

**BIOA 355/BIOL 385: Evolutionary Medicine  
Spring 2018**

**Instructor:** Dan Eisenberg, PhD

*E-mail:* For course-related questions:

- 1) First check to see if the answer is in the syllabus.
- 2) Use the course discussion forum to ask general questions so the rest of the class can benefit.
- 3) Only use email for personal questions which you don't want others to see or which would not be of interest to other students ([dtae@uw.edu](mailto:dtae@uw.edu)).

*Office Hours:* By appointment

**Teaching Assistant:** Hilary Bethancourt, MPH, MA

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*Office Hours:* By appointment

**Class meeting time:** T, Th 10:00 – 11:20 am (1 hr 20 min)

**Class meeting place:** Smith 211

**Class homepage:** <https://canvas.uw.edu/courses/1129820>

**Course description:**

This course explores evolutionary explanations for health and disease and considers how natural selection and the legacies of our human, primate, mammalian and bacterial ancestries have shaped our biology. Topics include mental disorders, aging, cancer, diet, obesity, diabetes, infectious diseases, racism and health differences between human groups.

**Course goals:**

By the end of this course, students should:

- Understand evolutionary theory and how it can inform our current biology, health and disease at individual, population and societal levels.
- Be able to synthesize and critically evaluate the strengths and weaknesses of evolutionary arguments.
- Be able to generate hypotheses about the evolutionary roots of health and disease.

**Readings:** There are no required books to purchase. Readings will be chapters from edited volumes, articles from the primary scientific literature, and other sources, all of which will be

posted on the Canvas page under “Files.” You are expected to read the assigned course readings before class.

Some tips from previous students on course readings:

- ❖ *Read, read, read! It's a lot of work to catch up if you get behind in the readings. In class discussions are a lot more interesting and useful (to you and your other classmates) if you come prepared.*
- ❖ *Taking good notes while doing the readings is essential to have reference to.*
- ❖ *Try to apply "proximate" and "ultimate" causes to everything that we learn - it will help you to understand that concept, and to tie each lesson into the overall class theme.*
- ❖ *Some advice is to be critical of the papers, authors make mistakes or have different viewpoints and being able to defend or go against an author's main viewpoint is a good skill to have.*
- ❖ *When you are doing the class readings, be sure to ask/write down questions that you have.*
- ❖ *Stay on top of the readings. Don't wait last minute to read because the articles are very lengthy.*
- ❖ *Take notes on all of the readings. It'll be helpful to look back over them when studying for tests.*
- ❖ *It's really easy to lapse into skimming an article but whenever I did that, it didn't go so well.*

**Please be sure to bring a copy of the day's readings to class (and also the reading from the previous classes if we haven't finished discussing them).** This will make it easier for you to participate in class discussions and make the most out of your time in class.

### **COURSE ASSIGNMENTS AND GRADING:**

Grades will be based on **participation** in classroom, group and online discussions, **quizzes**, and **two exams**.

**The grading breakdown is as follows:**

Participation	5%
Quizzes (Online and in class)	20%
Exam 1	35%
Exam 2	40%

**Exams:**

- You will need the scanable multiple choice ‘scantron’ sheets (“ScorePak® Standard Answer Sheets” available for you to purchase from The University Book Stores, the Student Union Facilities candy counters [HUB, By George, and South Campus Center Newstand], and the Easy Shoppe [1406 NE 40th Street]) and a number 2 pencil to fill it out with (bring a spare just in case). **FAILURE TO HAND IN YOUR EXAM WITH ALL QUESTIONS FILLED IN ON SCANTRON SHEET WILL RESULT IN A 15% REDUCTION OF EXAM GRADE.**
- Exams are a combination of true/false, multiple choice, fill in the blank and short answer questions.
- Exams will be based on material from lecture, readings, online videos, and class discussions. Sometimes it might seem like the class discussions are going on tangents; however, these discussions are often valuable may also be included on the exam.

- Exam II will primarily focus on the material presented in the second half of the class (i.e., material covered after Exam I). But it will require an understanding of the fundamental ideas presented in the first half of the class and will build on case studies from the first half of class to inform interpretations of later case studies. If many students get a question wrong on the first exam, that question is often repeated on the second exam.
- There will be some time set aside for an in class review session on the class before exams. These review sessions will be driven by questions from the class and will end when the class runs out of questions. We will not provide study guides or practice questions.
- If for some reason you miss an exam, arrangements must be made prior to the exam date. If you miss an exam you will have 24 hours to contact the instructor and official documentation (doctor's excuse, accident report, etc.) will be required to schedule a make-up. Students that fail to follow these guidelines will receive a zero on the exam.
- There will not be an exam during finals week.
- Exams will not be handed back, but you can schedule time with the TA to look over either exam.

Exam tips from previous students:

- ❖ *Make sure you really understand the readings and attend as many class sessions as possible because many materials appear in the exam are based off the discussion in class.*
- ❖ *I would suggest that students actively participate in class. At the beginning of class, I contributed to class discussion and I feel that that prepared me for the exams.*
- ❖ *Go to class every day; not only will you accrue participation points, you also won't have to study too hard for exams. Make sure you review the quiz questions too, especially to jog your memory if you're cramming.*

**Quizzes:**

Online Reading Quizzes:

- Each reading or homework video will be accompanied by several short questions in the "Quizzes" section of Canvas. These questions might be multiple choice, fill in the blank or short answer questions. Online reading quizzes might also include points discussed during previous class sessions.
- All online reading quizzes will be **due at 8:00 am** before class via the Canvas webpage. Late responses will not be accepted.
- You will have at least 16 opportunities to answer reading quizzes. Only the 14 highest scores will be counted towards your reading quizzes grade. Completing reading quizzes beyond the required number will help your participation grade. It is strongly recommended that you complete all reading quizzes since this will help you to review for the exams and your participation grade.

Online quiz tips from previous students:

- ❖ *Take the reading quizzes seriously. If you spend time really understanding the material in the reading quizzes, you'll already be fairly prepared by the time the exam rolls around.*
- ❖ *Actually do each reading before class and don't just skim for the reading quiz answers. Doing the reading really helps foster good conversation in class and helps solidify the ideas. They're really not thaaat long. Just give yourself an hour or two to finish them each night.*

### In class quizzes

- There may be occasional in class quizzes. Quiz questions will be related to the readings or previously discussed material.
- Correct answers on in class quizzes will count toward a portion of your total quiz grade.
- Participation in quizzes, regardless of correct answers, will count towards your participation grade (see below).

### **Participation:**

- The participation grade will be primarily based on your participation in designated discussions/assignments in class and on Canvas. This may include participation in quizzes or short writing assignments during class.
- Students must complete the assigned reading before class so as to be able to take part in class and group discussions. I may call on students randomly.
- Completing reading quizzes beyond the required number will also contribute to your participation grade.

### **Commitment to Viewpoint Diversity, Mutual Understanding, and Constructive**

**Disagreement:** In order to create a classroom environment that supports respectful, critical inquiry through the free exchange of ideas, the following principles will guide our work:

- Treat every member of the class with respect, even if you disagree with their opinion;
- Bring light, not heat;
- Reasonable minds can differ on any number of perspectives, opinions, and conclusions;
- Because constructive disagreement sharpens thinking, deepens understanding, and reveals novel insights, it is not just encouraged, it is expected;
- No ideas are immune from scrutiny and debate;
- The science of inquiry requires citation of data and evidence, not your personal opinion.

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### **Other Policies:**

The University of Washington is committed to fostering an environment where the free exchange of ideas is an integral part of the academic learning environment. Disruption or domination of classroom discussions can prohibit other students from fully engaging and participating. Any student causing disruption may be asked to leave any class session, and, depending on the severity and frequency of that behavior, an incident report may be filed with Community Standards and Student Conduct. As a condition of enrollment, all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the academic community. For more detailed information on these standards, please visit: <http://apps.leg.wa.gov/WAC/default.aspx?cite=478-120>.

### **Course schedule:**

<i>Class</i>	<i>Day</i>	<i>Date</i>	<i>Topic</i>	<i>Readings</i>
1	T	3/27	Overview of course, introduction to evolution	·Wilson (2007). Chapter 3: A Third Way of Thinking. 17-21.
2	R	3/29	Introduction to evolutionary medicine	·Nesse (1994). Chapter 1: The Mystery of Disease and Chapter 2: Evolution by Natural Selection. 3-25.

3	T	4/3	Life history theory	·Gluckman (2016). The Human Life History. 97-129 Chapter 5 p 97-129.
4	R	4/5	Aging	·Kirkwood (2002). Evolution of ageing. 737-745.
5	T	4/10	No Class, but quiz and see →	·watch sessions 1-2: <a href="http://tinyurl.com/cwwhg54">http://tinyurl.com/cwwhg54</a>
6	R	4/12	No Class, but quiz and see →	·watch sessions 3-4: <a href="http://tinyurl.com/cwwhg54">http://tinyurl.com/cwwhg54</a>
7	T	4/17	Diet and Nutrition	·Leonard (2002). Food for thought. Dietary change was a driving force in human evolution. 106-115. ·Gluckman (2016). Nutritional and Metabolic Adaptation. 205-236 Chapter 9 p 205-236.
8	R	4/19	Parent-offspring cooperation and conflict I	·Small (1998). Chapter 6: Food for Thought. xxii, 292 p.. ·Gettler (2009). The Science of Sharing Sleep. .
9	T	4/24	Parent-offspring cooperation and conflict II	·Sherman (2002). Nausea and vomiting of pregnancy in an evolutionary perspective. S190-S197. · <a href="https://tinyurl.com/2a6hdmv">https://tinyurl.com/2a6hdmv</a> ·Kilner (2012). Parent–offspring conflict. 119-132 not required to read section 7.4 and from section 7.5.2 to the end.
10	R	4/26	Exam I	
11	T	5/1	Stress and depression	·Pollard (2008). Chapter 8: Depression and stress. 136-152.
12	R	5/3	Racism and Health	·Sidanius (2000). Chapter 3: Gender and Race Discrimination: The Interactive Nature of Disadvantage. ix, 353 p..
13	T	5/8	Smoking, Booze, Fruit and Worms - Substance use and abuse	·Nesse (1994). An evolutionary perspective on substance abuse. 339-348.
14	R	5/10	Group Selection and the evolution of virulence	·Ewald (1993). The evolution of virulence. 86-93. ·Wilson (2008). Evolution "for the Good of the Group". 380-389.
15	T	5/15	Antibiotic resistance	·Bergstrom (2008). The ecology and evolution of antibiotic-resistant bacteria. 125-137.
16	R	5/17	Cancer	·Aktipis (2013). Evolutionary foundations for cancer biology. 144-159.
17	T	5/22	Non-genetic evolution and the evolution of science	·Cziko (1995). Without miracles : universal selection theory and the second Darwinian revolution. xiii, 385 p. p151-179.
18	R	5/24	Corruption in medicine/science	·Goldacre (2013). Chapter 1: Missing Data. 1-99 pg 1-37.
19	T	5/29	Final class and Exam Review	·Biss (2013). Sentimental Medicine: Why we still fear vaccines. 33-40. ·Sullivan (2017). Telling the Anti-Vaccine Community They're Wrong Has Been Tried for Years Now, and It Doesn't Work— Here's Another Approach. .
20	R	5/31	Exam II (NO FINAL EXAM DURING EXAMS WEEK)	

### **List of Class Readings:**

Aktipis, C. A. and R. M. Nesse (2013). "Evolutionary foundations for cancer biology." Evolutionary Applications 6(1): 144-159.

- Bergstrom, C. T. and M. Feldgarden (2008). The ecology and evolution of antibiotic-resistant bacteria. Evolution in health and disease. S. C. Stearns and J. C. Koella. Oxford ; New York, Oxford University Press. **Oxford biology**: 125-137.
- Biss, E. (2013). "Sentimental Medicine: Why we still fear vaccines." Harper's Magazine **January**: 33-40.
- Cziko, G. (1995). Without miracles : universal selection theory and the second Darwinian revolution. Cambridge, Mass., MIT Press.
- Ewald, P. W. (1993). "The evolution of virulence." Scientific American **268**(4): 86-93.
- Gettler, L. T. and J. J. McKenna (2009). "The Science of Sharing Sleep." mothering(152).
- Gluckman, P. D., A. Beedle, et al. (2016). The Human Life History. Principles of evolutionary medicine. Oxford, United Kingdom, Oxford University Press: 97-129.
- Gluckman, P. D., A. Beedle, et al. (2016). Nutritional and Metabolic Adaptation. Principles of evolutionary medicine. Oxford, United Kingdom, Oxford University Press: 205-236.
- Goldacre, B. (2013). Chapter 1: Missing Data. Bad pharma : how drug companies mislead doctors and harm patients: 1-99.
- Kilner, R. M. and C. A. Hinde (2012). "Parent–offspring conflict." The evolution of parental care (eds NJ Royle, PT Smiseth & M. Kölliker): 119-132.
- Kirkwood, T. B. L. (2002). "Evolution of ageing." Mechanisms of Ageing and Development **123**(7): 737-745.
- Leonard, W. R. (2002). "Food for thought. Dietary change was a driving force in human evolution." Scientific American **287**(6): 106-115.
- Nesse, R. M. (1994). "An evolutionary perspective on substance abuse." Ethology and Sociobiology **15**(5): 339-348.
- Nesse, R. M. and G. C. Williams (1994). Chapter 1: The Mystery of Disease and Chapter 2: Evolution by Natural Selection. Why we get sick : the new science of Darwinian medicine. New York, Times Books: 3-25.
- Pollard, T. M. (2008). Chapter 8: Depression and stress. Western diseases : an evolutionary perspective. Cambridge ; New York, Cambridge University Press: 136-152.
- Sherman, P. W. and S. M. Flaxman (2002). "Nausea and vomiting of pregnancy in an evolutionary perspective." American Journal of Obstetrics and Gynecology **186**(5): S190-S197.
- Sidanius, J. and R. C. Veniegas (2000). Chapter 3: Gender and Race Discrimination: The Interactive Nature of Disadvantage. Reducing prejudice and discrimination. S. Oskamp. Mahwah, N.J., Lawrence Erlbaum Associates: ix, 353 p.
- Small, M. F. (1998). Chapter 6: Food for Thought. Our babies, ourselves : how biology and culture shape the way we parent. New York, Anchor Books: xxii, 292 p.
- Sullivan, N. (2017). "Telling the Anti-Vaccine Community They're Wrong Has Been Tried for Years Now, and It Doesn't Work—Here's Another Approach." ALTERNET 2017.
- Wilson, D. S. (2007). Chapter 3: A Third Way of Thinking. Evolution for everyone: how Darwin's theory can change the way we think about our lives. New York, Delacorte Press: 17-21.
- Wilson, D. S. and E. O. Wilson (2008). "Evolution "for the Good of the Group"." American Scientist **96**(5): 380-389.