](#) and [Practice](#) will be followed with respect to final exams. Please review these documents to ensure you understand the contents and implications of the policy.
- Attendance may take many forms. Lack of attendance may impact the students' ability to successfully complete the course.
- This course may be eligible for Prior Learning Assessment. Students should refer to the RDC College Calendar for a list of excluded courses.
- Classroom Learning Resources may be available to students in alternate formats.
- Students should be aware that Personal Counseling, Career, Learning and Disability Services are provided by RDC. Inquire about locations at Information Desk. It is the student's responsibility to discuss their specific learning needs with the appropriate service provider.

Important dates for the 2014 Fall Term at RDC

Sept 3	First Day of Classes for Fall Term
Sept 5	Last Day to apply for Fall 2014
Sept 10	Last day to have tuition refunded for Fall Term courses
Sept 11	Last day to register or add/drop for Fall Term
Oct 1	First Day to apply for Fall term 2015
Oct 7	Emergency Response Day
Oct 13	Thanksgiving Day. College Closed.
Oct 24	Mid-term feedback date
Nov 10	Final examination schedule posted
Nov 10	College open. No credit classes.
Nov 11	Remembrance Day. College Closed.
Nov 12	Credit classes resume.
Dec 3	Last day of classes for Fall Term courses and last day to withdraw (WD)
Dec 8	First day of final examinations for Fall Term courses
Dec 13	Last day of final examinations for Fall Term courses
Dec 16	Deferred exams written
Dec 19	Last day for submission of final grades for Fall Term courses
Dec 22	Final grades available.

Changes to the Course Outline: Changes to the course outline will be made with the consent of the course instructor and students. Changes will be reviewed by the Department Chairperson for consistency with College policies.

Program Lead: 

Date: 26 August 2014

LECTURE TOPICS OUTLINE:

Topic Headings	Lecture Topic Outline	Resources and Readings (Campbell 9th ed)	Resources and Readings (Campbell 10th ed)
Topic 1. Introduction/Properties of Living Organisms	Introduction and Levels of Biological Organization, Properties of Life	Chapter 1 (pg 1 -17)	Chapter 1 (pg 1 -15)
Topic 2. Paradigms of Modern Biology	Discovery Science and the hypothetico-deductive method, Systems Biology	Chapter 1 (pg 3, 18-25)	Chapter 1 (16-25)
Topic 3. Properties of Water	Hydrogen bonding, Properties of water that contribute to the fitness of earth as an environment for life	Chapter 3	Chapter 3
4.Unity and diversity	Macromolecules, organelles and structures, Intro to Prokaryotes	Chapter 5 and chart of macromolecules Chapter 6, notes, and table of functions Chapter 27	Chapter 5 and chart of macromolecules Chapter 6, notes, and table of functions Chapter 27
5. How form fits function from molecules to organisms	Membrane structure Enzymes Animal Form and Function: basic principles	Concept map, pg 125-141 Poster projects	Concept map, pg 125-140 Poster Projects
6. Genetics	DNA and replication	Chapter 16 pg 308-324	Chapter 16 pg 316-331
7. Evolution	microevolution, speciation, macroevolution, human evolution	Chapter 22, 23 Chapter 24 (pg 489-494), Chapter 34 (728-733)	Chapter 22, 23, 24 (pg 501-504) Chapter 34 (742-744)
8. Ecology	biomes, density and dispersal, niches, food webs, energy pyramids, population trends	Chapters 52, 53, & 54	Chapters 52,53, & 54
9. Homeostasis and regulation	Entropy, metabolic feedback loops	Chapter 40 (pg 860-868)	Chapter 40 (pg 875-887)
Topic 10. Biology and Society	Special Topics (guest speakers)	Class Notes	Class Notes

Biology 201 Fall 2014 Lecture Objectives
(Readings are from Campbell 2014 10th ed)

Topics 1 and 2 (Chapter 1)

1. Describe the unifying themes that pervade the science of biology and explain how each helps to make sense out of the enormity of biology.
2. Describe seven emergent properties associated with life.
3. Define science; describe its unique characteristics, and explain how science is used to solve problems.
4. Be able to differentiate between deductive and inductive reasoning.

Topic 3. Water (Chapter 3)

1. Explain what a hydrogen bond is and indicate diagrammatically the hydrogen bonding interactions that occur among water molecules in solution.
2. List five unique physical (chemical) properties of water.
3. Discuss the biological implications of the unique physical properties of water.
4. Explain the basis of the pH scale.

Topic 4. Unity and Diversity (Chapter 5 and chart of macromolecules, Chapter 6, notes, and table of functions, Chapter 27)

1. Be able to compare the following characteristics for carbohydrates, lipids (phospholipids specifically), proteins, and nucleic acids: relative size, polymer or non-polymer, name of subunits (if applicable), basic shape, and primary function(s).
2. Understand that most macromolecules are polymers and that a limitless variety of polymers can be built from a small set of monomers
3. Explain how natural laws limit cell size
4. Understand that prokaryotic cells are small and structurally simple
5. Compare and contrast prokaryotic cells and eukaryotic cells.
6. Discuss the significance of the ability of some prokaryotes to “fix” atmospheric nitrogen.
7. Be able to distinguish between gram positive and gram negative bacterial cell walls
8. Examine how eukaryotic cells are partitioned into functional compartments.
9. Be able to discuss the structure and function of the following cellular organelles (WORKSHEET): Nucleus, Endomembrane system, Rough endoplasmic reticulum, Smooth Endoplasmic Reticulum, Golgi apparatus, Lysosomes, Vacuoles, Chloroplasts, Mitochondria, Cytoskeleton
10. Understand eukaryotic cell surfaces and the different types of junctions that exist between plant cells and between animal cells.

Topic 5. Form and Function (Concept map, pg 125-140, Poster Projects)

1. Understand exactly what a catalyst is, an enzyme is and what characteristics are shared by **ALL** enzymes.
2. Understand how enzymes lower the activation energy of a reaction
3. Be able to explain why the reactions catalyzed by each type of enzyme is very specific.
4. Describe the “active site” on an enzyme and an “induced fit”.
5. Understand the interrelationship and function of the following structures: Selectively permeable, Phospholipids, Amphipathic, Hydrophilic, Hydrophobic, Bilayer, Packing,

cholesterol, Unsaturated, Integral, Peripheral, Recognition, Carbohydrates, Transport, Enzymes, Proteins.

Topic 6. Genetics (Chapter 16 pg 316-331)

1. Describe the structure of DNA
2. Describe the process of DNA replication; include the following terms: antiparallel structure, DNA polymerase, leading strand, lagging strand, Okazaki fragments, DNA ligase, primer, primase, helicase, topoisomerase, single-strand binding proteins

Topic 7. Evolution (Chapter 22, 23, 24 pg 501-504, Chapter 34 pg 742-744)

1. Explain how James Hutton and Charles Lyell contributed to Darwin's theory of evolution.
2. Describe Jean Baptiste Lamarck's views on evolution.
3. State three inferences Darwin made from his observations which led him to propose natural selection as the mechanism for evolutionary change.
4. Distinguish between natural and artificial selection processes and explain how both may lead to changes in living organisms.
5. Be able to discuss at least five of the presently accepted sources of evidence for evolution.
6. Understand the role of mutation and sexual recombination in providing variation
7. Be able to explain the purpose of the Hardy Weinberg Theorem (review), and the five conditions which must be met for a population to be in H-W Equilibrium
8. Discuss how natural selection, genetic drift, and gene flow can alter allele frequencies in a population
9. Natural Selection causes adaptive evolution through directional, disruptive and stabilizing selection

Topic 8. Ecology (Chapters 52, 53 and 54)

1. To understand the definition of ecology and the difference between ecology and environmentalism, and start to explore how humans view the natural environment.
2. To understand the various levels of ecological organization and the sub-disciplines of ecology, including physiological, behavioral, population, community, ecosystem, landscape, and global ecology.
3. To gain an appreciation of the temporal and spatial elements of ecology
4. To comprehend the influence of the solar cycle on climate, position of the solar equator, and movement of the intertropical convergence
5. To be able to name the major terrestrial and aquatic biomes, their positions and predominant climatic conditions.
6. Do understand the process that influence population density, dispersion, and demographics
7. To understand how we describe population growth in unlimited conditions
8. To understand how the logistic model of population growth describes how a population grows more slowly as it nears its carrying capacity
9. To understand the role of density dependent factors on population growth
10. To be able to describe current human population growth trends.

Topic 9. Homeostasis (Chapter 40 pg 875-887)

1. To understand the concept of entropy and how organisms maintain homeostasis using specific examples.

Topic 10. Biology and Society (Class notes)

1. To be able to identify and discuss the economic, social, and biological issues which impact our ability to live in an environmentally sustainable manner.
2. To be familiar with work of Willie Smits in Indonesia (youtube: how to build a rainforest Willie Smits) and provide specific examples from this case study.