

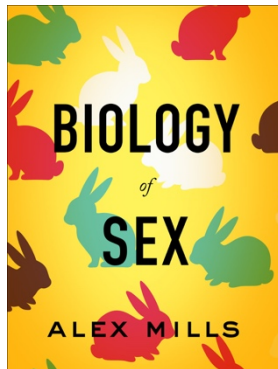
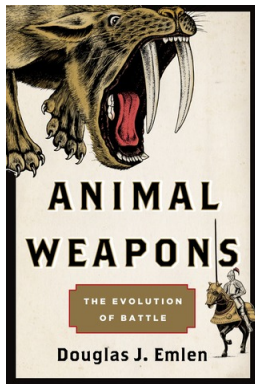
**Important policies:**

- You **MUST** appear on the official university roster to attend any class.
- If you do not have the pre-reqs for this course, you may be dropped from it.
- Upon receipt of this syllabus, if you choose to remain enrolled in the class you explicitly agree to be bound by the policies stated therein.

**Office hours:** By appointment. Please make your appointments at least 24 hours in advance. Come prepared.

I am always happy to hear from you by email. Email may be the fastest way to get a response from me. If you would like to meet, please allow 24-48 hours to schedule a meeting.

**1. Required texts etc.**



In addition to these readings I will be distributing scientific papers for this course during the semester. Reading the required material before each class period is a requisite for success in this course. Do not fall behind. Be prepared to discuss the reading material at the beginning of each week.

**2. Organization of the course:**

The class is focused around three themes: Sexual differentiation, Sexual dimorphism, and Sexual selection. We will be having active discussions about material at the forefront of these areas. You will be asked to write reflections and summaries of the course material throughout the semester.

**3. Attendance:** You are expected to attend **ALL** classes without exception.

**Class is held 8:30 – 8:45am T, Th**

**4. Unexcused absences**

The core of this class includes in class discussion, in class presentations, and guest speakers. For the sake of learning and out of respect for your fellow classmates, your presence in this class is critical. While I understand that things happen, more than three unexcused absences will result in an automatic 10-point deduction from your final grade.

**5. Examinations:** There are no lecture exams or a final for this course, although the class will meet during the final period for a synthetic discussion of the semester's material.

**6a. Undergraduate grade scale: 250 points**

Participation: 50% - 100 points

Writing: 50% - 250 points

Two, 3-5-page papers 75 points each

Peer feedback provided for outlines – 25 points each

**6b. Graduate grade scale: 400 points**

Participation: 40% - 140 points

Presentation: 20% - 70 points

Writing: 40% - 190 points

Two, 3-5-page papers 70 points each

Peer feedback provided for outlines – 25 points each

**7. Organization:**

During the first week of the semester students will be organized into five groups of four students (20 students total). For each topic that we discuss each group will be responsible for presenting a piece of this topic to the class. It may be a figure, an important piece of background information, a method, a synthesis of ideas, or maybe an opinion on a controversial topic. Groups are not required to include PPT slides in their presentation, but may include them if it will help their presentation. There is no time requirement to these presentations, but I am looking for a thorough description of the topic.

**8. Academic honesty:** This class (lecture and lab) has a “zero tolerance policy”. I expect that you will adhere to the highest standards of academic honesty. If evidence to the contrary is found, I will press for the **most severe sanctions** under University policy. ***This will include an automatic grade of “F” for the course and notification of the appropriate Dean for further sanctions. Please consult the official university policy statement that is posted on Sakai as part of your course documents.***

**9. Students with special needs:**

We will be using a unique class format that does not include exams. Please talk to me during the first week of class if you qualify for SSWD assistance. I am happy to talk to you about making this class a success for you.

Loyola University Chicago's Office of Services for Students with Disabilities coordinates and ensures services and accommodations for registered students with disabilities as mandated by the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973. These services provide equal educational opportunities to students by minimizing the impact of functional limitations upon their academic lives. Services for Students with Disabilities (SSWD) must have documentation of the disability on file to provide academic accommodations. ***We must receive this documentation no later than the end of the first week of classes.***

General guidelines about services can be found at <http://www.luc.edu/sswd/index.shtm>

**10. Rubric for class graduate presentation/discussion:**

1. Summary of the paper  
Explanation of question, methods, main conclusion: \_\_\_\_\_ (20pts)
2. Explanation of figures: \_\_\_\_\_ (20pts)
3. Use of external resources for context and background \_\_\_\_\_ (10pts)
4. Facilitation of discussion \_\_\_\_\_ (10pts)
5. Relate to other course material \_\_\_\_\_ (10pts)

Additional comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# The Evolution of Animal Sex

2019 Biology 395  
Reading list

## **Week 1: Introduction and sex chromosome evolution**

August 27: Introduction to the class, course mechanics

August 29: Lecture on sexual differentiation

*Biology of Sex*, Chapter 9

## **Week 2: Sex chromosome evolution**

September 3-5:

1) Gamble, T and Zarkower, D. 2012. Sex Determination. *Current Biology*

2) Gamble et al. 2015. Restriction site-associated DNA sequencing (RAD-seq) reveals an extraordinary number of transitions among gecko sex-determining systems.

*Biology of Sex*, Chapter 8.2-8.3

## **Week 3: Gonad development and sexual differentiation**

September 10-12

1) DeFalco and Capel. 2009. Gonad morphogenesis in vertebrates: Divergent means to a convergent end. *Annual Reviews of Cell and Developmental Biology*

2) Zhao et al. 2010. Somatic sex identity is cell autonomous in the chicken. *Nature*

## **Week 4: Environmental sex determination 1**

September 19-21

1) Holleley et al. 2016. Sex reversal in reptiles: Reproductive oddity or powerful driver of evolutionary change? *Sexual Development*.

2) Holleley et al. 2015. Sex reversal triggers rapid transition from genetic to temperature-dependent sex. *Nature*

*Biology of Sex*, Chapter 8.4

## **Week 5: Environmental sex determination 2**

September 26-28

1) Todd et al. 2016. Bending genders: The biology of natural sex change in fish. *Sexual Development*

2) Hayes et al. 2010. Atrazine induces complete feminization and chemical castration in male African clawed frogs (*Xenopus laevis*). *PNAS*

3) Hayes et al. 2002. Hermaphroditic, demasculinized frogs after exposure to the herbicide atrazine at low ecologically relevant doses. *PNAS*.

## **Week 6: Sexual conflict**

October 3-5

1) Cordero-Rivera and Rivas-Torres. 2019. Sexual conflict in water striders, dragonflies and diving beetles.

### **CHAPTER 11 ONLY**

2) Khila et al. 2012. Function, developmental genetics, and fitness consequences of a sexually antagonistic trait. *Science*.

*Biology of Sex*, Chapter 7.2

## **Fall break October 7-8**

## **Week 7: Sexual plasticity**

October 10

Ainsworth, C. 2015. Sex redefined. *Nature*.

*Biology of Sex*, Chapter 9.5

### **Week 8: Genital evolution**

October 15-17: Graduate student lead

- 1) Sanger et al. 2015. Resurrecting embryos of the tuatara, *Sphenodon punctatus*, to resolve vertebrate phallus evolution. *Biology Letters*.
- 2) Reinhardt et al. 2007. Female-limited polymorphism in the copulatory organ of a traumatically inseminating insect. *American Naturalist*.

**First paper assigned**

### **Week 9: Genital coevolution**

October 22-24: Graduate student lead

- 1) Brennan et al. 2010. Explosive eversion and functional morphology of the duck penis supports sexual conflict in waterfowl genitalia. *Proceedings B*.
- 2) Brennan P. 2016. Studying genital coevolution to understand intromittent organ morphology. *ICB*
- 3) Brennan et al. 2007. Coevolution of Male and Female Genital Morphology in Waterfowl. *PLOS*

**Outline of paper 1 due**

### **Week 10-11: Evolution of pregnancy**

October 29-November 7

- 1) Wagner et al. 2014. Evolution of mammalian pregnancy and the origin of the decidual stromal cell. *International Journal of Developmental Biology*
- 2) Griffith et al. 2017. Embryo implantation evolved from an ancestral inflammatory attachment reaction. *PNAS*
- 3) Pavlicev and Wagner. 2016 Evolution of the female orgasm. *JEZ-B*
- 4) Komisaruk. 2016. Commentary on “The Evolutionary Origin of Female Orgasm” by M. Pavlicev and G. Wagner, 2016, *J. Exp. Zool.* 326:326–337

**First paper due**

### **Week 12: Animal weapons part 1**

November 11-13

- 1) Parts 1-3 Doug Emlen, *Animal weapons*

### **Week 13: Mating systems 1**

November 19-21

- 1) Kamath and Losos. 2017. The erratic and contingent progression of research on territoriality: a case study. *Behavioral Ecology and Sociobiology*
- 2) Bush and Simberloff. 2018. A case for anole territoriality. *Behavioral Ecology and Sociobiology*
- 3) Kamath and Losos. 2018. Reconsidering territoriality is necessary for understanding *Anolis* mating systems. *Behavioral Ecology and Sociobiology*

### **Week 14: Mating systems 2**

November 26: Remes et al. 2015. The evolution of parental cooperation in birds. *PNAS*

**Second paper assigned**

**Thanksgiving break**

### **Week 15: Female dominance: hyenas**

December 3-5

- 1) Holekamp. 2006. Spotted hyenas
- 2) Curren et al. 2015. The functions of male-male aggression in a female-dominated mammalian society
- 3) Cunha et al. 2014. Development of the external genitalia: Perspectives from the spotted hyena (*Crocuta crocuta*)

**Outline of paper 2 due**

**Second paper due Wednesday, December 11**