

Introductory Ecology (Biology 3255) :: Syllabus

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Course format: Lecture, laboratory, and field exercises; 4 credit hours

Lectures: MWF 0930-1020h in Mendel 256

Laboratory: W 1330-1620h in Mendel 088 & 086 (**basement** level, east wing) + one required weekend field trip from Oct 6-7 (see below)

Required Text: Ricklefs, R.E. 2008. The economy of nature. Sixth edition. Freeman, New York, NY, USA.

Suggested Text: Pechenik, J.A. 2010. A short guide to writing about biology. Seventh edition. Pearson Longmans, New York, NY.

Other supplies:

- **Required: Bring laptop to lab** to complete exercises during class
 - Download JMP onto your computer by going through Biology's 'Resources' website (<http://www1.villanova.edu/villanova/artsci/biology/resources.html>)
- **Required:** Small notebook (+ pen/pencil!) for use during weekday labs & weekend trip
- **Required: Sleeping bag** + appropriate footwear and clothing for 36-hour field trip

Overview:

Introduction to the ecology of individuals, populations, communities, and ecosystems. Lectures cover environmental conditions, biomes, physiological adaptations, behavioral ecology, life history adaptations, population growth and regulation, species interactions, succession, community structure, ecosystem dynamics, and topics in applied ecology and conservation. (This is *not* a course in environmental science/engineering nor in social ecology; it will not focus on recycling, energy efficiency, nuclear waste, pollution treatment, or public policy, though we may touch on these topics occasionally.)

Course objectives:

To familiarize students with central topics, concepts, and methods in ecology. Laboratory component emphasizes collection and statistical analysis of ecological data. The course introduces students to the identification and observation of organisms and habitats through field trips; completion of one overnight class trip is *required*.

Students completing the course should:

- exhibit comprehension of concepts and factual knowledge throughout ecology, as presented in lectures, handouts, and text readings
- demonstrate mastery of quantitative foundations of ecology, including analytical and graphical representations of models
- show ability to summarize and evaluate primary research literature in ecology
- display familiarity with field guides for identification of organisms, and techniques for recording field observations
- exhibit understanding of basic procedures for collecting and analyzing data

Writing component:

Bio 3255 is “Writing Enriched”; the course will give students training in scientific writing, independent of particular career interests in Biology. Students will complete several graded writing assignments, including one involving revision and resubmission. Skills emphasized include searching and analyzing primary research literature; organizing a review; writing clearly and concisely; using accepted style and format; properly acknowledging sources; and presenting research results.

*Guidelines & expectations for **writing assignments** are detailed in a separate handout*

Evaluation and grading:

Students will be evaluated on written assignments and examinations, and on participation in laboratory/field exercises. Examinations will involve quantitative problems and objective, short-answer, and essay responses. Grade weighting will be as follows:

Lecture (66%):	Exam #1 (class time, Mon, 1 Oct.):	14 %
	Exam #2 (class time, Mon, 12 Nov.):	14 %
	Final Exam (Sat, 15 Dec., 8:00-10:30 AM)	22 %
	“Critique” essay (requires topic statement; first draft; and revised final version, on which grade mainly based)	16 %
Field/Laboratory (34%):	Weekend field trip essay (due Fri, 2 Nov.)	8 %
	Laboratory Project Report (written & oral)	10 %
	Lab “worksheets,” quizzes, attendance, subjective	16 %

NB: Revised Critique, Lab Project Report, *and* completion of the weekend trip are absolutely **required** before we will assign a final course grade.

Attendance and Participation:

Attendance in the lecture is *strongly* encouraged – although attendance is not *absolutely* mandatory, it *does* count towards your overall grade. I expect everyone to **contribute** to the course by asking questions, participating in discussions and “clicker” exercises, and filling out end-of-class feedback forms. Furthermore, I cannot imagine that you will find it possible to master this material without regular class attendance, especially since lecture coverage will not match the text (Ricklefs 2008) exactly; I will use some different examples and incorporate material from other sources. As you will notice, the lecture PowerPoints – which will be posted on Blackboard – will not tell the whole story, and they should not be considered a substitute for lecture attendance. Since you will have access to the lectures, you should not merely copy the words on the slide; I expect you to focus more on writing down things I say that help to synthesize information into coherent ideas. I will also periodically show videos, and you will also be responsible for knowing the organisms depicted as well as the concepts they illustrate. Regardless of whether you are in class or not, however, *you* are responsible for everything that is discussed in lecture, announced changes in the syllabus, and any handouts distributed in class.

Attendance at all laboratories is **required** and will factor in grading. Anyone who has to miss a laboratory session should see me during office hours or at the end of lecture to explain their absence in *advance* of the relevant lab session. Your **active** participation during lab sessions is expected. If you're not present, you can't participate – and there's no way to make up for the lost opportunity to contribute.

Completion of your weekend trip is **essential**. *Don't miss the bus!* It is extremely difficult for us to set up alternative arrangements in place of the group field activities included in the scheduled weekend trip. Unless you have an overwhelmingly valid excuse, **missing your assigned trip will seriously affect your grade** for Bio 3255. Invest in a good alarm clock (or two!) and use it; consider also making arrangements for a wake-up call.

I am here to help you not only learn the material covered in class, but also develop skills that will assist you in learning throughout your academic and professional careers. To that end, please feel free to ask questions inside or outside of class if there is something you don't understand – one my primary objectives is provide a supportive community for learning. To facilitate learning, please be respectful of your classmates by adhering to the list below:

- Be prepared for class (at the very least, skim reading *before* class)
- Do not be late to class (classes will start and end *on time*)
- Avoid conversations with others during class
- Limit food and beverages to those that can be consumed quietly
- Turn off pagers and cell phones (cell phones going off will result in a quiz!)

Academic Integrity:

The course will follow strictly the current University Policy regarding academic integrity. Violation of any element of the Code on **any** assignment or activity will result in an F for the **entire** course and initiation of formal disciplinary procedures. See page 7 for more.

Disability:

It is Villanova's policy to make reasonable academic accommodations for qualified individuals with disabilities (learning, physical). If you are a person with a disability, please contact me as soon as possible *and* register with the Learning Support Office (*required* to receive accommodations; contact 519-5636 or nancy.mott@villanova.edu).

Communication:

All students are expected (= **required**) to check their official Villanova University **e-mail account** regularly (ideally **at least once a day** but certainly every second day at a minimum) and to learn how to use e-mail for submission of assignments. We will use electronic means to contact you with important course information. "I didn't check my email" is **not** an acceptable excuse for missing a deadline, announcement, or other important piece of communication about the course. **If you use another account, make sure to have mail from your Villanova forwarded to that one.**

Students are also required to visit the course **web site** regularly to obtain important news, download documents, and visit links supporting lecture and lab content.

Animal Use:

The Department of Biology has established a formal policy regarding the ethical and humane treatment of animals in teaching and research. This course will **not** make intensive use of animals (i.e., no dissections or invasive experiments) but interested students are welcome to consult the Departmental policy to address any specific questions (see one of the Instructors, your TA, or the staff in the Department office). Our course will include observation of animals in the wild during field trips and weekday labs; behavioral experiments involving arthropods; and possibly capture, banding, and blood sampling of songbirds (approved under Dr. Curry's USFWS Bird Banding Permit).

Lecture, Exam, & Reading schedule (subject to change as needed)

Required reading in Ricklefs (2008) is denoted by R and chapter number for each lecture. (The material will be most helpful to you if read, where possible, **prior** to corresponding lectures.) **Dates and Times** for major assignments and exams are denoted by boxes.

DATE	TOPIC (timing subject to adjustment as needed)	READING
August		
27	Course organization & expectations; pretest	R1
29	Scale in space & time; key factors in physical environment I	R1-2
31	Physical environment II: coping with gradients	R2
September		
3	<i>No class: Labor Day</i>	
5	More on gradients and adaptations	R3
7	Light, heat, and energy; Mendel Medal lecture at 2PM	R3
10	Light, heat, and energy (cont.)	
12	Global patterns in the environment I: latitudinal gradients	R4
12	Critique Topic Statements due before 0930h (Word file sent as email attachment)	
14	Global patterns II: climate beyond latitude	R4
17	Global patterns III: variation through time	R4
19	Climate and soils	R5
21	Biomes	R5
24	Natural selection & adaptation	R6, 13
26	Natural selection & adaptation (cont.)	R6, 13
28	Odds and Ends: Q&A, problem-solving, review	
October		
1	Exam #1, during class period	R1-6
3	Life history ecology	R7
5	Sex: ecology & evolution; mating systems	R8
6-7	<i>Field Trip: Pine Barrens & Cape May</i> (0700h departure – 1600h return)	
8	Reproductive & social ecology	R9
10	Population ecology: starting concepts	R10
12	Population ecology II: structure	R10
12	Critique complete 1st submission due by 1700h (Word file sent as email attachment)	
15-19	<i>Semester Recess</i>	
22	Population growth I: unrestricted growth	R11
24	Population growth II: regulated growth	R11
26	Spatial and temporal variation in populations	R12
29	Species relationships	R14
31	Dynamics of Predation I	R15
November		
2	Dynamics of Predation II	Field Trip Essay due R15
5	Competition concepts, theory, evidence	R16
7	Competition II	R16
9	Odds and Ends: Q&A, problem-solving, review	R16
12	Exam #2, during class period	R8-16
14	Coevolution and mutualism	R17
16	Community concepts, structure	R18
19	Community development	R19

19	Final Revised Critique due by 1700h (Word file via email attachment)	
21-23	<i>Thanksgiving recess; no lecture, no lab</i>	
26	Biodiversity	R20
28	Island biogeography	R20
30	Historical ecology & biogeography	R21
December		
3	Energy in the ecosystems	R22
5	Lab Project Report due before 1300 (Word file as email attachment). Submit PowerPoint slides for presentation before 1300h also.	
5	Elemental cycles	R23
7	Elements in ecosystems (cont.)	R23-24
10	Landscape ecology	R25
11	Conservation ecology	R26
12	Course evaluations; Global ecology	R27
15	FINAL EXAM: 0800-1030h	R1-27 (emphasis on R17-R27)

Lab schedule (*tentative*; changes may be necessary because of bad weather, etc.):

Date	Topic
29 Aug.	Lab organization; using Macs; Measurement & descriptive statistics I
5 Sep.	Hypothesis Testing; Adaptive leaf-size; <i>t</i> -test
12 Sep.	Pollinator lab and regression analyses; Mark/recapture
19 Sep.	Competition projects: experimental design & set-up
26 Sep.	Review session for Exam #1 ; field trip planning
3 Oct.	Distributional Analyses with Galls; goodness-of-fit chi-square tests
10 Oct.	Field trip follow-up: discussion of species-area relationships
17 Oct.	<i>No lab meeting: Semester Recess ("Break Week")</i>
24 Oct.	Graveyard Tour; Human Demography
31 Oct.	"Fish Banks" simulation & discussion (or <i>plant harvest if necessary</i>)
7 Nov.	Review session for Exam #2
14 Nov.	Projects: data "harvest", data entry, and data management
21 Nov.	<i>No lab meeting: Thanksgiving week</i>
28 Nov.	Projects: Analysis, Presentation graphics, PowerPoint, reports
5 Dec.	Project Presentations <i>Written reports due before START of the lab period</i>
12 Dec.	Review session for Final Exam

Note: Requirements and due dates for additional work associated with weekday lab exercises will be announced in lab and posted on the course web site. Worksheets generally will be due prior to the following week's lab.

ACADEMIC INTEGRITY

Honesty is *essential* in the conduct of practicing scientists. In many areas of scientific activity, only the individual investigator knows exactly what was done, what was observed, or which ideas were truly original. Unless each scientist abides by a strict code of ethical conduct, the scientific process will unravel in a destructive spiral of diminished effectiveness and relevance. If scientists can't trust each other to report methods, results, and ideas honestly, how can *anyone* have any confidence at all in our findings and conclusions?

Villanova has established a **Code of Academic Integrity** that is consistent with the need for scientific honesty discussed above. The activities considered to be violations of this Code are explained in detail in the *Enchiridion* (available in hard-copy or on the College web site); additional information about University policies and procedures is available at <http://vpaa.villanova.edu/academicintegrity/index.html>). **Violations** of the Code include:

Cheating:	obtaining unauthorized help on an assignment
Fabrication:	using falsified, invented, or misleading information (<i>including</i> made-up or modified scientific data or citations)
Assisting in dishonesty:	helping to commit an academically dishonest act
Plagiarism:	relying on someone else's ideas or information without adequate acknowledgment (<i>not</i> limited to verbatim excerpts)
Multiple submission:	submitting the same work for more than one course without prior approval
Misrepresentation:	in essence, lying to academic staff about any aspect of a course

It is *your* responsibility to understand the Code and to follow it. We expect each student in Introductory Ecology to adhere carefully to the Code throughout *every* facet of the course. College policy mandates that students violating the Code may be assigned a failing grade. **Our policy is that barring exceptional circumstances, a student who violates the Code on any assignment will receive the grade of F for the *entire* course.** We are sorry to say that we have been forced to assign F grades a few times in recent years, for violations that included plagiarism, fabrication, multiple submission, and cheating. We will do so again if necessary; *please* don't take the risk.

Few students misunderstand the meaning of the term 'cheating' — but for many of you, what exactly constitutes 'fabrication' or 'plagiarism' may be less clear. Besides the sections in the *Enchiridion* cited above, we will also expect you to have read Pechenik (2010) where he provides additional clarification. If you're ever in doubt about whether acknowledgment or additional support is needed for material in *any* assignment for this course, *feel free to discuss your specific concerns with me or your TA*. We will do everything we can to help you understand how to write in a manner that is consistent with the standard of scientific integrity that your Biology instructors, and the majority of practicing scientists, expect.

In developing an appreciation of the components of scientific integrity, a good place to start is to consider when it is necessary to cite a source for statements in an essay, and how to do it. Your duty is to make *crystal* clear where you obtained all the information and ideas you incorporate in your writing—whether they be your own or someone else's. On the back of this handout are some examples that emphasize how to incorporate appropriate citations into your writing, and how to 'flag' (identify) original ideas as your own. You'll want to refer to this handout in later discussions about how to acknowledge your sources thoroughly.

When do you need to cite a source?

Model paragraph *without* supporting citations (i.e., how NOT to write):

“Global warming is a environmental problem of growing concern among scientists. Global warming results when solar energy is trapped in the earth’s atmosphere by gasses such as CO₂. Concentrations of atmospheric CO₂ have been increasing for at least 50 years. This increase has been caused by human industrial activity (power plants, factories, automobiles). In this paper, evidence and controversies relating to the phenomenon of Global Warming are reviewed.”

Sentence-by-sentence analysis of the ¶: where are citations needed?

** Note: the citation **format** used below matches that used in the journal *Ecology*, which I expect you to follow for all assignments in Bio 3255 (see Writing Assignments handout and course web site for details).

“Global warming is a environmental problem of growing concern among scientists.”
(General, non-specific statement of common knowledge; citation not essential)

“Global warming results when solar energy is trapped in the earth’s atmosphere by gasses such as CO₂ (Corgan 1979).”
(Specific statement referring to scientific mechanism; citation of source highly recommended.)
Note: citation format shown is for paper with exactly 1 author.

“Concentrations of atmospheric CO₂ have been increasing for at least 50 years (Simon and Garfunkel 1970).”
(Specific statement referring to scientific evidence; citation of source essential.) Note: citation format shown is for paper with exactly 2 authors. Names of both would be listed in terminal Literature Cited list, in the same order as in original publication.

“This increase has been caused by human industrial activity (power plants, factories, automobiles; Prince et al. 1999).”
(Specific statement referring to scientific interpretation; citation of source essential.) Note: citation format shown is for paper with more than 2 authors; **et al.** is an abbreviation for *et alia*, meaning “and others.” In *Ecology*’s format, you would always use this abbreviation for papers with ≥3 authors—but you’d list the names of *all* in the Literature Cited section.

“In this paper, evidence and controversies relating to the phenomenon of Global Warming are reviewed.”
(Great idea to state the paper’s purpose — but who’s doing the reviewing? Better to use **active voice** to make things clearer (“I will review...”), but no citation is required.)

Besides adequately citing your sources, it is also critical to distinguish **your** ideas from those of **others** (making sure your readers can tell whose ideas are whose) ... like this:

“Kubrick (2001) discussed the evidence that human industrial activity has caused an increase in atmospheric CO₂ concentrations. He examined emission data from 10 countries and found that the rate of anthropogenic CO₂ release over the past 50 years could not account for the amount of CO₂ now measurable in the atmosphere. Kubrick concluded that other ‘natural’ sources, such as volcanoes, must be responsible for the recent rise in CO₂ levels.”

“The arguments of Tchaikovsky (1812) are persuasive. However, I find flaws in his analysis...”

Final point about active vs. passive voice: Using the 1st person and active voice [“I think that...”] is **perfectly OK** in most instances— *and a great way to make clear which statements constitute your own original ideas*, which is something that you absolutely **should** be doing!! (Indeed, the Instructions to Authors for the journal *Ecology* and many other journals explicitly advise authors to use active voice.)

I **encourage** you to use the active voice **most of the time** in your scientific writing—including even in the Methods section of research reports. Really!!