

Evolutionary Medicine
Bi 410/510 CRN 14547/14555
Fall 2013

Instructor: Dr. Susan Masta; email smasta@pdx.edu; office ph (503) 725-8505

Office hours: Mondays 4-5 pm Room 531A SB1

Class meets: 2:00 – 3:50 pm Monday, Wednesday; XSB 259

Required Materials: Books: We will read and discuss multiple chapters from “*Why We Get Sick: The New Science of Darwinian Medicine*” by Randolph Nesse and George Williams, 1994, Vintage Books **and** “*Paleofantasy: What Evolution Really Tells Us about Sex, Diet, and How We Live*” by Marlene Zuk, 2013, W. W. Norton & Company.

Desire2Learn will be used to post materials and for online assignments and quizzes. You will need an active ODIN account. If you need assistance with Odin or D2L, contact the OIT Helpdesk (phone 503-725-HELP (4357); email help@pdx.edu; or in person in room 18 SMSU.)

Course Description:

This course will provide an introduction to evolutionary thinking as it applies to human diseases, traits, diet, and aging. Concepts in evolutionary theory will be introduced and will provide a framework for understanding the difference between proximate and ultimate causes of human ailments. The course will be a combination of short lectures, group discussions, and student presentations.

Prerequisite: One year of introductory biology.

Learning Objectives: In this course, you will:

- Gain an understanding of natural selection and other fundamental concepts in evolutionary biology that have relevance to the practice of medicine.
- Differentiate between ultimate and proximate levels of causation as they pertain to human disease.
- Understand why we are susceptible to illness, how genetic and environmental factors contribute to this vulnerability, and why certain diseases become expressed in particular populations, all within an evolutionary framework.
- Discover the roles played in certain diseases by evolutionary constraints and historical happenstance.
- Recognize how knowledge of evolutionary concepts helps medical researchers and physicians and how application of those concepts benefits the practice of medicine.

Skills Development: In this course, you will develop skills that will allow you to:

- Understand and interpret human traits and diseases in an evolutionary framework.
- Interpret and evaluate scientific literature pertaining to evolutionary medicine.
- Discuss and clearly explain scientific concepts.

Course Requirements & Grading:

Students will be expected to attend all classes. Students must complete assigned readings **prior** to the class session and must contribute to discussions. Prior to each class, students will be asked to complete an online assignment pertaining to that class’s discussion topic. Each week, there will be an online quiz. As a one-time assignment, students will summarize and evaluate a journal article in evolutionary medicine, and write a one-page report. This article will be presented to the class in Week 8 within groups in which each person will provide commentary and answer questions their classmates may pose. As a one-time final assignment, students will form small groups and pursue work culminating in a poster presentation during the final exam period. Grades will be assigned as: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, F < 60%, with minus and plus grades at appropriate cutoffs.

Final grades will be determined by:

- 1) Attendance, participation, online assignments – 35% (the 1 lowest online assignment will be dropped)
- 2) Weekly quizzes (10 total) – 25%
- 3) Journal article report and presentation – 20%
- 4) Final Poster Presentation – 20%

Accommodations:

Accommodations are collaborative efforts between students, faculty and the Disability Resource Center (DRC). Students with accommodations approved through the DRC are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through the DRC should contact the DRC immediately at 503-725-4150.

Academic honesty and code of conduct: it is each student's responsibility to follow the PSU Student Code of Conduct, which can be found at: <http://www.pdx.edu/dos/psu-student-code-conduct>

Syllabus

Date	Topic	Reading for Discussion	Assignments
30 September	Introduction to evolutionary medicine; Ultimate versus proximate levels of causation		
2 October	Evolutionary medicine overview; selection, fitness	Nesse and Stearns 2008	
7 October	Disease symptoms; hypothesis testing	<i>Why We Get Sick</i> Chs. 1 & 3; <i>Paleofantasy</i> Intro	
9 October	Natural selection of antibiotic resistance	<i>Why We Get Sick</i> Chs. 2 & 4;	
14 October	Evolution of virulence	Ebert & Bull 2003	Presentation topics selected
16 October	Recent natural selection in humans	<i>Paleofantasy</i> Chs. 3 & 4; Tishkoff et al. 2007	
21 October	Human diet	<i>Paleofantasy</i> Ch. 5; Konner & Eaton 2010	
23 October	Diabetes – thrifty phenotype and thrifty genes hypotheses	Hales & Barker 2001; Diamond 2003	
28 October	Life history evolution	Migliano et al. 2007	Poster group topics selected
30 October	Evolution of reproductive senescence	Hawkes et al. 1998; Kirkwood & Shanley 2010	
4 November	Evolution of aging	<i>Why We Get Sick</i> Ch. 8; Flatt & Promislow 2007	
6 November	Evolution of mate choice	<i>Why We Get Sick</i> Ch. 13; <i>Paleofantasy</i> Ch.7; Roberts et al. 2012	
11 November	PSU closed Veteran's Day		
13 November	Reproductive conflict; epigenetics	Haig & Wharton 2003; <i>Why We Get Sick</i> Ch. 13	
18 November	Student-led presentations		Presentations
20 November	Student-led presentations		Presentations
25 November	Why selection has not eliminated genetic diseases	<i>Paleofantasy</i> Ch. 9; Poolman & Galvani 2007	Report due
27 November	The hygiene hypothesis	Falcone & Pritchard 2005; Sachs et al. 2011	
2 December	Cancer	<i>Why We Get Sick</i> Ch. 12; Crespi & Summers 2005	
4 December	Mental health	Nesse 2009; and Crespi 2009	

****Presentations of posters will occur during the final exam period (in lieu of a final exam) on Wednesday 11 December 12:30-14:20.****