

MSCI-271, Ecology for Architects

Spring 2015

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

Course Description:

Architects build structures that serve as environments for organisms: human beings. Therefore, it is crucial that architects understand the ways in which organisms interact with the environment and other organisms. This course will investigate topics in Ecology that will enable students to think more broadly about what it means to design living and working spaces.

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

Meeting Time:	<i>Section 01:</i> Tuesdays, 9:30 am to 12:20 pm, Engineering 111 <i>Section 03:</i> Fridays, 9:30 am to 12:20 pm, Engineering 111
Instructor:	Dr. Christopher Jensen Associate Professor, Department of Math and Science <u>http://www.christopherxjjensen.com/</u> <i>Office:</i> ARC Lower Level, Room G-49 <i>Email:</i> <u>cjensen@pratt.edu</u> <i>Phone:</i> 718-636-3572, x3572 from the BK campus

Office Hours: Tuesdays and Fridays from 2:00 to 3:30 pm, or by appointment

Course Goals: By taking this course, you will...

- acquire an "ecological literacy" about how the natural world works
- develop an understanding of how scientific methods are used to construct ecological knowledge
- become familiar with some of the major ecological challenges facing the Earth today, and the important research which needs to be done to address these concerns
- develop a deeper understanding of how human development impacts ecological communities and systems
- become familiar with the ecological justification for sustainable practice in building and design

Learning Outcomes: Students who successfully complete Ecology for Architects will be able to...

- understand and describe the major ideas of natural selection, population and community ecology, biodiversity, climate change, and sustainability
- describe and debate some of the major ecological issues relating to the current and future human condition, e.g. ecosystem services, agricultural systems, water resources, the management of reserves, and the growth of cities
- identify and describe specific ways in which natural or anthropogenic activity might influence terrestrial and aquatic ecosystems
- describe and assess the ecological impact of the use and development of alternative energy technologies
- describe how environmental health may be impacted by toxic materials, and describe what factors contribute to toxicity
- address issues of ecological concern using qualitative and quantitative arguments
- describe the ecological basis of "green" movements in design and architecture

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%	Homework	You will be required to complete two kinds of homework in this class: Reading Questions and Follow-Up Questions . Both are posted and completed on the <i>LMS</i> . Reading Questions: For each week's readings, I will post a list of concepts. You will be asked to correctly identify which of these concepts were covered in each reading. To receive credit, you must provide answers 30 minutes before your class session meets. Follow-Up Questions : After each class I will post a series of short-form questions. If you emerge from class with a good understanding of the major ideas discussed, you should be able to complete these questions in very little time. The <i>LMS</i> actually allows you to correct wrong answers on these questions, although at the cost of some credit. You are free to use any resource <u>other than another person</u> to complete all homework assignments: your notes, books/articles, the internet, and other media are all allowed (see Open Information Policy and Honor Code below). Unlike other assignments, late Reading and Follow-Up Questions will not be accepted.
40% Classwork		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 and work. Based on your participation during each regular class session, I will assign you a specific grade and occasionally make comments on the strengths and weaknesses of your contribution. You will also complete assignments in class. 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.
10%	Midterm Exam	During Week 07 of class, a <i>Midterm Exam</i> will be taken in class on the <i>LMS</i> . This midterm will cover all material from Weeks 01 through 06. Please make sure to bring your Pratt I.D. to class on the day of your <i>Midterm Exam</i> , as we will be taking this exam in a Pratt computer lab. The midterm will be in an "open notes/ open book/open internet" format and will focus on broad concepts regarding how cooperation evolves rather than the regurgitation of biological facts.
30%	Final Exam	This course ends with a cumulative <i>Final Exam</i> that will be taken in class on the <i>LMS</i> . Please make sure to bring your Pratt I.D. to class on the day of your <i>Final Exam</i> , as we will be taking this exam in a Pratt computer lab. The final will be in an "open notes/open book/open internet" format and will focus on broad concepts learned in the course rather than the regurgitation of scientific facts.

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

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Lateness and absence:

Of Students: I expect you to arrive to all class sessions on time. Lateness and absence will adversely affect your classwork grade.

Of Assignments: Late **Reading** and **Follow-Up Questions** will not be accepted. Other assignments will be penalized by 10% per day.

How to submit documentation for an excusable absence and/or missed deadlines:

There are very few legitimate reasons to miss all or part of a class session or for submitting assignments after the stated deadlines. Valid excuses include family emergencies and personal health issues. The following reasons <u>do not</u> excuse lateness or absence: oversleeping, excessive work load in other classes, inability to use the *Learning Management System*, or "forgetting". If you believe that you have failed to complete work and/or attend class for a legitimate reason, please submit documentation that:

- 1. establishes a clear reason why you could not complete work and/or attend class; and
- 2. clearly delineates the period of time during which you were incapacitated.

Documentation should come from an appropriate source (*for example:* health care provider, employer, clergy) and include contact information that will allow your instructor to validate your excuse. Your instructor makes the final determination on what is and what is not a legitimate reason for missing class and/or submitting assignments after stated deadlines.

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.

Open Information Policy and Honor Code:

You will never be required to memorize anything in this class: we maintain an "open information environment", so you may use your notes, books/articles, the internet, and other media to complete homework, in-class assignments, and quizzes.

HOWEVER: Unless <u>specifically stated otherwise</u>, all work in this class is to be completed <u>on your own</u>. You <u>may not</u> and <u>should not</u> obtain help from <u>any</u> other person to complete any of your work: this includes all homework, all quizzes, and individual assignments. You should also <u>not share</u> any of your individual work with other students. "Studying together", discussing material outside of class, and any other processing of the course materials <u>prior</u> to completing coursework is allowed and encouraged, but you need to do your own work. Students are asked to sign an oath to uphold and honor this code at the beginning of the semester, and are expected to take this commitment seriously even when violating the code would likely escape detection. Any violations of this policy will be considered cheating and reported as appropriate (see *Classroom Civility and Academic Honesty* below).

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: <u>https://lms.pratt.edu/</u> (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: <u>http://www.adobe.com/products/acrobat/readstep2.html</u>. I strongly recommend that you use *Acrobat Reader*, rather than another program, to read all of the PDF's provided in this class.

<u>*Important</u>: If you experience 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: MSCI-271: *Ecology for Architects* syllabus, page 3 of 9

- a. visiting their office in the basement of the ARC Building; or
- b. calling (718) 636-3765; or
- c. emailing services@pratt.edu; or
- d. using the "Computers & Technology Services" section of the "Get Help With" tab of <u>my.pratt.edu</u>.
- 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* <u>when the LMS</u> <u>problem occurs</u>, 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.

Extra-Credit American Museum of Natural History Assignment:

All students have the opportunity to complete an extra-credit assignment based on a trip to the *American Museum* of *Natural History* in Manhattan. The trip is self-guided, and you can complete this assignment any time before the due date of May 11th. The extra credit earned for completing this assignment can be applied to either *Homework* or *Classwork*; you indicate your preference based on where you upload your assignment. To receive credit for this assignment, you must also submit your original museum ticket to your instructor. Please see the LMS for the *Guidelines* to this assignment and a place where you can upload your assignment.

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 phone ringers 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 (I have established the style I prefer here: http://www.christopherxjjensen.com/teaching/for-students/#citation) and use it consistently. Any work 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.christopherxjjensen.com/teaching/

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_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.

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 Disability Services 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 the Disability Services office. Your records will be kept completely confidential. For more information, please see the Pratt webpage for Disability Services (<u>https://www.pratt.edu/student-life/student-affairs/disability-resource-center/</u>).

Weekly Units:

Week	Date Sec. 01	Date Sec. 03	Major Topic(s)	Key Questions	Readings	Events & Assignments
01	Jan. 20th	Jan. 23rd	Introduction to Ecology & Ecosystem Services	 What is ecology? How is the field of ecology organized? How does ecology relate to other biological sciences? How are ecology and environmental science related? What benefits and services do we derive from healthy, functioning ecosystems? 	 Millennium Ecosystem Assessment "Living Beyond Our Means: Natural Assets and Human Well-Being" ESA "Ecosystem Services" Scientific American "The economist has no clothes" 	 Reading Questions due 30 minutes before your class section meets (extra credit this week only) Syllabus distributed LMS Warm-up Assignments discussed Follow-Up Questions due @ 5 pm EST five days after your class section meets
02	Jan. 27th	Jan. 30th	Change in Nature	 What is ecological succession? How are ecological and evolutionary change different? How are ecological and evolutionary change intertwined? How have ecosystems of the past changed in response to large-scale change? How do scientists know determine whether species will be able to adapt to anthropogenic change? 	 <i>Kimball's Online Biology Text</i> "Forest Succession" <i>Scientific American</i> "On the Termination of Species" <i>Scientific American</i> "Tiny Plants that Once Ruled the Seas" <i>Scientific American</i> "The Last Great Global Warming" 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Follow-Up Questions due @ 5 pm EST five days after your class section meets LMS Warm-up Assignments due, January 31st @ 11:59 EST
03	Feb. 3rd	Feb. 6th	Interaction in Ecological Communities	 What forms can population growth take? What factors regulate population growth? What are the different ways in which organisms can interact? What comprises an ecological community? How does ecological efficiency limit the size of food webs? What makes an ecological community stable? 	 The Encyclopedia of Earth "Exponential Growth" & "Carrying Capacity" National Geographic "Wolf Wars" Nature "Legend of the Wolf" Scientific American "Ecosystems on the Brink" The New York Times "In Life's Web, Aiding Trees Can Kill Them" 	 Reading Questions due 30 minutes before your class section meets Follow-Up Questions due @ 5 pm EST five days after your class section meets

Week	Date Sec. 01	Date Sec. 03	Major Topic(s)	Key Questions	Readings	Events & Assignments
04	Feb. 10th	Feb. 13th	Ecological Cycling	 How does energy move through an ecosystem? How does matter move through an ecosystem? How does water move through an ecosystem? What roles do organisms play in the cycling of water, energy, and matter? 	 Scientific American "Global Population and the Nitrogen Cycle" Scientific American "The Ocean's Invisible Forest" Nature "A Long Dry Summer" Scientific American "The Hidden Life of Truffles" 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Follow-Up Questions due @ 5 pm EST five days after your class section meets
05	Feb. 17th	Feb. 20th	Biomes & Ecological Resilience	 What are the major characteristics of different earth biomes? How does ecological succession produce biomes? What factors determine the form and function of different biomes? What are the major threats to these biomes? What determines whether species are resilient to human impacts on biomes? 	 <i>Kimball's Online Biology Text</i> "Biomes" <i>NASA Earth Observatory</i> "Biomes" <i>National Geographic</i> "Our Good Earth" <i>National Geographic</i> "Ghost Cats" <i>NPR Weekend Edition Saturday</i> "On The Trail Of A Mountain Lion" 	 Reading Questions due 30 minutes before your class section meets Follow-Up Questions due @ 5 pm EST five days after your class section meets
06	Feb. 24th	Feb. 27th	Biodiversity Conservation	 Why is biodiversity important? How is the growth of human populations impacting the earth's biodiversity? How do we conserve biodiversity? What are invasive species and how do they threaten biodiversity? 	 Scientific American "Which Species Will Live?" Scientific American "Conservation for the People" BioScience "Does Green Building Come up Short in Considering Biodiversity?" Encyclopedia of Life "What is an Invasive Species?" Landscape Architecture "Brave New Ecology" 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Follow-Up Questions due @ 5 pm EST five days after your class section meets
07	Mar. 3rd	Mar. 6th	Midt	erm Exam taken <u>in class</u>	on the <i>LMS</i> .	 Class visits a computer lab: remember to bring your Pratt ID!!

Week	Date Sec. 01	Date Sec. 03	Major Topic(s)	Key Questions	Readings	Events & Assignments
08	Mar. 10th	Mar. 13th	Climate Change	 What evidence suggests that climate change is affecting ecosystems? How might climate change affect the earth's ecosystems in the future? To what degree is architecture responsible for climate change? 	 Scientific American "Arctic Plants Feel the Heat" Scientific American "Climate Change: A Controlled Experiment" Solar Today "It's the Architecture, Stupid" 	 Reading Questions due 30 minutes before your class section meets Follow-Up Questions due @ 5 pm EST five days after your class section meets
	Mar. 17th	Mar. 20th		Spring Bre	eak, No Class	
09	Mar. 24th	Mar. 27th	Pollution: Nutrients & Toxics	 What is the impact of human activity on the nutrient levels experienced by ecosystems? How have human activities altered the flow of materials within and between ecosystems? How does pollution alter the functioning of ecosystems? What risks does pollution pose to human health? 	 Scientific American "Fixing the Global Nitrogen Problem" Proceedings of the National Academy of Sciences "Atrazine induces complete feminization and chemical castration in male African clawed frogs" National Geographic "The Pollution Within" 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Follow-Up Questions due @ 5 pm EST five days after your class section meets
10	Mar. 31st	Apr. 3rd	Urban Ecology	 In what ways do cities function like ecosystems? How well do urban systems mimic ecosystems? How does the way a city is designed affect the way that city impacts ecosystems? What kinds of ecological communities are excluded by urban development? What kinds of ecological communities can be fostered by urban development? 	 <i>PlaNYC</i> 2011 promo video <i>The New Yorker</i> "Green Manhattan" <i>TreeHugger</i> "New York City: Sustainable City?" Scientific American "How Green Is My City" <i>Scientific American</i> "Wading in Waste" 	 Reading Questions due 30 minutes before your class section meets <u>Class conducted remotely</u>: please see the <i>LMS</i> for details on how to join the class online. Follow-Up Questions due @ 5 pm EST five days after your class section meets Ecological Footprint Report due, April 4th @ 11:59 EST

Week	Date Sec. 01	Date Sec. 03	Major Topic(s)	Key Questions	Readings	Events & Assignments
11	Apr. 7th	Apr. 10th	Sustainability 1: Boundaries for Maintaining Civilization	 What is sustainability? How can ecological footprints be used to understand the sustainability of human practices? How do we conceptualize sustainability from an ecological perspective? What are some ways that human civilization can avoid destroying the ecological systems on which we depend? 	 Global Urbanization "Human Population Grows Up" National Geographic "Age of Man: Enter the Anthropocene" Scientific American "Living on a New Earth" 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Follow-Up Questions due @ 5 pm EST five days after your class section meets Choice Readings for Week 12 should be registered on the <i>LMS</i> by April 11th @ 11:59 EST
12	Apr. 14th	Apr. 17th	Sustainability 2: Design & Technology	 How is sustainability infused into the designs and practices of modern society? What technologies are needed to create a more sustainable global human society? How can architecture be designed in a more sustainable manner? 	 Scientific American "The Efficient City" Wired "Black Magic" CHOICE readings from one of these categories: A. Agriculture; B. Biofuels; C. Energy efficiency; D. Geoengineering; E. Green roofs; F. Solar power; or G. Vertical farming (see the LMS to sign up for one of these categories). 	 Reading Questions due 30 minutes before your class section meets Follow-Up Questions due @ 5 pm EST five days after your class section meets
13	Apr. 21st	Apr. 24th	Sustainability 3: Quantifying the Impact of Architectural Design	 Why does sustainability have to be quantitative rather than qualitative? How do we quantify the potential and actual impacts of architectural designs? 	 Jensen "There's no such thing as qualitative sustainability" Environment Magazine "The Short List" American Institute of Architects "A Guide to Life Cycle Assessment of Buildings: Executive Summary" (p. 9-42 of full document) 	 Reading Questions due 30 minutes before your class section meets Class visits a computer lab: remember to bring your Pratt ID!! Course Evaluations Follow-Up Questions due @ 5 pm EST five days after your class section meets Choice Readings for Week 14 should be registered on the <i>LMS</i> by April 25th @ 11:59 EST

Week	Date Sec. 01	Date Sec. 03	Major Topic(s)	Key Questions	Readings	Events & Assignments
14	Apr. 28th	May 1st	Sustainability 4: Science & Policy	 How can science be used to make informed policy decisions? What is the boundary between science and politics? 	 CHOICE readings from one of these categories: A. Individual; B. Institutional; C. Local; D. National; or E. International (see the <i>LMS</i> to sign up for one of these categories). 	 Reading Questions due 30 minutes before your class section meets Follow-Up Questions due @ 5 pm EST five days after your class section meets Bring any questions you have in preparation for the Final Exam
	May 5th	May 8th	Studio Days, No Class			
15	May 12th	May 15th	Fi	n al Exam taken <u>in class</u> c	on the <i>LMS</i> .	 Extra credit AMNH Assignment due, May 11th @ 11:59 EST Class visits a computer lab: remember to bring your Pratt ID!!