

**FORMAT 2**

Submit originals (including syllabus) and one copy and electronic copy to the **Faculty Senate Office**  
 See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures/> for a complete description of the rules governing curriculum & course changes.

**CHANGE COURSE (MAJOR) and DROP COURSE PROPOSAL**  
 Attach a syllabus, except if dropping a course.

**SUBMITTED BY:**

<b>Department</b>	Biology & Wildlife	<b>College/ School</b>	CNSM
<b>Prepared by</b>	Diane Wagner	<b>Phone</b>	474-5227
<b>Email Contact</b>	diane.wagner@alaska.edu	<b>Faculty Contact</b>	Diane Wagner

**1. COURSE IDENTIFICATION: As the course now exists.**

<b>Dept</b>	<b>BIOL</b>	<b>Course #</b>	<b>F271</b>	<b>No. of Credits</b>	<b>4</b>
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<b>COURSE TITLE</b>	<b>Principles of Ecology</b>
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**2. ACTION DESIRED: Changes to be made to the existing course.**

<b>CHANGE COURSE</b>	<b>RECEIVED</b>	<b>x</b>
<b>DROP COURSE</b>		
<b>NUMBER</b>	<b>SEP 20 2012</b>	<b>x</b>
<b>TITLE</b>	<b>Dean's Office</b>	
<b>DESCRIPTION</b>	<b>College of Natural Science &amp; Mathematics</b>	
<b>PREREQUISITES</b>		
<b>FREQUENCY OF OFFERING</b>		<b>x</b>
<b>CREDITS (Including credit distribution)</b>		
<b>COURSE CLASSIFICATION</b>		
<b>CROSS LISTED</b>		
<i>Dept. (Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)</i>		
<b>STACKED (400/600) Include syllabi.</b>		
<b>Dept. and Course #</b>		
<b>OTHER (please specify)</b>		

**3. COURSE FORMAT**

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council **and** the appropriate Faculty Senate curriculum committee. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

Leah Berman  
9/21/12 TLP

Governance  
10/3/12 TLP

<b>COURSE FORMAT:</b> (check <b>all</b> that apply)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5	6 weeks to full semester
OTHER FORMAT (specify all that apply)						
Mode of delivery (specify lecture, field trips, labs, etc)	Lecture and lab					

**4. COURSE CLASSIFICATIONS:** (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities	S = Social Sciences	
Will this course be used to fulfill a requirement for the baccalaureate core?	YES	NO <input checked="" type="checkbox"/>
IF YES, check which core requirements it could be used to fulfill:		
O = Oral Intensive, Format 6 also submitted	W = Writing Intensive, Format 7 submitted	Natural Science, Format 8 submitted

**5. COURSE REPEATABILITY:**

Is this course repeatable for credit?	YES	NO	<input checked="" type="checkbox"/>
Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).			
How many times may the course be repeated for credit?	TIMES		
If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?	CREDITS		

**6. CURRENT CATALOG DESCRIPTION AS IT APPEARS IN THE CATALOG: including dept., number, title and credits**

**BIOL F271 Principles of Ecology (n)**  
4 Credits  
Basic principles in physiological, ecosystem, population and community ecology. Environmental factors and their influence on plants and animals. Structure, growth and regulation of populations. The ecosystem concept, biogeochemical cycles, and the structure and function of major terrestrial biomes. Special fees apply. *Prerequisites: BIOL F115X; BIOL F116X; LS F100 or LS F101 or successful completion of library skills competency test; or permission of instructor.* (3+3)

**7. COMPLETE CATALOG DESCRIPTION AS IT WILL APPEAR WITH THESE CHANGES:**  
*(Underline new wording strike through old wording and use complete catalog format including dept., number, title, credits and cross-listed and stacked.) PLEASE SUBMIT NEW COURSE SYLLABUS. For stacked courses the syllabus must clearly indicate differences in required work and evaluation for students at different levels.*

F371 is the new approved course number.

**BIOL F271 3XX Principles of Ecology (†)**

4 Credits Offered Fall

Basic principles in physiological, ecosystem, population and community ecology. Environmental factors and their influence on plants and animals. Structure, growth and regulation of populations. The ecosystem concept, biogeochemical cycles, and the structure and function of major terrestrial biomes. Special fees apply. *Prerequisites: BIOL F115X; BIOL F116X; LS F100 or LS F101 or successful completion of library skills competency test; or permission of instructor. (3+3)*

**8. IS THIS COURSE CURRENTLY CROSS-LISTED?**

YES/NO	No	If Yes, DEPT	NUMBER

(Requires written notification of each department and dean involved. Attach a copy of written notification.)

**9. GRADING SYSTEM: Specify only one**

LETTER:	x	PASS/FAIL:

**10. ESTIMATED IMPACT**

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

The change in frequency will free up faculty to teach other courses, including new ones under the new undergraduate curriculum.

**11. LIBRARY COLLECTIONS**

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No	x	Yes		No change to library needs
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**12. IMPACTS ON PROGRAMS/DEPTS:**

What programs/departments will be affected by this proposed action?  
 Include information on the Programs/Departments contacted (e.g., email, memo)

This course is required by the following other programs: Fisheries BS, Natural Resource Management BS, Wildlife Biology & Conservation BS. It also appears in lists of optional course requirements for the Geography BS and Rural Development BA. In spring 2012, we contacted the following program representatives about the proposed change:

- Mark Lindberg, chair of Wildlife Biology and Conservation Program, Dept of Biology & Wildlife, CNSM. The proposed change is awkward for this program, as there are wildlife courses at the 300 level that use Principles of Ecology as a prerequisite. However, the Wildlife program has not formally objected to this change

- Trent Sutton, chair of Fisheries, SFOS. Trent discussed with faculty and had no objections.
- Dave Valentine, chair of Natural Resource Management, SNRAS. We received no response to an email informing NRM of this change.
- Patricia Heiser, Geography, SNRAS. We received no response to an email informing Geography of this change.

### **13. POSITIVE AND NEGATIVE IMPACTS**

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

The proposed change in course level could have a positive impact on students majoring in fisheries, NRM, and geography by providing a slightly more sophisticated introduction to ecological science, and by helping students to accumulate upper division credits. It would have a negative impact if changes to the course made it more difficult for these students succeed. However, both course instructors agree that, if students have fulfilled the prerequisites, they will be able to succeed in the course when it is taught at the 300 level.

The primary positive impact of the change in frequency will be that faculty will be freed up to teach other courses that will form part of the new undergraduate curriculum. The primary negative outcome will be that students will need to plan ahead a bit more, and will need to wait a year to repeat the course if they fail it.

### **JUSTIFICATION FOR ACTION REQUESTED**

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you ask for a change in # of credits, explain why; are you increasing the amount of material covered in the class? If you drop a prerequisite, is it because the material is covered elsewhere? If course is changing to stacked (400/600), explain higher level of effort and performance required on part of students earning graduate credit. Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

Under the current Biological Sciences B.A. and B.S. curricula, all undergraduates are required to take Principles of Ecology. We therefore needed to teach the course twice annually, in order to meet demand with existing lab space. Under the new curriculum some students will no longer be required to take Principles of Ecology. In addition, with the Life Sciences building coming on board we will have space available to teach a larger lab course if necessary. Faculty are needed to teach other courses, including courses that contribute to the new "capstone" requirement. It therefore makes more sense to reduce the frequency of offering to once a year.


The change from 200 to 300 level is sought for two reasons. First, student performance has increased over time. In the spring offering of the course, I have seen a 20% increase in the proportion of students earning A and B grades in the course since 2008. Similarly, Richard Boone, the instructor for the fall offering, reports that the number of students who struggle with the course material have declined in recent years. Both instructors hypothesize that the more restrictive prerequisites adopted by the Fundamentals of Biology courses (BIOL F115X and 116X) in 2006 and 2008 have improved the preparedness of students entering Principles of Ecology. Whatever the cause, we think that students can handle, and in fact will enjoy, engaging the subject of ecology at a higher level of sophistication and detail.


The second reason for changing the course level is to assist students majoring in biological sciences to earn a sufficient number of upper division credits in order to graduate in a timely manner. Some of our majors, especially those in the B.A. program, have found it challenging to accumulate 39 upper division credits within four years. We reason that if the course can successfully be taught at the upper division, then it should be taught at upper division.

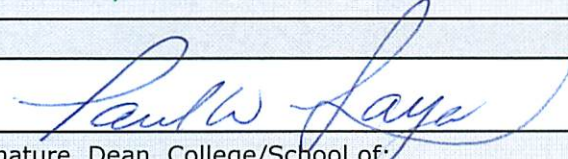
The primary change I (Diane Wagner) would make in my offering of the course would be to adopt a more detailed and sophisticated text book, probably "Ecology 4th edition" by Ricklefs and Miller, a text that covers the material in a more rigorous and quantitative manner than my current text. The current labs and lab assignments, which include exploratory work, data analysis and written assignments, are already sufficiently challenging for the upper division. However, students will be

expected to make more frequent use of the primary scientific literature in their written lab assignments.

**APPROVALS: (Additional signature blocks may be added as necessary.)**

	Date	9/14/2012
Signature, Chair, Program/Department of:	Biology and Wildlife	

	Date	
Signature, Chair, College/School Curriculum Council for:	CNSM	9/26/2012

	Date	
Signature, Dean, College/School of:	CNSM	10/1/12

	Date	
Signature of Provost (if applicable)		

**Offerings above the level of approved programs must be approved in advance by the Provost.**

**ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE.**

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		

**ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)**

	Date	
Signature, Chair, Program/Department of:		

	Date	
Signature, Chair, College/School Curriculum Council for:		



**PRINCIPLES OF ECOLOGY**  
**BIOL F3XX**  
**(Draft for 2013/2014 academic year or later)**

**Meetings**

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)

**Instructor**

Prof. Diane Wagner  
163 Arctic Health Research Building, [diane.wagner@alaska.edu](mailto:diane.wagner@alaska.edu), 474-5227  
Office hours XXX or by appointment

**TAs** 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

**Catalog Description**

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.

**Required Text**

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.

**Website**

The course website is administered through Blackboard at [classes.uaf.edu](http://classes.uaf.edu). 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 <http://www.whfreeman.com/Catalog/static/whf/ricklefsmiller/>. On this website you will find answers to guiding questions in the text, flashcards, and links to relevant journal and popular articles.

**Instructional Methods**

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.

**Prerequisites**

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

Assessment	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**

Students are expected to be active participants at all class meetings, both lecture and lab. Lectures will frequently incorporate short problem-solving activities, and effective participation in these activities is tracked. 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 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 3XX**  
**Spring 201X Course Schedule**

<b>Week 1</b>			<u>Reading:*</u>
R	Date	Introduction	Ch 1
and 2			
No labs			
<b>Week 2</b>			
T	Date	Life & the Physical Environment – Water & Solutes	Ch 3 & 4
R	Date	Life & the Physical Environment – Energy & Heat	
Ch 5			
LAB: Allelopathy Experiment – Begin; plus Lab Report Expectations			
DUE IN LAB: nothing			
<b>Week 3</b>			
T	Date	Response to Variation in the Environment	Ch 6
R	Date	Biological Factors in the Environment	
Ch 7			
LAB: Data Analysis & Ecological Literature			
DUE IN LAB: Allelopathy Data to TA			
<i>(Fri, &lt;date&gt; is the deadline to drop a course without it appearing on the transcript)</i>			
<b>Week 4</b>			
T	Date	Climate, Topography, & Diversity	Ch 8
R	Date	Ecosystems: Introduction and Energy Flow	Ch 9
LAB: Allelopathy Experiment – End			
DUE IN LAB: Worksheet from lab			
<b>Week 5</b>			
T	Date	Pathways of Elements in Ecosystems	Ch 10
R	Date	Nutrient Regeneration and Regulation of Ecosystem Function	Ch 12 & 13
LAB: Interactions in Ecology: Planning Greenhouse Experiment (meet in the usual room, 402 BUNN)			
DUE IN LAB: Your team's experimental design			
DUE ON BLACKBOARD: Homework assignment 1, due Friday 17 Feb 5pm			
<b>Week 6</b>			
T	Date	<b>Exam 1</b>	
R	Date	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			
<b>Week 7</b>			
T	Date	Population Growth	
Ch 15			
R	Date	Population Regulation	
Ch 16			
Date : Measuring Population Abundance & Dispersion			
DUE IN LAB: Allelopathy lab report			

T	Date	Metapopulations, Population Fluctuations	Ch 17 & 18
R	Date	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 <dates>, **Spring break, no classes**

Week 10

T	Date	Resources and Consumers	
	Ch 20		
R	Date	Competition	Ch 21 &
	22		
	LAB:	Population Growth	
	DUE IN LAB:	Life Tables Worksheet	

*(Fri, <date> is the deadline for student- and faculty-initiated withdrawals; "W" on transcript)*

Week 11

T	Date	Predation	
	Ch 23		
R	Date	Herbivory & Parasitism	
	Ch 24		
	LAB:	Temperature Acclimation in Fish	
	DUE IN LAB:	Fish data	
	DUE ON BLACKBOARD:	Homework assignment 2, due <date and time>	

Week 12

T	Date	<b>Exam 2</b>	
R	Date	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 13

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

Week 14

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

Week 15

T	Date	Evolution of Life Histories	Ch
32			
R	Date	Evolutionary Ecology of Sex	Ch
33			
	LAB:	Forest Ecology continuation, and Aquatic Ecology	
	DUE IN LAB:	Forest Ecology Worksheet	

**Week 16**

T	Date	Evolutionary Ecology of Social Behavior	
		Ch 34	
R	Date	Human Influences on Ecosystems – Class Discussion	handouts
	LAB:	Permafrost tunnel field trip	
	DUE IN LAB:	nothing	
	DUE ON BLACKBOARD:	Homework assignment 3, due <date and time>:	

**Final exam – <Where and When>**

\* Chapters in Ricklefs & Miller, Ecology 4th Edition