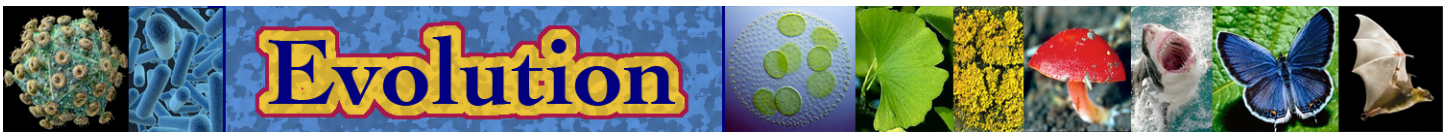

MSCI-260P, Evolution
Department of Mathematics and Science, School of Liberal Arts and Sciences

Course Description:

This course provides a background in the fundamental principles of evolution, including natural selection, adaptation, population genetics, coevolution, speciation, and macroevolution. Using historical texts as well as cutting-edge research papers, we will explore the ongoing development of Darwin's theory of evolution. Through the readings, activities, and dialogue supported by the course, students will learn to apply evolutionary concepts to both the natural and human-mediated world around them.

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

Meeting Time: Tuesdays, 9:30 am to 12:20 pm, Engineering 108

Instructor:
Dr. Christopher Jensen
Assistant Professor, Department of Math and Science
http://www.christopherxjjensen.com/
Office: ARC Lower Level, Room G-49
Email: cjensen@pratt.edu
Phone: 718-636-3572, x3572 from the BK campus

Office Hours: Mondays 12:30 to 2:30 pm, Tuesdays 12:30 to 1:30 pm *or by appointment*

Course Goals:

- To appreciate the historical events which have led to the science of evolution.
- To understand the mechanisms by which evolution occurs.
- To explore the diversity of species and understand their evolutionary origin and relatedness.
- To discover the evidence amassed in favor of evolutionary theories.
- To understand the evolutionary significance of human beings.
- To apply evolutionary theories to the modern world.

Learning Objectives: Successful completion of *Evolution* will allow you to...

- Connect the course of human history to innovations in evolutionary understanding.
- Describe how natural selection operates to produce adaptation.
- Chronicle a diversity of adaptations and explain their function(s).
- Depict the diversity of life and explain the origin of this diversity.
- Analyze biological evidence relevant to evolution in the past and present.
- Assess the degree to which scientific evidence favors different evolutionary theories.
- Explain how evolutionary knowledge can be applied to human society and culture.
- Report on your own observations of and experiments with the process of evolution.

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
5%	*Quizzes*	You will be given a fifteen (15) minute quiz at the beginning of each class session. Based on recent class sessions and 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 not the actual readings on your quiz.
20%	*Participation*	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.
25%	*Assignments*	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 each assignment based on its clarity of thought, level of insight, and contribution to class dialogue.
25%	*Research Project*	During the semester, you will be given a research project. This project will require you to investigate the process and product of evolution through simulation software. The project will be written up as a formal report documenting your use of scientific methods to solve an evolutionary problem.
25%	*Final Exam*	This class ends with a cumulative final. The final will be in an "open notes" format (but not open book) and will focus on broad concepts of evolution rather than the memorization of biological facts. Sample questions and the opportunity to ask review questions will be provided at the end of the semester.

Under no circumstances will personalized extra-credit work be provided for students who have missed classes or failed to submit work on time

Lateness and Absence:

Of Students: I expect you to arrive to class on time. Students who arrive more than 15 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 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".

Weekly Units:

Week	Date	Major Topic(s)	Key Questions	Readings
1	Jan. 18th	**The Origin of Evolution**	What were the earliest theories explaining evolutionary patterns? Who were the prominent scientists who contributed to early evolutionary theory? What led Darwin to his theory of natural selection?	**Zimmer** Chapters 1 & 2 *Scientific American* "Darwin's Living Legacy"
2	Jan. 25th	**Natural Selection & Adaptation**	What is natural selection? How does artificial selection differ from natural selection? What are some types of natural selection? How does natural selection produce adaptation?	**Zimmer** Chapter 6 & p. 155-169 *Scientific American* "Testing Natural Selection"
3	Feb. 1st	**Population Genetics**	Why is heritability a prerequisite for evolution? What are the different patterns inheritance can take? Why is genetic diversity needed in order for evolution to occur? What is the role of mutation in evolutionary processes? What is genetic drift and how does it cause evolutionary change?	**Zimmer** Chapter 5 *Scientific American* "From Atoms to Traits"
4	Feb. 8th	**Sex & Reproduction**	Why do organisms reproduce sexually? How is sexual selection different from other forms of natural selection? What roles do conflict and cooperation play in reproduction?	**Zimmer** Chapter 12 *EurekaAlert* "War between the sexes: the coevolution of genetalia in waterfowl" *National Geographic* "Father Knows Best"
5	Feb. 15th	**Speciation**	What is a species? How do we identify different species? What is the evolutionary process that generates new species? What drives the patterns of species diversity that we observe across the earth's ecosystems? What is evolutionary convergence?	**Zimmer** Chapter 9 *Scientific American* "What is a Species?"
6	Feb. 22nd	**The Tree of Life I**	Where did life come from? What were some of the major evolutionary innovations of early life? What is a phylogenetic tree and how is DNA evidence used to construct this tree?	**Zimmer** Chapter 7 *Scientific American* "Barcode of Life" *Scientific American* "The Origin of Life on Earth"
7	Mar. 1st	**The Tree of Life II**	How did the diversity of life on earth evolve? How do we classify extant organisms based on their evolutionary history? How do major evolutionary shifts occur? What causes evolutionary radiations?	**Zimmer** p. 59-74 & 169-185 *Scientific American* "Regulating Evolution" *Nature* "Origin of Pinnipedia"

Week	Date	Major Topic(s)	Key Questions	Readings
8	Mar. 8th	**The Fossil Record**	How does geological knowledge contribute to our understanding of evolution? How are fossils used to reconstruct evolutionary histories? What are "fossil intermediates" and why are they important?	**Zimmer** Chapter 3 *Scientific American* "Taking Wing" *Nature* "Squint of the Fossil Flatfish"
	Mar. 15th	*Spring Break, No Class*		
9	Mar. 22nd	**Extinctions & Radiations**	How common is extinction? Why do extinctions occur? What is "mass extinction" and how has it influenced the evolutionary history of the earth? How does the current-day prevalence of extinction compare with the past?	**Zimmer** Chapter 10 *National Geographic* "Lost Giants" *Scientific American* "On the Termination of Species"
10	Mar. 29th	**AMNH FIELD TRIP**		
11	April 5th	**Coevolution**	What is coevolution? What is the connection between symbiosis and coevolution? What ecological interactions produce coevolution? How do we find evidence for coevolution?	**Zimmer** Chapter 11 *Scientific American* "The Taming of the Cat" + one CHOICE video
12	April 12th	**Multilevel Selection**	Can selection occur at levels above the individual? How is kin selection different from other forms of natural selection? What is group selection and how is it different from other forms of selection? Can cooperation be a product of natural selection?	*Evolution for Everyone* Chapters 18-20 *Scientific American* "Darwin Misunderstood"
13	April 19th	**Humans & Cultural Evolution**	How did humans evolve? How does our evolutionary history compare with other organisms? What is "cultural evolution" and how does it compare with biological evolution?	**Zimmer** p. 75-83, 205-208, & 342-352 *TED Talks* "Joshua Klein: The amazing intelligence of crows" *National Public Radio* "As The Crow Flies, Tokyo Battles Avian Pest"
14	April 26th	**Prospects for Evolution**	What are some ways that technology may affect the future path of evolution? Can evolutionary knowledge serve humanity? How does the science of evolution interact with human culture?	**Zimmer** Chapter 13 + one CHOICE reading
15	May 3rd	**FINAL EXAM**		

Important Dates	
Event	**Date**
Research Project Proposal due	Tuesday, **February 22nd** @ 11:59 pm EST
Research Project due	Wednesday, **March 23rd** @ 11:59 pm EST
AMNH Assignment due	Tuesday, **April 5th** @ 11:59 pm EST
Final Exam	Tuesday, **May 3rd**

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 a valiant but 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*, immediately contact me via email or phone, or visit the ***Help Desk in the basement of the Engineering Building (they can also be contacted at x3765 or helpdesk@pratt.edu). In order for me to verify claims of *LMS* outages, I must hear from you *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. You main textbook will be:

> Zimmer, Carl. (2010). *The Tangled Bank: An Introduction to Evolution*, First Edition. Roberts and Company, Greenwood Village, Colorado. (ISBN #978-0981519470)

This book is required and can be purchased from the PrattStore. All other readings will be posted on the *LMS*. You are encouraged to save paper by viewing these readings electronically (as opposed to printing them out).

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.

Any disruptive, disrespectful, or dishonest behavior will be promptly reported to the appropriate campus authority. Students must adhere to all Institute-wide policies (listed in the *Bulletin* under "Community Standards") which include policies on attendance, academic integrity, plagiarism, computer, and network use. Please see http://www.pratt.edu/policies (click on *Judicial Procedures*) for policies and procedures for handling academic conduct issues.

AMNH Trip:

On March 29th, 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 during the month of March. Further details will be provided in class during Week 06.

Help with Writing:

Your *Research Project* 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 work 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:

Any student eligible for and requesting academic accommodations due to a disability is requested to provide a letter of accommodation from *Disability Services* within the first few weeks of the semester. Please contact Mai McDonald, Disability Services Coordinator, in the *Office of the Vice President for Student Affairs*, Main Building, Lower Level: 718-636-3711. See http://www.pratt.edu/student_life/student_services/disability_services/ for more information.