



MSCI-270, Ecology

Department of Mathematics and Science, School of Liberal Arts and Sciences, Pratt Institute

Course Description:

Ecology is the study of the interactions between organisms and their environment. This course provides a background in the fundamental principles of ecological science, including concepts of natural selection, population and community ecology, biodiversity, and sustainability. Students will acquire an “ecological literacy” about how the natural world works, and develop an understanding of how scientific methods are used to construct ecological knowledge. The course will also explore some of today’s major ecological challenges, and the important research that is being done to address these concerns.

Upon completion, this course is worth three (3) credits.

Meeting Time: *Section 01:* Tuesdays, 9:30 am to 12:20 pm, North Hall 107
 Section 02: Tuesdays, 2:00 pm to 4:50 pm, North Hall 107

Instructor: Dr. Christopher Jensen
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Office Hours: Mondays 12:30 to 2 pm, Thursdays 2:30 to 4 pm, *or by appointment*

Course Goals:

- To acquire an "ecological literacy" about how the natural world works.
- To develop an understanding of how scientific methods are used to construct ecological knowledge.
- To explore the multiple levels at which ecological interactions take place.
- To become familiar with some of the major ecological challenges facing the Earth today, and the important research being done to address these concerns.
- To develop a deeper understanding of how human development impacts ecological communities and systems.

Learning Objectives: Students who successfully complete *Ecology* will be able to...

- Explain the various levels at which ecology functions.
- Describe the services that ecosystems provide to human societies.
- Explain the role that evolutionary processes play in ecological systems.
- Describe and categorize interactions between organisms and their environment.
- Chronicle and explain the various threats to current-day ecosystems.
- Assess the need for changes in human behaviors that threaten ecosystem services.
- Incorporate ecological understanding into a creative work or critique a designed object that claims to incorporate ecological understanding.

Assessment Criteria:

Below is a summary of how you will be graded in this course. All grades will be posted on the *LMS*, so please take advantage of the fact that you can always know how you are doing in the course.

Contribution to Grade	Category	Description
20%	<i>Participation</i>	We'll be discussing course readings in light of our own particular concerns. I'll have questions for you; I will expect you to have questions for me. Come to class having read and thought about assigned readings, ready to actively engage in dialogue. To receive participation credit you need to be present in class; to receive full participation credit you need to be actively engaged in class discussions.
15%	<i>Assignments</i>	You will complete assignments during class and as homework. Some of these assignments will be done individually, others will require group cooperation. I will be grading your work on each assignment based on its clarity of thought, level of insight, and contribution to class dialogue.
15%	<i>Quizzes</i>	You can count on a quiz at the beginning of each class session. Based on the assigned readings for each day, these quizzes will provide you with the opportunity to demonstrate that you understood the material. You are free to use your notes but <u>not</u> the actual readings on your quiz.
20%	<i>Midterm Paper</i>	For your <i>Midterm Paper</i> , you will be asked to describe a particular ecological problem. Using your understanding of ecological science, you will explain the root causes of the problem and identify potential solutions to the problem.
5%	<i>Museum Assignment</i>	During Week 11, our class will not meet. Instead, you will be given an assignment to be completed based on a trip to the American Museum of Natural History in Manhattan. The trip is self-guided, and you can complete this assignment anytime before the due date of April 9th. Further details will be provided in class during Week 04.
25%	<i>Final Project</i>	For your <i>Final Project</i> , you will identify key ideas and concepts from the class that you find interesting or inspiring, perform additional research investigating these ideas/concepts, and produce a designed object that illustrates these ideas and concepts to a general audience. A <i>Project Summary</i> that <u>must</u> accompany your <i>Final Project</i> allows you to explain the science that inspired your creative work.



Under no circumstances will personalized extra-credit work be offered to any student



Lateness and Absence:

Of Students: I expect you to arrive to class on time. Students who arrive more than 20 minutes late will receive a zero for the day's quiz. In addition, lateness and absence can adversely affect your participation and assignments grades.

Of Assignments: Late assignments, including major projects, will be penalized by 10% per day.

Excuses: There are very few legitimate reasons to miss all or part of a class session or for submitting assignments after the stated deadlines. In order for an absence or lateness to be excused, you must provide formal documentation stating which classes/deadlines were affected and explaining the reason behind the absence; all documentation will be subject to strict verification. Valid excuses include family emergencies and personal health issues. The following reasons do not excuse lateness or absence: oversleeping, excessive work load in other classes, inability to use the *Learning Management System*, or "forgetting".

Learning Management System (LMS):

During the course of the semester, we will make extensive use of Pratt's *Learning Management System (LMS)*. I recommend that you use the *Firefox* browser to access the *LMS* via this page: <http://lms.pratt.edu/> (I discourage you from using the *my.pratt.edu* entrance point, as it is not always working). Use your ONEKEY username and password to log in. I expect you to check the *LMS* several times a week for announcements, reading assignments, and updates to your class grade (note that you can also set the *LMS* to send you email messages every time our class page is updated). I will be using the *LMS* to send email announcements throughout the semester, so please make sure that you check the email address listed under your *LMS* profile regularly. "I forgot to check my Pratt email" is an invalid excuse.

I try to make the assignments, announcements, and other documents I post on the *LMS* as universally-readable as possible. The only proprietary program you will need to have loaded onto your computer is *Acrobat Reader*, which can be downloaded here: <http://www.adobe.com/products/acrobat/readstep2.html>. I strongly recommend that you use *Acrobat Reader*, rather than another program, to read all of the PDF's provided in this class.

***Important*:** If you should have any problems with the *LMS*, you should:

1. Report the problem to the **Service Desk** and receive a "ticket number" by one of four means:
 - a. visiting their office in the basement of the Engineering Building; or
 - b. calling (718) 636-3765; or
 - c. emailing services@pratt.edu; or
 - d. using the "Submit a Service Request" function on the *Campus Tech* tab of my.pratt.edu.
2. Receive an email from the **Service Desk** assigning your problem a "ticket number".
3. Forward this email from the **Service Desk** to me.

In order for me to verify claims of *LMS* outages, you must contact the **Service Desk** when the *LMS* problem occurs, not hours or days later.

Reduced-Paper-Use Classroom:

Whenever possible, we will reduce the amount of paper that this course consumes. All of your out-of-class assignments, including the two-dimensional components of your two projects, must be submitted electronically via the *LMS*. Your work will be graded and returned electronically. Please do your best to reduce the amount of printing that you do for the course.

Readings:

You will be assigned a series of reading materials from popular science periodicals, books, and the scientific literature (see **Weekly Units** below). All required readings will be posted on the *LMS*. You are encouraged to save paper by viewing these readings electronically (as opposed to printing them out).

If you feel the need for a comprehensive *Ecology* textbook, these two will be on reserve in the library:

Smith, Thomas M. and Robert Leo Smith, 2006. *Elements of Ecology, 6th Edition*. Pearson/Benjamin Cummings. (ISBN #9780805348309)

Levin, Simon A. (editor), 2009. *The Princeton Guide to Ecology*. Princeton University Press. (ISBN #9780691156040)

There will be no required reading from these books; consulting them is purely at your discretion.

Classroom Civility and Academic Honesty:

I expect you to maintain the civility and integrity of our course in and out of the classroom. In class, this means arriving on time, turning off cell phones and refraining from sending text messages, maintaining focus on class discussion, respecting the right of others to speak, and leaving the classroom in good condition (among other things). Out of class, this means properly citing all work that is not your own (in other words, not plagiarizing).

Plagiarism means presenting, as one's own, the words, the work, information, or the opinions of someone else. It is dishonest, since the plagiarist offers -- as his/her own -- the language, or information, or thought for which he/she deserves no credit. Types of plagiarism include: (1) The use of any material from any source other than yourself in a paper or project without proper attribution. This includes material from the Internet, books, papers or projects by other students, and the media; (2) The extensive use of the ideas of others in your work without proper attribution; and (3) Turning in work done by another person, downloaded from the web, purchased from any agency or supplier, as one's own. Plagiarism occurs when one uses the exact language of someone else without putting the quoted material in quotation marks and giving its source. The method for documenting sources and references is established by a number of standards: please choose one of these standards (such as the *MLA Handbook for Writers of Research Papers* or the *Chicago Manual of Style*) and use it consistently. Any paper submitted that does not use proper referencing will not be marked. Plagiarized assignments receive no credit, and all cases of plagiarism will be referred to the Registrar. For more information on avoiding plagiarism, please see: <http://www.christopherxjensen.com/teaching/for-students/#no-plagiarism>.

Any disruptive, disrespectful, or dishonest behavior will be promptly reported to the appropriate campus authority. Students must adhere to all Institute-wide policies which include policies on attendance, academic integrity, plagiarism, computer, and network use. Please see http://www.pratt.edu/student_life/student_affairs/student_policies/ (click on *Online Student Handbook*) for policies and procedures for handling academic conduct issues.

Help with Writing:

Both major projects in this class will require you to produce written work. All students can benefit from feedback on their writing. I am happy to read and respond to rough drafts of either assignment, provided they are emailed to me no later than 5 days before the day the paper is due.

Pratt's *Writing and Tutorial Center* can also help you produce the best project possible. The center is located on the 1st Floor of North Hall (it has all the great fish tanks... you can't miss it!). Call them at (718) 636-3459 or send an email to wtc@pratt.edu to make an appointment.

Rights of Students with Disabilities:

If you have a physical or learning disability, ADD/ADHD, chronic disease, or physical condition that we should know about, please contact Mai McDonald at 718-636-3711, to discuss your needs and how we can best serve you. In order to receive classroom accommodations and other services, you must have documentation of your disability on file in our office. Your records will be kept completely confidential. For more information, please see the Pratt webpage for Disability Services (www.pratt.edu/student_life/student_services/disability_services/).

Weekly Units:

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
01	Jan. 15th	Introduction to Ecology and Ecosystem Services	1. What is ecology? 2. How is the field of ecology organized? 3. How does ecology relate to other biological sciences? 4. How are ecology and environmental science related? 5. What ecosystem services do human beings enjoy?	▸ <i>Nature</i> "The value of the world's ecosystem services and natural capital" ▸ <i>ESA</i> "Ecosystem Services" ▸ <i>Scientific American</i> "The economist has no clothes"	▸ Syllabus distributed ▸ LMS Warm-up Assignments discussed
02	Jan. 22nd	Individuals: Behaviors, Niches, and Natural Selection	1. How does evolution shape the form, function, and behavior of organisms? 2. What is adaptation and what produces adaptation? How is adaptation related to an organism's "niche"? 3. What evidence is there for adaptation due to natural selection? 4. What determines the lifestyle of each species?	▸ <i>Beak of the Finch</i>, Chapter 4 ▸ <i>Beak of the Finch</i>, Chapter 5	▸ Weekly Quiz ▸ Class visits a computer lab: remember to bring your Pratt ID!! ▸ LMS Warm-up Assignments due, January 22nd @ 11:59 EST
03	Jan. 29th	Populations: Growth and Regulation	1. Why do populations grow? 2. What forms can population growth take? 3. What factors regulate population growth?	▸ <i>The Encyclopedia of Earth</i> "Carrying Capacity" & "Exponential Growth" ▸ <i>Science</i> "Population Growth and the Earth's Human Carrying Capacity" ▸ <i>Global Urbanization</i> "Human Population Grows Up"	▸ Weekly Quiz ▸ Midterm Paper Guidelines distributed ▸ Class visits a computer lab: remember to bring your Pratt ID!!
04	Feb. 5th	Communities 1: Species Interactions	1. What are the different ways in which organisms can interact? 2. What is the difference between intra- and inter-specific competition? 3. In what ways do organisms have negative impacts on each other? 4. In what ways do organisms have positive impacts on each other?	▸ <i>Scientific American</i> "The Fish and the Forest" ▸ <i>Science</i> "Ancient Tripartite Coevolution"	▸ Weekly Quiz ▸ AMNH Assignment distributed
05	Feb. 12th	Communities 2: Food Webs, Community Dynamics, and Landscape Ecology	1. What comprises an ecological community? 2. What maintains the health of a community? 3. What are keystone species? 4. How does ecological efficiency limit the size of food webs? 5. How do organisms interact with and/or create the landscapes in which they exist?	▸ <i>Scientific American</i> "Lessons from the Wolf" ▸ <i>National Geographic</i> "Wolf Wars" ▸ <i>Scientific American</i> "Ecosystems on the Brink"	▸ Weekly Quiz

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
06	Feb. 19th	Ecosystems 1: Cycling of Energy and Matter	1. How does energy move through an ecosystem? 2. How does matter move through an ecosystem? 3. What roles do organisms play in the cycling of energy and matter?	▸ <i>Scientific American</i> "The Hidden Life of Truffles" ▸ <i>Scientific American</i> "Global Population and the Nitrogen Cycle" ▸ <i>Scientific American</i> "The Ocean's Invisible Forest" ▸ <i>Science</i> "Should Oceanographers Pump Iron?"	▸ Weekly Quiz ▸ Midterm Paper Proposal due, February 19th @ 11:59 EST
07	Feb. 26th	Ecosystems 2: Ecological Succession and Biomes	1. How does ecological succession produce biomes? 2. What are the major characteristics of different earth biomes? 3. How do energy and matter cycle through different biomes? 4. How do the abiotic and biotic components of the ecosystem interact? 5. What are the major threats to these biomes?	▸ <i>Scientific American</i> "The Prolific Afterlife of Whales" ▸ <i>Kimball's Online Biology Text</i> "Forest Succession" ▸ <i>Kimball's Online Biology Text</i> "Biomes" ▸ <i>NASA Earth Observatory</i> "Biomes" ▸ <i>National Geographic</i> "Our Good Earth"	▸ Weekly Quiz
08	Mar. 5th	Biodiversity and Conservation	1. What is the biological significance of "biodiversity hotspots" and endemic species? 2. Why is biodiversity important? 3. How is the growth of human populations impacting the earth's biodiversity? 4. How do we conserve biodiversity? 5. How can disturbed ecosystems be restored?	▸ <i>Scientific American</i> "Conservation for the People" ▸ <i>Scientific American</i> "Which Species Will Live?" ▸ <i>National Geographic</i> "Time for a Sea Change" ▸ <i>National Geographic</i> "Ocean Census"	▸ Weekly Quiz ▸ <i>Final Project Guidelines</i> distributed ▸ Midterm Paper due, March 5th @ 11:59 EST ▸ Choice Reading for Week 09 should be registered on the <i>LMS</i> by March 8th @ 11:59 EST
	Mar. 12th	Spring Break, No Class			
09	Mar. 19th	Invasive Species	1. How do non-native species disrupt ecosystems? 2. What characteristics increase the chances that a given species will become invasive? 3. How can we mitigate the effects of invasive species? 4. Why are island habitats so susceptible to invasion?	▸ <i>Frontiers in Ecology and the Environment</i> "Invasive alien species in the era of globalization" ▸ <i>Scientific American</i> "A Friend to Aliens" ▸ ONE READING FROM THE CHOICE SET (See <i>LMS</i>)	▸ Weekly Quiz

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
10	Mar. 26th	Nutrient Inputs and Pollution	1. What is the impact of human activity on the nutrient levels experienced by ecosystems? 2. How have human activities altered the flow of materials within and between ecosystems? 3. How does pollution alter the functioning of ecosystems?	▸ <i>Scientific American</i> "Phosphorus: A Looming Crisis" ▸ <i>Scientific American</i> "Fixing the Global Nitrogen Problem" ▸ <i>Scientific American</i> "Reviving Dead Zones" ▸ <i>National Geographic</i> "The Gulf of Oil"	▸ Weekly Quiz ▸ Final Project Proposal due, March 26th @ 11:59 EST
11	Apr. 2nd	AMNH SELF-GUIDED FIELD TRIP			▸ This week as been reserved to provide you with time to visit the museum.
12	Apr. 9th	Climate Change	1. What evidence suggests that climate change is affecting ecosystems? 2. How might climate change affect the earth's ecosystems in the future?	▸ <i>Scientific American</i> "Spring Forward", "Arctic Plants Feel the Heat" ▸ <i>Scientific American</i> "Climate Change: A Controlled Experiment" ▸ <i>National Geographic</i> "The Acid Sea"	▸ Weekly Quiz ▸ AMNH Assignment due, April 9th @ 11:59 EST ▸ Ecological Footprint Report due, April 11th @ 11:59 EST
13	Apr. 16th	Sustainability 1: Challenges to Cooperative Behavior	1. What is sustainability? 2. In what ways do organisms cooperate? 3. Does natural selection act on larger systems as well as individuals? 4. What are the limits of higher-level selection?	▸ <i>Scientific American</i> "The Climax of Humanity" ▸ <i>Scientific American</i> "The Arithmetic of Mutual Help" ▸ <i>Nature</i> "A safe operating space for humanity" ▸ <i>PNAS</i> "The Collective-Risk Social Dilemma..."	▸ Weekly Quiz ▸ Class visits a computer lab: remember to bring your Pratt ID!! ▸ Choice Readings for Week 14 should be registered on the LMS by April 19th @ 11:59 EST
14	Apr. 23rd	Sustainability 2: Design and Technology	1. How is sustainability infused into the designs and practices of modern society? 2. What technologies are needed to create a more sustainable global human society?	▸ <i>Scientific American</i> "Living on a New Earth" ▸ <i>Scientific American</i> "Can we feed the world & sustain the planet?" ▸ <i>Scientific American</i> "The Efficient City" ▸ ONE READING FROM CHOICE SET #1 (See LMS) ▸ ONE READING FROM CHOICE SET #2 (See LMS)	▸ Weekly Quiz ▸ Course Evaluations ▸ Final Project due, April 23rd @ 11:59 EST
15	Apr. 30th	FINAL PROJECT DISCUSSION	1. How do contemporary artists incorporate ecological concepts into their work? 2. How can creative work be used to convey ecological concepts?	▸ STUDENT ABSTRACTS (See LMS)	▸ Weekly Quiz