

Grande Prairie Regional College

Department of Science

COURSE OUTLINE

**Biology 2080
Principles of Ecology**

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Description:

Ecology is the scientific study of the environmental interactions that determine the distribution and abundance of organisms. The environment can be abiotic (temperature, water availability, soil nitrogen levels, etc.) or biotic (influences exerted by other organisms). The **organism** can be viewed as the most fundamental unit of ecology in the sense that no smaller unit has a separate life in the environment. Although ecological systems can be as small as a drop of water or as large as the entire biosphere, ecologists recognize 4 hierarchical levels of study: the response of **individuals** to their environments; the response of **populations** of a single species; the composition and structure of **communities**; the processes occurring within **ecosystems**.

Within ecology there are a number of fields of study. These can be approached in different ways. For example, **behavioural ecology** is concerned with patterns of behaviour within populations; **physiological ecology** explores how individuals are physiologically or functionally adapted to live in their environments and carry out their roles; **evolutionary ecology** is concerned with the impact of evolution on current ecological patterns and the historical formation of adaptations.

This course is designed to provide a comprehensive survey of ecological concepts that can stand alone or serve as preparation for more advanced courses. Labs and field exercises emphasize the collection, analysis and interpretation of data from ecological experiments and complement lecture material. Examples will be drawn from a broad range of organisms and systems.

Prerequisites: Biology 1080

Transferability: U of C - Ecology 313; U of A - Biology 208
U of L - Biology 2200

Resources:

Smith, T. L. and R. L. Smith, 2009, *Elements of Ecology* 7th ed., Pearson, Benjamin Cummings Publ. Co., 658 pp (required textbook)

Ambrose, H.W., and K.P. Ambrose, 1977, *A Handbook of Biological Investigation*, 4th ed., Hunter (recommended)

Requirements:

- This is a 3-credit course that includes 3 hours of lecture and 3 hours of lab each week beginning on January 4th, 2010. Lectures will run Monday and Wednesday from 10:00 to 11:20.
- Since presence at lectures and laboratories, participation in classroom discussion and projects, and the completion of assignments are important components of this course, students will serve their interests best by regular attendance. Those who choose not to attend must assume whatever risks are involved. In this connection, the attention of the students is directed to the *Academic Guidelines of Grande Prairie Regional College*.
- All assignments must be completed and handed in to the instructor by the date specified. Late assignments will not be marked. Students must attend laboratory sessions and complete each exercise in order to receive credit for the lab reports.
- Plagiarism will not be tolerated. Any student who plagiarizes will be given a zero on the assignment in question. A second case of plagiarism will result in expulsion from the course. The instructor reserves the right to use electronic plagiarism detection services.

Evaluation:	Mid-term Exam:	25%
	Laboratory:	25%
	Term Paper:	10%
	Final Lecture Exam:	40%

Examinations may include both multiple choice and short answer questions.

At the end of this course you will be assigned a letter grade. These letter grades correspond to percentages in the following way:

90-100 = A+	76-79 = B+	67-69 = C+	55-59 = D+
85-89 = A	73-75 = B	64-66 = C	50-54 = D
80-84 = A-	70-72 = B-	60-63 = C-	0-49 = F

Lecture Schedule:

Introduction	
The nature of Ecology	Chp 1
Ecological Experimental Design	
Adaptation & Natural Selection	Chp 5
Habitats & Environments:	
Climate	Chp 2
Freshwater & Marine Ecosystems	Chp 3
Terrestrial Ecosystems	Chp 4
Physiological Ecology	Chp 6,7
(Response of organisms to environmental variation; tolerance; avoidance; adaptations)	
Life History Strategies	Chp 8
(Individual reproductive strategies; species survival strategies)	
Population Ecology	Chp 9-12
(Demographics & dispersion; age structure & life tables; population growth; intraspecific competition; metapopulations and spatial distribution; equilibrium and non-equilibrium theories of population regulation)	
Competition	Chp 13
(Concept of the niche; interspecies competition; competitive exclusion & coexistence)	

Predation (Herbivory; carnivory; optimal foraging strategy; coexistence of pred/prey)	Chp 14
Parasitism & Mutualism	Chp 15
Community Structure Species Diversity (measurement & determinants of diversity; islands) Primary vs Secondary Succession; mechanisms of change; concept of the climax community)	Chp 16-18
Ecosystem Ecology Primary & secondary production; trophic structure & food webs Biogeochemical cycles; decomposition; nutrient cycling; global patterns	Chp 20-22

Ten Things to Remember when you study Ecology: (A. Mackenzie, A.S. Ball, S.R. Virdee)

1. Ecology is a science
2. Ecology is only understandable in the light of evolution
3. Nothing happens 'for the good of the species'
4. Genes and the environment are both important
5. Understanding complexity requires models
6. 'Story-telling' is dangerous
7. There are hierarchies of explanations
8. There are multiple constraints on organisms
9. Chance is important
10. The boundaries of ecology are in the mind of the ecologist