**Evolutionary Medicine**

*Fall 2017*

*BSC 4933*

**Instructor:** Lynn B. Martin, Ph.D. **Time:** 9:30 – 10:45, Tues and Thurs

**Email**: [lbmartin@usf.edu](mailto:lbmartin@usf.edu) **Room:** EDU 261

**Office**: SCA 130 **Office hours:** 10:45-noon, Tuesdays

**Course description:**

This course will use a Darwinian perspective to investigate problems in health and disease. The course will consist of lectures and reading in 3 areas:

i) the value of strong inference and comparative and integrative methods to biology;

ii) basic evolutionary biology with respect to its importance for human health;

iii) selected topics in evolutionary medicine.

*My goal for the class is to help you learn to think about human health from both top-down (evolution and ecology) and bottom-up (physiology and genetics) perspectives.*

**Texts: (available at the USF bookstore, Amazon, BN.com, etc.)**

Ewald, *Plague Time: The New Germ Theory of Disease*

Gluckman, Beedle, Buklijas, Low and Hanson, *Principles of Evolutionary Medicine, 2nd edition*

Nesse and Williams, *Why We Get Sick: The New Science of Darwinian Medicine*

**Grading: (grade is derived from points earned out of a possible maximum of 600)**

Evolution one-pager 25 points

Denis Noble report 25 points

Exam 1 100 points

Exam 2 100 points

Exam 3 100 points

Exam 4 100 points

Class participation 50 points

Book critique 1 50 points

Book critique 2 50 points

No make-ups will be allowed and no extensions will be given without a valid excuse (hospitalization, military duty, accident). If you believe you are entitled to an extension, you must make your case within 2 days of the assignment due date. Otherwise, you will earn a “0” for that assignment. No extra credit will be given and grades are NOT curved.

Grading scale: (The plus/minus scale will not be used)

A – 90 and above; B – 89-80; C – 80-79; D – 69-60; F – 59 and below.

**Attendance:** USF policy mandates that you attend the first class meeting or be dropped from the class roster. Attendance will not be taken on other class days, but excessive tardiness is unacceptable. If you arrive to class more than 5 minutes late, you will not be allowed to enter on the second offense.

**NOTE:** October 28 is the last day for withdrawal.

**TENTATIVE SCHEDULE**

**Date Topic Readings Assignment due**

**August 22** Syllabus and Intro NW 1-3, Ewald intro

[Barbara Natterson-Horowitz](https://www.ted.com/talks/barbara_natterson_horowitz_what_veterinarians_know_that_doctors_don_t) TED talk

24 What is disease? Gluckman 1 **Evolution paragraph**

29 Evolutionary theory Gluckman 2

31 [Denis Noble](https://www.youtube.com/watch?v=j3WenGjyokg) talk

**September 5** Molecular basis of variation Gluckman 3 **Denis Noble report**

7 Evolution and development Gluckman 4

12Human life history Gluckman 5

14 Human evolution Gluckman 6

[Christine Warinner](https://www.ted.com/talks/christina_warinner_tracking_ancient_diseases_using_plaque) TED talk

19 **EXAM 1**

21 Infectious disease I Ewald, Preface and 9-42

[Paul Ewald](https://www.ted.com/talks/paul_ewald_asks_can_we_domesticate_germs) TED talk

26 Infectious disease II Ewald, 43-70 **Book review 1 due**

28 Infectious disease III Ewald, 71-106

**October 3** Infectious disease IV Ewald, 107-166

5 Infectious disease V Ewald, 167-244

10\*\*\* **EXAM 2**

15 Evolutionary perspective Gluckman 7

17 Sex and reproduction NW 13, Gluckman 8

19\*\*\* Epigenetics, development and policy

[Peter Gluckman](http://www.evmeded.org/video/plenary-evolution-and-development-from-theory-and-controversy-to-public-policy/?post_types=video&_sf_s=epigenetic&_sfm_year=1859+2017) talk (**watch on your own**)

24 Nutrition Gluckman 9

26 Aging NW 8, Haussman chp.

[Steven Austad](http://www.evmeded.org/video/talk-aging-can-we-have-it-all-what-evolutionary-biology-says-about-medically-slowing-aging/) talk

31 Psychology and behavior NW 14, Gluckman 10

[Frans de Waal](https://www.ted.com/talks/frans_de_waal_do_animals_have_morals) TED talk

**November 2** Allergy NW 11 and Profet 1991

7 **EXAM 3 Book review 2 due**

9 Cancer Intro, Neese

[Paul Ewald](http://www.evmeded.org/video/toward-a-unified-evolutionary-theory-of-cancer/) talk

14 Evo origins of cancer Ujvari 1, Nunney

*Guest lecturers: Joel Brown and Bob Gatenby*

16 Cancer in wild animals Ujvari 2, Madsen

21 Tools from evo bio Ujvari 14, Gatenby

23 **Thanksgiving**

28 Evo, med, and society Gluckman 14

30 **EXAM 4**

**Key**

Ewald = Ewald, *Plague Time: The New Germ Theory of Disease*

Gluckman = Gluckman, Beedle and Hanson, *Principles of Evolutionary Medicine*

NW = Nesse and Williams, *Why We Get Sick: The New Science of Darwinian Medicine*

**IMPORTANT DISCLAIMERS**

\*\*\*denotes that Dr. Martin will be out of town. Also, pay close attention to Canvas as he may have to change the class schedule for other out-of-town responsibilities.

All students are held to USF Integrative Biology Instructional Guidelines, which can be found here: <http://biology>.usf.edu/ib/admin/.

**Book reports**

Each person will be responsible for reading and reporting on two books from the list below. Reports should not exceed 2 pages. All reports should be 1.5-spaced in Arial, 10-point font (1” margins).Grading emphasis will be placed on your ability to demonstrate understanding of the material, although grammar will be evaluated if necessary.

Each report should consist of:

1. An overview of the book, emphasizing its main message.

2. Three quotationsfrom the book. In 1-2 sentences, describe why these statements are important to the book’s main message and what pertinence they have to the course.

3. A summary statement about the book, particularly whether you were convinced by the argument and/or whether you had lingering questions or concerns.

**Suggested Books**

You are welcome choose a book not on the list, but get my permission first.

*Evolution: General*

Buss, L. The Evolution of Individuality.

Bonner, JT. Why Size Matters

Dennett, Daniel C. Darwin’s Dangerous Idea: Evolution and the Meanings of Life. Jablonka, E., Evolution in Four Dimensions.

Coen, E. The Art of Genes.

Maynard Smith, J. The Origins of Life: From the Birth of Life to the Origins of Language.

Zimmer, C. Evolution: The Triumph of an Idea.

Dawkins, Richard. The Selfish Gene.

Dawkins, Richard. Climbing Mount Improbable

Dawkins, Richard. River out of Eden

Ridley, Matthew. Genome.

Bell, G. The Basics of Selection.

Noble, Denis. The Music of Life.

Noble, Denis. Dance to the Tune of Life.

Mayr, Ernst and Jared Diamond. What Evolution Is.

Zimmer, Carl. Evolution: The Triumph of an Idea.

Matt Ridley: The Agile Gene: How Nature Turns on Nurture

Richard Dawkins: The Ancestor’s Tale: A Pilgrimage to the Dawn of Evolution

Ernst Mayr: What Makes Biology Unique?

Geerat J. Vermeij: Nature: An Economic History

Stephen R. Palumbi: The Evolution Explosion

*Evolution and Disease*

McNeill, W. Plagues and Peoples.

Garrett, Laurie. The Coming Plague

Kolata, Gina. Flu: The Story of the Great Influenza Pandemic of 1918

Zimmer, Carl. Parasite Rex

Drexler, M. Secret Agents: The Menace of Emerging Infections.

Greaves, M. F. Cancer: The Evolutionary Legacy

*Evolution and Human Nature*

Dudley, Robert. The Drunken Monkey.

Ridley, Matthew. The Red Queen: Sex and the Evolution of Human Nature.

Wright, R: The moral animal: The new science of evolutionary psychology.

McKeown, Thomas. The Origins of Human Disease.

Ridley, Matt. Origins of Virtue: Human Instincts and the Evolution of Cooperation.

Silver, Lee. Remaking Eden : How Genetic Engineering and Cloning Will Transform the

American Family.

Sapolsky, Robert M. Why Zebras Don’t Get Ulcers: An Updated Guide to Stress, Stress- Related Diseases, and Coping.

Sapolsky, R. The Trouble with Testosterone: And Other Essays on the Biology of the Human Predicament.

Sapolsky, Robert. Behave.

Pinker, S. The Blank Slate: The Modern Denial of Human Nature.

Hrdy, S. Mother Nature: Maternal Instincts and How They Shape the Human Species.

Diamond, J. The Third Chimpanzee: The Evolution and Future of the Human Animal.

*Evolution and Natural History*

Carroll, Sean. Endless Forms most Beautiful. Diamond, Jared. Guns, Germs, and Steel: The Fates of Human Societies.

Dawkins, R. The Blind Watchmaker : Why the Evidence of Evolution Reveals a Universe

Without Design.

Williams, G.C. The Pony Fish’s Glow: and Other Clues to Plan and Purpose in Nature.

Weiner, J. The Beak of the Finch: A Story of Evolution in Our Time.

Weiner, J. Song of the Dodo.

**Class participation:**

The more you are engaged in class discussions about the material, the more likely you will be to learn key information and hence perform well on exams. Subsequently, throughout the semester, in-class lectures will be replaced by discussions in which you will earn points based on your verbal contributions. If you have troubles with public speaking, I strongly suggest that you write down several questions before coming to class on a discussion day. Each discussion day, you’ll be able to gain the maximum points for a day by offering a question, comment, or criticism 2x per class. Talk with me early if you’re concerned about this class element and/or to check your performance on this assignment.

**Other important notes:**

1. Students who anticipate missing class due to a religious observance must submit notification in writing by the third class. Other absences are not excusable and NO LATE ASSIGNMENTS WILL BE ACCEPTED.

2. The content of the course is the sole property of the instructor and may not be reproduced or distributed in any form for sale. PowerPoints of lectures will be available on Canvas before lecture. They will not contain all of the information for which you are responsible. You must read all assignments and take detailed notes to excel. This requirement also holds for discussion days; it’s imperative that you take notes on these days too if you seek a high grade.

3. Assignment due dates and lecture content are subject to change, so your attendance is critical.

4. S-U grades must be negotiated in writing within the first three weeks of the term.

5. An “I” grade indicates incomplete course work and may only be awarded when only a small portion of coursework is incomplete and when the student otherwise has a passing grade. A Biology department “Incomplete Grade Contract” must be completed before the “I” grade is given.

6. No cell phones are to be used in the classroom. Any use of these devices, or abuse of tablets or laptops, is grounds for dismissal from the class that day; second offenses will result in your prohibition of bringing such devices to class. Third offenses will result in your permanent dismissal from class.

7. Disruption of academic process is an act by a student in a classroom or teaching environment which in the reasonable estimation of a faculty member: i) distracts attention from the academic material (e.g., persistent, disrespectful or abusive disruptions), or ii: presents danger to the health, safety or well-being of class participants. These acts will not be tolerated.

8. Uncollected assignments will not be retained longer than 90 days from the due date. Grades cannot be disputed beyond 90 days from their assignment.

9. Academic dishonesty will not be tolerated and you will be held to all academic policies and standards of the USF. Any form of cheating is academic dishonesty. ‘Cheating’ is defined by the University as (1) unauthorized granting or receiving of aid during the prescribed period of a course-graded exercise (students may not consult written materials such as notes or books, may not look at the paper of another student, nor consult orally with any other student taking the same test); (2) a student’s asking another person to take an examination for or in place of him/her; (3) taking an examination for or in place of another student; (4) stealing visual concepts, such as drawings, sketches, diagrams, musical programs and scores, graphs, maps, etc., and presenting them as one’s own; (5) stealing, borrowing, buying, or disseminating tests, answer keys, other examination materials, research papers, creative papers, speeches, other graded assignments, text or phrases from websites, etc., except as officially authorized; (6) stealing or copying of computer programs and presenting them as one’s own. Engaging in plagiarism is academic dishonesty, even though a student may plagiarize without any intent to be dishonest. ‘Plagiarism’ is defined by the University as literary theft consisting of the unattributed quotation of the exact words of a published text, or the unattributed borrowing of original ideas by paraphrase from a published text. Plagiarism detection software (e.g., SafeAssign) may be used on your assignments.

10. No make-ups or extensions will be made without a valid excuse. If you believe you are entitled to an extension, you must make your case within 2 days of the assignment due date. Otherwise, you will earn a “0” for that assignment. Valid excuses include medical emergencies (individual or immediate family only), legal (accident or court case; individual only), or funerary (immediate family only). Reasons for requesting a make-up must relate specifically to the time period of the missed coursework. Reasons for requesting a make-up must be documented in writing by an involved professional. The instructor retains the right to make additional inquiries concerning the documentation. The instructor retains the right to give a make-up that is different in exact content and/or style than the missed coursework. A staff member is not permitted to administer a make-up.Chronic attendance problems for reasons beyond a student’s control may warrant withdrawal from the course. You should see the Undergraduate Program Assistant for information concerning late withdrawals and refund of fees.

11. In the event of an emergency, it may be necessary for USF to suspend normal operations.  During this time, USF may opt to continue delivery of instruction through methods that include but are not limited to: Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It’s the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USF, College, and department websites, emails, and MoBull messages for important general information.