HEB 1328 – Spring 2020
Species-Spanning Medicine:
The Nature of Physical and Mental Illnesses in Humans and Other Animals

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Lecture and Location: Tuesdays and Thursdays, 6:00 – 7:15pm EDT, Remote Teaching Only

Discussion Sections by Teaching Fellow: Katia Chadaideh, kchadaideh@g.harvard.edu, Section Times TBD

Professor's Office Hours: Fridays – Drop-in office hours from 3:00-5:00pm EDT

TF's Office Hours: TBD

Course Description

Heart attacks, breast cancer, obesity, anxiety, compulsive disorders, eating issues, and self injury can be found across the animal kingdom. Human exceptionalism has been so entrenched in modern medicine it has obscured many of crucial health connections across species. This course presents species-spanning medicine as a new perspective for understanding: 1) the nature of disease 2) how evolutionary processes have shaped human vulnerability to illness and 3) how anthropocentric traditions have contributed to stigma associated with mental illness, cancer, obesity and other disorders.

Taught by a physician, this course uses a "mini-medical school" approach to introduce relevant medical information and formal methods of phylogenetic modeling as an evolutionary framework. *No prior medical or advanced scientific knowledge is assumed.* Both physical and mental illnesses will be covered. This year, mental illnesses across species and mental illness stigma will receive special focus. Students will be introduced to formal methods of systematic review and meta-analysis, and motivated students will be encouraged to submit their work to national conferences.

Course Objectives

1. Students will develop an understanding of evolutionary perspectives of contemporary medical, surgical and psychiatric illness.
2. Students will acquire a range of skills important for scientific literacy and useful for research and publication including:
    a. Developing an appropriate question for a systematic review
    b. Conducting all steps of a SWIFT-Review.
    c. Creating a taxonomy
    d. Generating phylogenetic models of disease vulnerability
    e. Analysis of phylogenetic models.

****No prior knowledge of the above skills is assumed.*

Course Materials

1. *Zoobiquity* by Natterson-Horowitz and Bowers (ISBN: 978-0307477439)
2. *Hunger: A Memoir of (My) Body* by Gay (ISBN: 978-0062420718). *****This book contains sensitive content.*****
3. *Illness as Metaphor and AIDS and Its Metaphors* by Sontag (ISBN: 978-0312420130)

Reading assignments will come from the above course materials and various articles each week.

*****Important Note regarding Sensitive Content*****

There are passages of sensitive content in some of the reading assignments as they include content on sexual harassment or violence. These will be noted accordingly in the list of course readings, where relevant.

If you would like information and/or require support regarding issues of sexual harassment or violence, here are some resources available to Harvard students:

- Harvard Title IX office: https://titleix.harvard.edu/what-title-ix

- Office for Sexual Assault Prevention and Response (OSAPR): https://osapr.harvard.edu/ OSAPR runs a 24-Hour Information/Support Line at 1-617-495-9100. All assistance is confidential. Calling does not initiate an official university complaint–that choice is up to you. OSAPR also provides a list of Harvard-wide resources, where you can connect with timely and confidential counseling, explore filing a complaint, contact specially trained 24/7 emergency services, and learn about engaging interim measures — academic, workplace, housing, or other support services — to help you continue to participate in all aspects of the Harvard community.

- Harvard University Health Services (HUHS) also provides confidential counseling resources. Their number is 1-617-495-5711.

Grading

20% Weekly Assignments and In-Class Discussion
20% Discussion Attendance and Participation
20% Midterm Project
15% Oral Presentation
25% Final Project

Grade Distribution

A = 94% and above; A minus = 90 to 93.49%; B plus = 87 to 89.49%; B = 83 to 86.49%;
B minus = 80 to 82.49%; C plus = 77 to 79.49%; C = 73 to 76.49%; C minus = 70 to 72.49%
D plus = 67 to 69.49%; D = 63 to 66.49%; D minus = 60 to 62.49%; F = below 60%

Weekly Assignments and In-Class Discussion (20%)

Each week, a controversial issue in medicine will be presented and students assigned their 'position' and asked to write a one-page summary justifying it. This summary is due on Wednesdays at 11:59pm EDT.

During class, students will engage each other in debate and discussion related to the issue. A weekly grade will include both your written assignment and in-class participation.

Discussion Attendance and Participation (20%)
Attendance and participation in a discussion section are mandatory. Your TF will teach technical details related to the class assignments and final exam.

Midterm Project (20%)
Students will develop a research question and 1) conduct a systematic review using SWIFT-Review as well as 2) build a phylogeny related to it.

The Midterm Project instructions will be distributed on Friday, October 2, 2020 at 12:00pm EDT and will be due via Canvas upload on Friday, October 9, 2020 at 12:00pm EDT. Late submissions will receive a 10% deduction on your final exam per 24-hour period.

Oral Presentation (15%)
Each student will present research on how evolutionary and comparative methods change perspectives on the cause of a psychiatric or physical illness.

Final Project (25%)
Students will develop a research question and 1) conduct a systematic review using SWIFT-Review as well as 2) build a phylogeny related to it. The final project instructions will be distributed at 12:00pm EDT on Friday, December 4, 2020 and will be due no later than 12:00pm EDT on Friday, December 11, 2020 via Canvas upload. Late submissions will be given 10% deductions per 24-hour period.

Policy regarding Absences and Extensions
Excused absences require a doctor's note or notification with a valid excuse at least 24 hours in advance if it's not because of an emergency. For extensions requests, these requests are handled on a case-by-case basis. Most extension requests require a doctor's note unless it's an emergency situation. For students who have several exams and/or projects due on the same date for multiple classes, both professor and TF are to receive the extension request by email far in advance of the due date.

Academic Integrity
All written work must be in a student's own words and represent original thought. The ideas of others as well as quotations must be properly attributed; more than six words copied from another source without proper reference constitute plagiarism.

Assignments/papers cannot be made up, except under rare circumstances when prior permission has been granted by the instructor. With regard to plagiarism and/or cheating, please refer to the Harvard Academic Integrity and Academic Dishonesty policy. It can be found at https://handbook.fas.harvard.edu/book/academic-integrity. Please review it carefully and contact Dr. Natterson-Horowitz if you have any questions.

Students with Disabilities
Harvard makes reasonable academic accommodations for qualified students with disabilities. To receive academic and classroom disability accommodations, students must first consult with the Harvard Accessible Education office. A counselor will work with the student and academic department

to provide reasonable academic accommodations. For more information, visit http://aeo.fas.harvard.edu, call 1-617-496-8707, and/or email AEO@fas.harvard.edu.

COURSE SCHEDULE AND READING ASSIGNMENTS

Week #	Tuesdays and Thursdays
1	**Thursday, September 3, 2020** **Introduction to Evolutionary Medicine** *Zoobiquity:* Chapter 1, *"Dr. House, Meet Doctor Doolittle,"* pp. 3-24.
2	**Tuesday, September 8, 2020** and **Thursday, September 10, 2020** *Note: Weekly Assignment #1 due Wednesday, September 9, 2020 at 11:59pm EDT via Canvas upload.* **Cardiovascular Pathology and Evolutionary Perspectives** Readings *Zoobiquity:* Chapter 2, *"The Feint of Heart,"* pp. 25-39 and Chapter 6, *"Scared to Death,"* pp. 139-167. Lampert R. Emotion and Sudden Cardiac Death. *Expert Rev Cardiovasc Ther* 2009;7(7):723-5. Esler M. Mental stress and human cardiovascular disease. *Neuroscience & Biobehavioral Reviews* 2017;74(Part B):269-276.
3	**Tuesday, September 15, 2020** and **Thursday, September 17, 2020** *Note: Weekly Assignment #2 due Wednesday, September 16, 2020 at 11:59pm EDT via Canvas upload.* **Cancer and Evolutionary Perspectives** Readings *Zoobiquity:* Chapter 3, *"Jews, Jaguars, and Jurassic Cancer,"* pp. 40-69. *Illness as a Metaphor…*: "Illness," pp. 5-87. Madsen T, Arnal A, Vittecoq M, et al. Chapter 2 – Cancer Prevalence and Etiology in Wild and Captive Animals. *Ecology and Evolution of Cancer* 2017;11-46.

	Ostrander EA, Dreger DL, Evans JM. Canine Cancer Genomics: Lessons for Canine and Human Health. *Annual Review of Animal Biosciences* 2019;7:449-472.
4	**Tuesday, September 22, 2020** and **Thursday, September 24, 2020** *Note: Weekly Assignment #3 due Wednesday, September 23, 2020 at 11:59pm EDT via Canvas upload.* **Basic Phylogenetic Analysis, Building Phylogenies of Disease Vulnerability, Systematic Reviews and Developing Adaptive Hypotheses** Readings Pollock, Alex and Eivind Berge. "How to do a systematic review." *International Journal of Stroke* 13 (2018): 138-156.
5	**Tuesday, September 29, 2020** and **Thursday, October 1, 2020** *Note: Weekly Assignment #4 due Wednesday, September 30, 2020 at 11:59pm EDT via Canvas upload and on Friday, October 2, 2020, Midterm Project instructions to be distributed at 12:00pm EDT.* **STDs and Evolutionary Perspectives** Readings *Zoobiquity:* Chapter 10, *"The Koala and the Clap,"* pp. 249-272. Johnson HJ, Koshy AA. Latent Toxoplasmosis Effects on Rodents and Humans: How Much is Real and How Much is Media Hype? *mBioASM* 2020;11(2):e02164-19. Waterman, Jane M. "The Adaptive Function of Masturbation in a Promiscuous African Ground Squirrel." *PLoS One* 5 (2010): e13060.
6	**Tuesday, October 6, 2020** and **Thursday, October 8, 2020** *Note: Midterm Project due on Friday, October 9, 2020 at 12:00pm EDT via Canvas upload. No Weekly Assignment due this week.* **Sexuality and Evolutionary Perspectives** *****All of this week's readings contain sensitive content related to sexual harassment and violence***** Readings *Zoobiquity:* Chapter 4, *"Roar-gasm,"* pp. 70-110. *****contains sensitive content*****

	Clutton-Brock, T.H., G.A. Parker. "Sexual coercion in animal societies." *Anim. Behav.* (1995) 49:1345-1365. ** Harris, Heather S., Stori Coates, Michelle M Staedler, M. Tim Tinker, David A. Jessup, James T. Harvey and Melissa A. Miller. "Lesions and Behavior Associated with Forced Copulation of Juvenile Pacific Harbor Seals (*Phoca vitulina richardsi)* by Southern Sea Otters (*Enhydra lutris nereis*)." *Aquatic Mammal* 36 (2010): 331 -341. *****VERY GRAPHIC CONTENT***** Maruthupandian, Jayabalan and Ganapathy Marimuthu. "Cunnilingus Apparently Increases Duration of Copulation in the Indian Flying Fox, *Pteropus giganteus*." *PLoS One* 2013 8(3): e59743.** Sugita, Norimasa. "Homosexual Fellatio: Erect Penis Licking between Male Bonin Flying Foxes *Pteropus pselaphon*." *PLoS One* (2016). doi: 10.1371/journal.pone.0166024.** Tan, Min, Gareth Jones, Guanjin Zhu, Jianping Ye, Tiyu Hong, Shanyi Zhou, Shuyi Zhang and Libiao Zhang. "Fellatio by Fruit Bats Prolongs Copulation Time." *PLoS One* 4 (2009): e7595.** Miller, Geoffrey, Joshua M. Tybur, and Brent D. Jordan. "Ovulatory Cycle Effects on Tip Earnings by Lap Dancers: Economic Evidence for Human Estrus?" *Evolution and Human Behavior* 27 (2007): 375-81.
7	**Tuesday, October 13, 2020 and Thursday, October 15, 2020** *Note: Weekly Assignment #5 due Wednesday, October 14, 2020 at 11:59pm EDT via Canvas upload.* **Obesity and Evolutionary Perspectives** Readings *Zoobiquity:* Chapter 7, *"Fat Planet,"* pp. 168-203. *Hunger:* pp. 3-111 *****contains sensitive content related to sexual harassment and violence in Chapter 11, pages 38-45. These pages are in the paperback edition and may differ in a hard cover or eBook***** Bairlein F. How to get fat: nutritional mechanisms of seasonal fat accumulation in migratory songbirds. *Naturwissenschaften* 2002;89:1-10. Nutall FQ. Body Mass Index: Obesity, BMI, and Health: A Critical Review. *Nutr Today* 2015;50(3):117-128.

8	**<u>Tuesday, October 20, 2020</u>** and **<u>Thursday, October 22, 2020</u>** *<u>Note</u>: Weekly Assignment #6 due Wednesday, October 21, 2020 at 11:59pm EDT via Canvas upload.* **Eating Disorders and Evolutionary Perspectives** <u>Readings</u> *Zoobiquity:* Chapter 9, *"Fear of Feeding,"* pp. 226-248 *Hunger:* pp. 115-226 McMillan F. Stress-induced and emotional eating in animals: A review of the experimental evidence and implications for companion animal obesity. *Journal of Veterinary Behavior* 2013;8(5):376-385. Razzoli M, Sanghez V, Bartolomucci A. Chronic subordination stress induces hyperphagia and disrupts eating behavior in mice modeling binge-eating-like disorder. *Front Nutr* 2015, https://doi.org/10.3389/fnut.2014.00030. Wong, Marian Y.L. et al. Fasting or feasting in a fish social hierarchy. *Current Biology* 18 (2008): R372-R373.
9	**<u>Tuesday, October 27, 2020</u>** and **<u>Thursday, October 29, 2020</u>** *<u>Note</u>: Weekly Assignment #7 due Wednesday, October 21, 2020 at 11:59pm EDT via Canvas upload.* **Self-Injury and Compulsions** <u>Readings</u> *Zoobiquity:* Chapter 8, *"Grooming Gone Wild,"* pp. 204-225. *****contains sensitive content related to self-injury***** *Hunger*: pp. 227-304
10	**<u>Tuesday, November 3, 2020</u>** and **<u>Thursday, November 5, 2020</u>** *<u>Note</u>: Weekly Assignment #8 due Wednesday, November 4, 2020 at 11:59pm EDT via Canvas upload.* **Trauma and Addiction** <u>Readings</u> *Zoobiquity:* Chapter 5, *"Zoophoria,"* pp. 111-138.

	Mutschler J, Bilbao A, von der Goltz C, et al. Augmented Stress-Induced Alcohol Drinking and Withdrawal in Mice Lacking Functional Natriuretic Peptide-A Receptors. *Alcohol and Alcoholism* 2010;45(1):13-16. Katriina T. Resilience in Dogs? Lessons from Other Species. *Vet Med (Auckl)* 201;10:159-68.
11	**Tuesday, November 10, 2020** and **Thursday, November 12, 2020** *Note: Weekly Assignment #9 due Wednesday, November 4, 2020 at 11:59pm EDT via Canvas upload.* **Adolescence and Evolution** Readings *Zoobiquity:* Chapter 11, *"Leaving the Nest,"* pp. 273-300. *Wildhood:* Chapter 1
12	**Tuesday, November 17, 2020** and **Thursday, November 19, 2020** *Note: Weekly Assignment #10 due Wednesday, November 18, 2020 at 11:59pm EDT via Canvas upload.* **Student Presentations**
13	**Tuesday, November 24, 2020** *Note*: *No Weekly Assignment due.* SPECIAL ACTIVITY TBD **No Class on Thursday, November 26, 2020 – THANKSGIVING BREAK**
14	**Tuesday, December 1, 2020 and Thursday, December 3, 2020** *Note*: *No Weekly Assignment due.* *Final Project instructions to be distributed Friday, December 4, 2020 at 12:00pm EDT.* **Student Presentations**

15	**Final Project Due Date and Time**: Friday, December 11, 2020 at 12:00pm EDT via Canvas upload. Late submissions will receive a 10% grade deduction per 24-hour period past due date and time.