

DIVERSITY OF BIOLOGICAL SEX CHARACTERISTICS (BIOL 4970/5970), FALL 2022

Instructor: Dr. Ari Berkowitz
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Class: Tu Th 10:30-11:45 AM, Richards Hall 304

Office Hrs: Tu Th 1-3 PM, W 2-4 PM, or by appt.

Required readings: Available on Canvas (canvas.ou.edu)

COURSE OBJECTIVES

After completing this course, you should be able to:

- 1) Explain the advantages and disadvantages of sexual reproduction and how it likely evolved.
- 2) Describe the diversity of non-human animal genetic, hormonal, anatomical, physiological, and behavioral sex characteristics.
- 3) Explain how vertebrate sex determination, differentiation, and development typically occur.
- 4) Describe the diversity of human anatomical and physiological sex characteristics and explain the likely causes of such diversity.
- 5) Discuss, using biological evidence accurately, under what circumstances genital surgeries on infants should occur and how athletes with atypical sex characteristics should be allowed to compete.

GRADING

<u>Course component</u>	<u>Contribution to grade</u>
Pop quizzes.....	10%
Class participation.....	10%
Papers [3-5 pages each; 4970: 3 papers (topics 1-3); 5970: 4 papers (incl. 2 topic 3 options)]....	80%

Pop quizzes will include material from required readings assigned for that day or before. There will be no make-up quizzes.

Grading Errors: If you believe there was an error in a quiz or a mistake in paper grading, you must give the instructor a *written* description of the apparent mistake and your reasoning within one week of receiving the grade. (You can use email.) The instructor will decide on the complaint and inform the student *at a later time*.

IMPORTANT DATES

Due dates for paper 1: 1st draft-September 27; final version-October 6

Due dates for paper 2: 1st draft-October 20; final version-November 1

No class (Thanksgiving): November 24

Due dates for paper(s) 3-4 final version: December 1

NOTES

- 1) **Attendance and class participation are expected.** Some important announcements may also occur during class. Please contact the instructor promptly if you need to miss class for medical reasons. OU encourages all students and faculty to get vaccinated for COVID-19 and to wear masks in class (see <https://www.ou.edu/together/university-mandatory-masking-policy>).
- 2) **Readings:** All readings will be available on Canvas (canvas.ou.edu) as pdf files and/or links to internet sites. Students are expected to access and read all the readings labeled “required.” Readings labeled “optional” are completely optional.
- 3) **Discussions:** This course will emphasize class discussions. **Please be civil and respectful of each other at all times.** Disagreements are acceptable and even encouraged, as they will help us gain a deeper understanding of the issues, but we must disagree without being disagreeable. Please don’t make assumptions about your fellow students or expect anyone to volunteer anything personal.
- 4) **Email:** Some communications may be via e-mail. Students are expected to access their OU e-mail account (or set e-mail forwarding appropriately) and check for course-related messages **daily**.
- 5) **Plagiarism:** Regulations and responsibilities stated in the *Student Code* and *Faculty Handbook* will be followed in the event of academic dishonesty. (See <http://integrity.ou.edu/>.) **Papers must be written entirely by the student alone; plagiarism will not be tolerated. Student papers should not copy phrases from publications or quote authors. Student papers will be submitted electronically to Turnitin.com to check for plagiarism.**
- 6) **Incomplete:** If a grade of W or I is requested, University policy will be followed.
- 7) **Disability:** The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Disability Resource Center [<http://www.ou.edu/drc.html>; 730 College Ave., phone: 405-325-3852 (voice) or 405-217-3494 (VP)] prior to receiving accommodations in this course.
- 8) **Pregnancy:** Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact the professor as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see www.ou.edu/content/eoo/faqs/pregnancy-faqs.html for commonly asked questions.
- 9) **Harassment:** For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24/7, counseling services, mutual no-contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5, M-F) or OU Advocates 405-615-0013 (24/7) to learn more or to report an incident.
- 10) **Religious observances:** It is University of Oklahoma policy to excuse absences resulting from religious observances and to provide without penalty for the rescheduling of required classwork that falls on religious holidays. If you will miss class for a religious observance, please notify the instructor in advance so we can more easily make arrangements to accommodate your absence.

STUDENT PAPER TOPICS

1: What are the advantages and disadvantages of sexual reproduction between a female and a male, as compared to the alternatives?

2: What kinds of variations of sex-related genes, hormones, anatomy, physiology, and behavior occur among non-human animals and why do you think they occur?

3-4 options:

What are the biological causes of diverse human sexual anatomy, physiology, and behavior?

Under what circumstances should genital surgeries on human infants occur and why?

How should intersex, transgender, and nonbinary athletes be allowed to compete, and why?

Note: For the first two papers, a draft paper must be uploaded to Canvas by the draft paper due date. The draft paper will not be graded, but if it is not submitted on time, there will be a grade deduction of 1/3 grade per day late on the student's final paper grade.

TIPS FOR READING ORIGINAL RESEARCH ARTICLES

When you read, focus on the Introduction, Summary or Abstract, and Discussion or Conclusions (probably read in that order). Try not to get hung up on methodological details or unfamiliar vocabulary. As you read, ask yourself the following questions: What did the author(s) basically do in the key experiment(s)? Why did they choose to do this particular experiment(s)? What was the major finding(s) of this experiment(s)? How did the authors interpret this finding(s)? Do you think this interpretation of the finding(s) is reasonable? Try to identify the key 1-3 data figures in the article and evaluate whether they really support the authors' conclusions.

WEEK	TOPIC	REQUIRED READINGS	OPTIONAL READINGS
Week 1: 8/23, 8/25	Overview	Dimijian 2005	Roughgarden 2016 article <i>or</i> Roughgarden 2021 seminar; Warkentin 2021 seminar
Weeks 1-2: 8/25, 8/30, 9/1	Evolution of sex Advantages and disadvantages of sexual reproduction	Stearns & Hoekstra 2005 Ch. 8; Hurst 2016 ; Roughgarden 2009 Chs. 1-2; Crow 1994	Openstax Biology 11.1 ; Stearns & Hoekstra pp. 70-75; Maynard Smith et al. 1988; Tobler & Schlupp 2008
Weeks 3-4: 9/6, 9/8, 9/13	> 2 sexes; parthenogenesis	Gaines 2022; Simon et al. 2002; Whitfield 2004; Neaves & Baumann 2011	Heitman 2015; Roehl 2016 ; Yadav et al. 2021; Kearney et al. 2022; Simon et al. 2010; Scanlan 2012 ; St. Petersburg St. Univ. 2021 ; Winteritz & Abbate 2015
Weeks 4-5: 9/15, 9/20	Sexual selection	Stearns & Hoekstra 2005 pp. 236-273; Roughgarden 2007	
Weeks 5-6: 9/22, 9/27	Diversity of non-human animal sex characteristics Vertebrate sex determination, differentiation, and development	Berkowitz Human Physiology lectures (3); Capel 2017	Silverthorn 2016; Laycock & Meeran 2013 Ch. 8; Uhlenhaut et al. 2009; Matson et al. 2011
Weeks 6-7: 9/29, 10/4	Hermaphrodites + intersex animals	Roughgarden 2009 Chs. 3-4; Scharer & Ramm 2016; Levy et al. 2020	Cormier 2021 ; Todd et al. 2019
Weeks 7-8: 10/6, 10/11, 10/13	Diverse sexual anatomy/physiology; > 2 animal genders	Simon 2013 ; Jimenez et al. 1993; Glickman et al. 2005; Roughgarden 2009 Ch. 6 + pp. 136-153	vom Saal et al. 1999; Kopachena & Falls 1993; Maney et al. 2015
Week 9: 10/18, 10/20	Sex and the brain Non-human animal brains	Phoenix et al. 1959; Agate et al. 2003; McCarthy 2020	
Week 10: 10/25, 10/27	Human brains	Hines 2020; Joel et al. 2020; Eliot 2021	Jordan-Young 2012; Joel et al. 2015; Eliot et al. 2021
Week 11: 11/1, 11/3	Diversity and treatment of human biological sex characteristics Intersex people	Ainsworth 2015; Fausto-Sterling 1993; BBC News 2015	TED Radio Hour 2020 ; Montañez 2017 ; Arboleda et al. 2014; Springer et al. 2016; Imperato-McGinley et al. 1974; Quinn 2015 1 & 2
Weeks 12-13: 11/8, 11/10, 11/15	Intersex surgeries	Fausto-Sterling 2000 Ch. 3; Quinn 2018 ; Dreger 2017	Buzzfeed 2015 ; Kiira Triea
Weeks 13-14: 11/17, 11/22	Gay & transgender people	LeVay 2017 Ch. 3; Williams 2018; Gross 2016; Radix & Harris 2021	Balthazart 2020; Reardon 2021; LeVay 1991; Bao & Swaab 2011; Wilson 2021; Rew et al. 2021; Schillace 2022; Bazelon 2022
Weeks 15-16: 11/29, 12/1, 12/6, 12/8	Athletic competitions	Padawer 2016; Karkazis et al. 2012; CBS News 2021; Surprenant 2021 ; de la Cretaz 2021	Futterman 2022; IOC 2021; Photopoulos 2021; Radiolab 2018 ; Longman 2020; Bermon et al. 2014; Healy et al. 2014; Tajrobehkar 2017 ; Frisch 2015

Note: This schedule is tentative and may be changed by the instructor as needed.