



MSCI-362, *The Evolution of Sex*

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

Course Description:

This course explores the evolution of sexual reproduction as an alternative to nature's original means of propagating genes (asexual cloning). We'll explore why sex evolved, weighing the benefits and liabilities associated with sexual reproduction. We will also look at the diversity of sexual strategies employed across all kingdoms of life and consider the conflict and cooperation inherent in the reproductive process. The course will conclude by looking at the sexual behavior of humans and our closest primate relatives.

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

Meeting Time: Thursdays, 9:30 am to 12:20 pm, North Hall 107

Instructor: Dr. Christopher Jensen
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Office Hours: Wednesdays 2 to 3:30 pm, Thursdays 12:30 to 2 pm, *or by appointment*

Course Goals:

- To understand the process of evolution and how it shapes reproductive behaviors, anatomies, social systems.
- To compare the advantages and disadvantages of asexual and sexual means of reproducing.
- To explore how sexual competition has led to the diversity of reproductive adaptations observed in nature.
- To demonstrate that male and female reproductive strategies are often in conflict, and the resolution of this conflict depends on the ecological conditions experienced by each species.
- To provide an overview of primate reproductive strategies, including that of human beings.
- To explain the role of sex in modern human societies in light of both biological and cultural evolution.

Learning Objectives: Students who successfully complete *The Evolution of Sex* will be able to...

- Explain why sexual reproduction is employed by such a diverse array of organisms.
- Describe how reproductive competition has led to the evolution of a variety of unique adaptations.
- Give examples of adaptations that result from the process of sexual selection.
- Explain the basis of differing reproductive strategies of males and females and predict how different ecological conditions will affect these strategies.
- Draw connections between the reproductive behaviors of humans and our nearest primate relatives.
- Research and explain a scientific question related to an evolved reproductive trait.
- Analyze modern human sexual practices in the light of our evolutionary history.
- Incorporate scientific research and concepts related to reproduction into a creative work.

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
15%	<i>Reading Response</i>	During each week of class, I will post a series of reading response questions (RRQ's) on the <i>LMS</i> . These questions will help guide your reading and get you thinking about key issues that will be discussed in class. To receive credit, you must provide answers by 5:00 pm on the day before class. Because I need to read your answers before each class meeting, late <i>Reading Response Questions</i> will not be accepted (please do not email!).
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.
20%	<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.
20%	<i>Midterm Paper</i>	For your midterm paper, you will conduct research on a particular scientific question related to how sexual behavior evolves. Using both primary and secondary sources, you will describe the hypotheses that have been posited to answer your question, explain the predictions made by each of these hypotheses, and discuss the forms of data that have been or could be used to test these predictions.
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. 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. Late reading responses are not accepted.

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".

Readings:

You will be assigned a series of reading materials from popular science periodicals, books, and the primary (peer-reviewed) scientific literature. Your main books are required and will be:

Judson, Olivia (2002). *Dr. Tatiana's Sex Advice to All Creation: The Definitive Guide to the Evolutionary Biology of Sex*. Henry Holt and Company. ISBN: 978-0-8050-6332-5, \$17.00.*

Ryan, Christopher and Cacilda Jethá (2010). *Sex at Dawn: The Prehistoric Origins of Modern Sexuality*. HarperCollins. ISBN: 978-0-06-170780-3, \$15.99.*

These books are required and can be purchased from the PrattStore.

All other readings will be posted on the *LMS*. These readings include articles from the science literature as well as chapters from the following books:

Diamond, Jared (1997). *Why is Sex Fun?: The Evolution of Human Sexuality*. Basic Books. (ISBN: 0-465-03127-7)*

Dixson, Alan F. (2009). *Sexual Selection and the Origins of Human Mating Systems*. Oxford. (ISBN: 978-0-19-955943-5)

Eldredge, N. (2004). *Why we do it: Rethinking sex and the selfish gene*. New York: Norton. (ISBN: 978-0-39305-082-0)*

Roughgarden, Joan (2004). *Evolution's Rainbow: Diversity, Gender, and Sexuality in Nature and People*. University of California Press. (ISBN: 978-0-52026-012-2)*

Roughgarden, Joan (2009). *The Genial Gene: Deconstructing Darwinian Selfishness*. University of California Press. (ISBN: 978-0-52026-593-6)*

Saxon, Lynn (2012). *Sex at Dusk: Lifting the Shiny Wrapping from Sex at Dawn*. CreateSpace. (ISBN: 978-1477697283)*

You are encouraged to save paper by viewing these readings electronically (as opposed to printing them out); books with asterisks (*) are on reserve in the Pratt Brooklyn library.

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 any two-dimensional components of your 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.

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:

Your *Final 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:

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 (http://www.pratt.edu/student_life/student_services/disability_resource_center/for_students/services/).

Weekly Units:

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
1	Aug. 29th	Evolution: Survival and Reproduction	<ol style="list-style-type: none"> 1. What is an organism? 2. How do sexual and asexual organisms differ? 3. What causes populations of organisms to evolve? 4. What role do survival and reproduction play in the evolutionary process? 5. What processes determine the success of organisms at surviving and/or reproducing? 	<ul style="list-style-type: none"> ▸ <i>Why We Do It</i>: “Chickens and Eggs” [Ch 2, p. 29-50] ▸ <i>Why We Do It</i>: “The Natural Economy” [Ch 3, p. 51-61] 	<ul style="list-style-type: none"> ➔ Syllabus distributed ➔ LMS Warm-up Assignments discussed ➔ RRQ's due August 30th @ 5 pm EST
2	Sept. 5th	Species and Sex	<ol style="list-style-type: none"> 1. What is a species? 2. How is sexual reproduction tied into the definition of a species? 3. How do we define sex? 4. Why are most populations composed of two sexes in equal abundance? 	<ul style="list-style-type: none"> ▸ <i>Dr. Tatiana</i>: p. 1-5, 137-143, 176-181, 187-195, 199-211 ▸ <i>Why We Do It</i>: “The Consequences of Baby-Making” [Ch 4, p. 62-75] ▸ <i>Why We Do It</i>: “Economics + Babies + Time = Evolution” [Ch 5, p. 76-94] ▸ <i>Evolution's Rainbow</i>: “Sex versus Gender” [Ch 2, p. 22-29] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ LMS Warm-up Assignments due September 5th @ 5 pm EST
3	Sept. 12th	Sex: Why Bother?	<ol style="list-style-type: none"> 1. What are the costs and benefits of sexual reproduction? 2. Why be a hermaphrodite? 3. What are the costs of inbreeding? 4. Why does sexual reproduction exist? 5. What are the benefits of outbreeding? 	<ul style="list-style-type: none"> ▸ <i>Dr. Tatiana</i>: p. 167-176, 182-186, 195-199, 212-234 ▸ <i>Evolution's Rainbow</i>: “Sex and Diversity” [Ch 1, p. 13-21] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class
4	Sept. 19th	Reproductive Competition	<ol style="list-style-type: none"> 1. What are some ways that organisms compete reproductively? 2. What is sperm competition? What role(s) can females play in sperm competition? 	<ul style="list-style-type: none"> ▸ <i>Dr. Tatiana</i>: p. 7-33, 60-72, 76-92, 122-126 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ Midterm Paper Guidelines distributed ➔ Class visits a computer lab: remember to bring your Pratt ID!!

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
5	Sept. 26th	Sexual Selection and its Detractors	<ol style="list-style-type: none"> 1. What is sexual selection and how does it arise from sexual competition? 2. How do male and female reproductive strategies differ? 	<ul style="list-style-type: none"> ▶ <i>Dr. Tatiana</i>: p. 33-39, 42-49, 56-59, 72-75, 105-121 ▶ <i>Evolution's Rainbow</i> "The Theory of Evolution" [Ch 9, p. 159-181] ▶ <i>The Genial Gene</i> "Social Selection Defined" [Ch 3, p. 61-69] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ Class visits a computer lab: remember to bring your Pratt ID!!
6	Oct. 3rd	Mating Systems: Social Groups & Ecological Influences	<ol style="list-style-type: none"> 1. What conflicts determine the mating system typical of different organisms? 2. How do ecological factors influence the optimal mating strategy of males and females? 	<ul style="list-style-type: none"> ▶ <i>Dr. Tatiana</i>: p. 40-42, 50-55, 93-104, 126-137 ▶ <i>Why is Sex Fun?</i> p. 15-34 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ Midterm Paper Proposals due October 3rd @ 11:59 pm EST
7	Oct. 10th	Reproduction and Society	<ol style="list-style-type: none"> 1. What conditions favor reproductive monogamy? 2. How is sex used for social as well as reproductive purposes? 	<ul style="list-style-type: none"> ▶ <i>Dr. Tatiana</i>: p. 152-165 ▶ <i>Genial Gene</i> "The Behavioral Tier" [Ch 7, p. 129-162] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class
8	Oct. 17th	Same Sex Animal Relationships	<ol style="list-style-type: none"> 1. How do we explain same sex couplings among animals? What might be the benefits of extending sexual behaviors to members of one's own sex? 2. What is the phylogenetic relationship between different primate mating strategies? 	<ul style="list-style-type: none"> ▶ <i>Scientific American Mind</i> "Bisexual Species" ▶ <i>Dr. Tatiana</i> p. 143-151 ▶ <i>Sex at Dawn</i> "The Ape in the Mirror" [Ch 4, p. 61-78] ▶ <i>Scientific American Mind</i> "Bonobo Sex & Society" 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ <i>Final Project Guidelines</i> distributed ➔ Midterm Papers due October 17th @ 11:59 pm EST
9	Oct. 24th	What Kind of Primate are Humans?	<ol style="list-style-type: none"> 1. How do different primate reproductive strategies compare? 2. What are the limitations of comparing humans to our primate relatives? 	<ul style="list-style-type: none"> ▶ <i>Sex at Dawn</i> "Little Big Man" [Ch 15, p. 215-223] ▶ <i>Sex at Dawn</i> "The Truest Measure of Man" [Ch 16, 225-232] ▶ <i>Sex at Dawn</i> "Sometimes a Penis is Just a Penis" [Ch 17, p. 233-243] ▶ <i>Sex at Dusk</i> "Body Talk" [Ch 8, p. 243-274] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
10	Oct. 31st	Humans as Reproductively Exceptional	<ol style="list-style-type: none"> 1. What characteristics make human reproduction unique? 2. Why are human reproductive practices so different from other animals? 	<ul style="list-style-type: none"> ▶ <i>Why is Sex Fun?</i> “The Animal with the Weirdest Sex Life” [Ch 1, p. 1-13] ▶ <i>Sex at Dawn</i> “Who’s Your Daddies?” [Ch 6, p. 90-104] ▶ <i>Sex at Dawn</i> “Mommies Dearest” [Ch 7, 105-112] ▶ <i>Why is Sex Fun?</i> “Wrong Time for Love” [Ch 4, p. 63-88] 	<ul style="list-style-type: none"> ➔ RRQ’s due 5 pm EST Wednesday before class ➔ Slots for <i>Final Project Presentations</i> become available: sign up on the LMS
11	Nov. 7th	Pleasure & Conflict	<ol style="list-style-type: none"> 1. What is the role of orgasm in human reproduction? 2. How do sexual conflicts influence the mating system of humans? 	<ul style="list-style-type: none"> ▶ <i>Sexual Selection & The Origins of Human Mating Systems</i> “Cryptic Female Choices” [Ch 4, p. 71-81] ▶ <i>Sex at Dawn</i> “The Prehistory of O” [Ch 18, 244-254] ▶ <i>Sex at Dawn</i> “When Girls Go Wild” [Ch 19, p. 255-268] ▶ <i>Sex at Dusk</i> “Let’s Hear it for the Girls” [section of Ch 9, p. 273-282] ▶ <i>Sex at Dawn</i> “Paternity Certainty: The Crumbling Cornerstone of the Standard Narrative” [Ch 9, p. 124-137] ▶ <i>Sex at Dusk</i> “Paternity” [sections of Ch 4, p. 111-116, 140-147] 	<ul style="list-style-type: none"> ➔ RRQ’s due 5 pm EST Wednesday before class ➔ Final Project Proposals due November 7th @ 11:59 pm EST
12	Nov. 14th	Are Humans Monogamous?	<ol style="list-style-type: none"> 1. What evidence is there for humans as a monogamous species? 2. What evidence is there for humans as polygynous species? 3. What evidence is there for humans as a species with a multi-male/multi-female mating system? 	<ul style="list-style-type: none"> ▶ <i>Why is Sex Fun?</i> “What are Men Good For?” [Ch 5, p. 89-102] ▶ <i>Sex at Dawn</i> “A Closer Look at the Standard Narrative of Human Sexual Evolution” [Ch 3, 46-60] ▶ <i>Sex at Dawn</i> “Making a Mess of Marriage, Mating, and Monogamy” [Ch 8, p. 113-123] ▶ <i>Sex at Dawn</i> “Jealousy: A Beginner’s Guide to Coveting Thy Neighbor’s Spouse” [Ch 10, p. 138-149] ▶ <i>Sex at Dusk</i> “Monogamy & Jealousy” [Ch 6, p. 181-210] 	<ul style="list-style-type: none"> ➔ RRQ’s due 5 pm EST Wednesday before class

Week	Date	Major Topic(s)	Key Questions	Readings	Events & Assignments
13	Nov. 21st	Human Sexuality Today	<ol style="list-style-type: none"> To what degree do reproductive imperatives drive contemporary human sexual behavior? Besides reproduction, what other function does sex play for humans? How has modern culture influenced human sexuality? 	<ul style="list-style-type: none"> ▸ <i>Evolution's Rainbow</i> "Sexual Orientation" [Ch 14, p. 245-261] ▸ <i>Sex at Dawn</i> "Remember the Yucatan!" [Ch 1, p. 19-24] ▸ <i>Sex at Dawn</i> "On Mona Lisa's Mind" [Ch 20, p. 271-279] ▸ <i>Sex at Dawn</i> "The Pervert's Lament" [Ch 21, p. 280-300] 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ Final Projects due November 21st @ 11:59 pm EST ➔ Sign Up for a <i>Final Project Presentation slot</i> by November 21st @ 11:59 pm EST
	Nov. 28th	<i>Thanksgiving Break, No Class</i>			
14	Dec. 5th	The Future of Human Sexuality & Final Project Presentations 1	<ol style="list-style-type: none"> How might human reproductive practices change in the future? How well do contemporary artists and designers incorporate an understanding of how sex and sexual behaviors evolved into creative work? How can scientific understanding of how sex and sexual behaviors evolved be incorporated into creative work? 	<ul style="list-style-type: none"> ▸ <i>Sex at Dawn</i> "Confronting the Sky Together" [Ch 22, p. 301-312] ▸ <i>Student Project Summaries 1</i> (posted on the LMS) 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ <i>In-class presentation of Final Projects</i> (see the LMS for presentation schedule)
15	Dec. 12th	Final Project Presentations 2	<ol style="list-style-type: none"> How well do contemporary artists and designers incorporate an understanding of how sex and sexual behaviors evolved into creative work? How can scientific understanding of how sex and sexual behaviors evolved be incorporated into creative work? 	<ul style="list-style-type: none"> ▸ <i>Student Project Summaries 2</i> (posted on the LMS) 	<ul style="list-style-type: none"> ➔ RRQ's due 5 pm EST Wednesday before class ➔ <i>In-class presentation of Final Projects</i> (see the LMS for presentation schedule)