

**PRINCIPLES OF ECOLOGY**  
**BIOL 271** NEW APPROVED COURSE NUMBER IS F371.  
**(Draft for 2013/2014 academic year)**

<b>Meetings</b>	Lecture Tue & Thu 9:45-11:15, Schaibel Auditorium Labs: F01 - Wed 9:15-12:15, 402 Bunnell (CRN 35129) F02 - Wed 2:15-5:15, 402 Bunnell (CRN 34130) F03 - Thu 2:00-5:00, 402 Bunnell (CRN 35131)
<b>Instructor</b>	Prof. Diane Wagner <a href="mailto:diane.wagner@alaska.edu">diane.wagner@alaska.edu</a> Telephone for course-related issues 474-5622 Office hours Tues 12 - 1 or by appointment in 403 Bunnell
<b>TAs</b>	TA 1, contact info TA 2, contact info TA 3, contact info TA 4, contact info  TA contact information, office hours, and locations will also be posted on Blackboard
<b>Catalog Description</b>	Basic principles in physiological, ecosystem, population, and community ecology. The course covers environmental variation and how organisms cope with that variation; the structure, growth and regulation of populations; and ecosystem structure and function.
<b>Required Text</b>	Ricklefs, R.E. and G.L. Miller (1999) Ecology, Fourth Edition. W.H. Freeman. The text is available in paperback or casebound form in the UAF Bookstore. A copy of the text will also be available on reserve in Rasmuson library.
<b>Website</b>	The course website is administered through Blackboard at <a href="http://classes.uaf.edu">classes.uaf.edu</a> . Please log on to Blackboard and confirm that you can access course materials during the first week of class.  Your textbook provides a companion website at <a href="http://www.whfreeman.com/Catalog/static/whf/ricklefsmiller/">http://www.whfreeman.com/Catalog/static/whf/ricklefsmiller/</a> . On this website you will find answers to guiding questions in the text, flashcards, and links to relevant journal and popular articles.
<b>Instructional Methods</b>	Instructional methods include lectures, discussion, and laboratory work. Students should read the assigned portion of the text book before lecture. During most lectures, we will break for a short period to engage in problem-solving activities in smaller groups.
<b>Prerequisites</b>	Biology 115X or 106X; BIOL 116X or 105X; LS F100X or LS F101X or successful completion of library skills competency test; or permission of instructor

### **Prior knowledge expected**

The course material will build on concepts skills you should have learned in previous courses; particularly the following:

- Basic chemical concepts (atomic and molecular structure, stoichiometry, oxidation-reduction reactions, acid-base reactions)
- Elemental composition, basic structure, and function of proteins, carbohydrates, lipids and nucleic acids
- Osmosis and diffusion
- Cell structure and function
- Mechanisms of photosynthesis and cellular respiration
- Mendelian genetics and mutation
- Biological classification system (domain, kingdom, phylum, etc.)
- Phylogenetic trees
- Sexual and asexual reproduction
- Plant and animal structure and function, including homeostasis
- Basic mathematics (percents, averages, unit conversions, probability, logarithms, algebra)
- The structure of a scientific paper / lab report
- Basic understanding of how to find journal articles and books using the library's online resources

### **Course Goals**

The goals of BIOL 271 are to provide students with (a) an understanding of the basic patterns, mechanisms and concepts central to the science of ecology and (b) the ability to design, implement, interpret, and communicate simple ecological experiments using the scientific method.

### **Learning Outcomes**

More specifically, students completing the course should be able to explain the following concepts and draw on them to solve problems:

- Mechanisms that produce variation in Earth's climate at global and regional scales, and effects of climate on soils, vegetation, and communities
- Major environmental challenges faced by organisms on land and in water, and physiological and behavioral mechanisms by which animals and plants deal with those challenges
- The role of environment, population size, and genetic diversity in evolutionary change
- Patterns of variation in the life history traits of plants and animals, and tradeoffs among those traits
- How populations grow under ideal conditions and what factors limit population growth under real conditions
- The structure of natural communities and changes in community composition and ecosystems over time
- Pathways and transformations of energy and matter
- Human influences on ecosystems, in particular on the carbon and nitrogen cycles, and implications for global change

Students who complete the course should also be able to apply the following skills:

- Measure the abundance, density, and dispersion of plant and animal populations
- Apply exponential, geometric, and logistic mathematical models of population growth
- Design, interpret, and communicate a simple ecological experiment

<b>Assessment</b>	Midterm 1	15%	
	Midterm 2	15%	
	Final exam	20%	
	Essay	6%	
	Homework (3 assignments)		9%
	Lab assignments	30%	
	Participation	5%	

**Grading** Grades will be assigned based on the percentage of points you earn in class. Grades will not be assigned on a curve. No extra credit assignments are available.

Grade	% of Total Points
A	90 - 100
B	80 - 89
C	70 - 79
D	60 - 69
F	0 - 59

**Exams** Exams emphasize reasoning, problem-solving, and clarity of expression. The format will include short-answer, essay, and math problems. The final exam will emphasize material presented since the last midterm, but will also incorporate earlier material. You may not use your own calculator on exams. Departmental calculators will be distributed when needed. You will have a chance to familiarize yourself with the departmental calculators prior to the exam, if you wish.

**Missing exams** - If you need to miss an exam for a scheduled activity (e.g. sports event), you must schedule a makeup at least one week before the exam. If you are ill on the day of the exam, you must a) contact the instructor by email or phone before the exam begins, b) take a makeup exam within 48 hours, and c) bring to the makeup exam a note from a medical professional explaining your absence.

**Lectures** Lectures will cover the concepts and facts you will need to know in order to do well in the course. PowerPoint presentations will accompany most lectures, and the slides will be posted to Blackboard later that day. PowerPoint slides are intended to illustrate lecture topics and may be useful study aids. However, viewing the slides is not a substitute for attending lecture. Plan to attend class and take notes. Some lectures, notably those which introduce population growth models and associated calculations, will be delivered using the overhead projector, so there will be no electronic summary to fall back on if you miss lecture. If you cannot attend lecture, you should obtain the notes from a classmate. During many lectures, we will break for problem solving activities. While lecture attendance is not mandatory, participation in these problem solving activities during lecture will contribute to your overall participation score (see below).

**Labs** Labs will illustrate concepts from lecture and allow you the opportunity to pursue your own questions about ecology by designing and implementing experiments. Lab attendance is required.

There are graded assignments associated with each full lab exercise. Lab reports, written in the format of a scientific paper, are required for two of the labs, and you will have the option to re-write the first paper assignment.

Detailed instructions about how to write an effective lab report will be given in a separate handout. Less demanding worksheets are required for the remainder of the lab exercises. Due dates are listed on the schedule. Quizzes (see below) will take place at the beginning of most labs, so it is important to be on time.

**Missing labs** - If you need to miss a lab, you should arrange to attend another lab that week. Contact both your own TA and the TA of the lab section you wish to attend. Only rarely can make-up labs be arranged. If you miss a lab entirely, you may receive zero points for any associated assignments or papers. Please keep in mind that many of the lab exercises will be carried out in teams. If you do not attend lab, you will place your team members at a disadvantage.

**Late assignments** Late assignments will be marked down by 5% per day, with a maximum penalty of 50%.

**Homework** There will be 3 homework assignments. Each is due the week before an exam (see schedule). Homework assignments will be posted on Blackboard on Monday and are due Thursday at 5pm of the same week. Homework assignments will cover some of the material that will be covered on the next exam and are intended to help you study effectively.

**Essay** Students are expected to write a single short essay (500-1000 words). For this assignment, you will choose a single species found in interior Alaska and write about how its physiology, morphology, and/or behavior allow it to survive the winter at high latitude. You must include at least 3 references from journal articles. A more detailed description of this assignment will be provided in class.

**Participation** You are expected to be an active participant at all class meetings, both lecture and lab. Lectures will frequently incorporate short problem-solving activities, and effective participation in these activities is tracked. Your participation in lab is crucial. Many of our experiments are conducted in teams; if you are absent, your team members will have to do your share of the work. Please note that some experiments will require maintenance and data collection outside class hours. Your willingness to contribute to the success of your team's experiments counts toward your participation grade. At the end of the course, the instructor will work with TAs to evaluate your participation in the course.

**Academic dishonesty** Acts of academic dishonesty include cheating on exams, helping others to cheat, plagiarizing (see the next paragraph), feigning illness to obtain an extension, turning in work that was written for another class without permission, and receiving credit for a group project to which you did not contribute. Please read the UAF Student Code of Conduct in the UAF Catalog. Students who behave dishonestly will receive an F for the class and the case will be presented to the University Disciplinary and Honor Code Committee for review.

Plagiarism means presenting someone else's ideas or text – published or unpublished – as if they were your own. Instances of plagiarism include failing to cite your sources properly and copying someone else's work. Please note that making small alterations to someone else's text to obscure the resemblance still constitutes plagiarism. Students are welcome to work in groups to discuss lab assignments and homework and are encouraged to review each other's work, but unless otherwise specified, each student must prepare his or her own assignments.

**Student  
Support  
Services**

**Writing Center** - Students are encouraged to take advantage of the Writing Center on campus in 801 Gruening, 474-5314.

**Student Support Services Program** – Tutors, laptops, and calculator checkout services are available to eligible low-income and first-generation students, as well as those with disabilities. <http://www.uaf.edu/sssp>, 512 Gruening, 474-6884, [fysssp@uaf.edu](mailto:fysssp@uaf.edu).

**Academic Advising Center** – The Academic Advising Center offers free workshops on how to succeed in college. <http://www.uaf.edu/advising/student>, 509 Gruening, 474-6396, [advising@uaf.edu](mailto:advising@uaf.edu).

**Disabilities**

The Office of Disability Services implements the Americans with Disabilities Act and insures that UAF students have equal access to the campus and course materials. The instructor will work with the Office of Disabilities Services (<http://www.uaf.edu/disability/>, 208 Whitaker Bldg, 474-5655, [uaf-disabilityservices@alaska.edu](mailto:uaf-disabilityservices@alaska.edu)) to provide accommodation to students with disabilities. If you have a physical or learning disability, please inform the instructor during the first 2 weeks of class.

## Principles of Ecology, BIOL 271 Fall 201X Course Schedule

			<u>Text: Chapter.Section<sup>1</sup></u>
Week 1			
R	Aug	xx	Introduction
			Ch 1 and 2
			No labs
Week 2			
T	Sep	xx	Life & the Physical Environment – Water & Solutes
			Ch 3 & 4
R	Sep	xx	Life & the Physical Environment – Energy & Heat
			Ch 5
	LAB:		Allelopathy Experiment – Begin; plus Lab Report Expectations
	DUE IN LAB:		nothing
Week 3			
T	Sep	xx	Response to Variation in the Environment
			Ch 6
R	Sep	xx	Biological Factors in the Environment
			Ch 7
	LAB:		Data Analysis & Ecological Literature
	DUE IN LAB:		Allelopathy Data to TA
			<i>(Fri, Sep xx is the deadline to drop a course without it appearing on the transcript)</i>
Week 4			
T	Sep	xx	Climate, Topography, & Diversity
			Ch 8
R	Sep	xx	Ecosystems: Introduction and Energy Flow
			Ch 9
	LAB:		Allelopathy Experiment – End
	DUE IN LAB:		Worksheet from lab
Week 5			
T	Sep	xx	Pathways of Elements in Ecosystems
			Ch 10
R	Sep	xx	Nutrient Regeneration and Regulation of Ecosystem Function
			Ch 12 & 13
	LAB:		Interactions in Ecology: Planning Greenhouse Experiment (meet in the usual lab Room, 402 BUNN)
	DUE IN LAB:		Your team's experimental design
	DUE ON BLACKBOARD:		Homework assignment 1, due Friday 17 Feb 5pm
Week 6			
T	Oct	xx	<b>Exam 1</b>
R	Oct	xx	Population Structure
			Ch 14
	LAB:		Interactions in Ecology: Greenhouse Experiment - Begin (meet in Institute of Arctic Biology Greenhouse on West Ridge) room: 402 BUNN)
	DUE IN LAB:		nothing
Week 7			
T	Oct	xx	Population Growth
			Ch 15
R	Oct	xx	Population Regulation
			Ch 16
	LAB:		Measuring Population Abundance & Dispersion
	DUE IN LAB:		Allelopathy lab report
Week 8			
T	Oct	xx	Metapopulations, Population Fluctuations
			Ch 17 & 18
R	Oct	xx	Population Dynamics & Metapopulations
			Ch 19
	LAB:		Life Tables and Human Demography
	DUE IN LAB:		Population Abundance and Dispersion Worksheet
	DUE IN LECT:		Essay on traits of a species adapted to the Fairbanks area
Week 9			
T	Oct	xx	Resources and Consumers
			Ch 20
R	Oct	xx	Competition
			Ch 21 & 22
	LAB:		Population Growth

<sup>1</sup> Chapters in Ricklefs & Miller, Ecology 4<sup>th</sup> Edition

DUE IN LAB: Life Tables Worksheet  
(Fri, Oct xx is the deadline for student- and faculty-initiated withdrawals; "W" on transcript)

Week 10

T Oct xx Predation Ch 23  
R Oct xx Herbivory & Parasitism Ch 24  
LAB: Temperature Acclimation in Fish  
DUE IN LAB: Fish data  
DUE ON BLACKBOARD: Homework assignment 2, due Friday 30 Mar, 5pm

Week 11

T Nov xx **Exam 2**  
R Nov xx Coevolution and Mutualism Ch 25  
LAB: Interactions in Ecology: Greenhouse Experiment - End (meet in Institute of Arctic Biology Greenhouse on West Ridge)  
DUE IN LAB: Fish Acclimation Worksheet

Week 12

T Nov xx Communities and Their Structure Ch 26 & 27  
R Nov xx Community Development Ch 28  
LAB: Interactions in Ecology: Greenhouse Experiment – Analysis and Interpretation  
DUE IN LAB: Graph(s) and major conclusions

Week 13

T Nov xx Biodiversity Ch 29  
R Nov xx Evolution and Adaptation Ch 30 & 31  
LAB: Forest Ecology  
DUE IN LAB: Interactions in Ecology: Greenhouse Experiment Lab Report

Week 14

T Nov xx Evolution of Life Histories Ch 32  
R Nov xx **Thanksgiving break – no class**  
LAB: Forest Ecology continuation, and Aquatic Ecology  
DUE IN LAB: Forest Ecology Worksheet

Week 15

T Dec xx Evolutionary Ecology of Sex and Social Behavior Ch 33 and 34  
R Dec xx Human Influences on Ecosystems – Class Discussion handouts  
LAB: Permafrost tunnel field trip  
DUE IN LAB: nothing  
DUE ON BLACKBOARD: Homework assignment 3, due Friday 4 May, 5pm

**Final exam – <Where and When>**