

**ANTH 175: EVOLUTIONARY MEDICINE (SYLLABUS VERSION 3/30/10)**

**Spring Quarter 2010**

**Clinical Services 250 MW 12:00-1:20 pm**

**(4 Credit Hours; Satisfies an SC Group Requirement)**

**Instructor:** Dr. Josh Snodgrass

Office Hours: MW 2:00-3:00 & by appointment (354 Condon Hall)

Phone: 346-4823

E-mail: jjosh@uoregon.edu

**Graduate Teaching Fellows (GTFs):**

**Terry Rueckert (rueckert@uoregon.edu; 346-5289)**

Office Hours: TBA; Office: 302 Condon Hall

**Ross Tindale (rtindale@uoregon.edu; 346-5289)**

Office Hours: Tuesdays from 9-11; Office: 302 Condon Hall

**Course Description:** Application of evolutionary thinking to the study of human health and disease

**Course Content:** This course provides an introduction to evolutionary (or Darwinian) medicine, a relatively new field that recognizes that evolutionary processes and human evolutionary history shape health among contemporary human populations. The field of evolutionary medicine emphasizes ultimate explanations, such as how natural selection and other evolutionary forces shape our susceptibility to disease; this perspective complements that of biomedicine, which generally focuses on identifying the immediate mechanisms that give rise to diseases and malfunctions. The evolutionary medicine approach has provided insights into why diseases occur at all and additionally has produced valuable insights on treatment strategies. This course will examine a variety of diseases using an evolutionary perspective, including infectious diseases, mental disorders, and cancers. The course will emphasize chronic diseases, such as cardiovascular disease, obesity, and diabetes, and will focus particular attention on the role of diet and psychosocial stress in the development and progression of these conditions.

**Expanded Course Description:** This is a science group satisfying course that is designed to be a comprehensive introduction to evolutionary, or Darwinian, medicine. In brief, evolutionary medicine is the application of evolutionary thinking, including evolutionary processes and human evolutionary history, to understanding health and disease among contemporary human populations. This course uses a scientific approach, drawing on the methods, theories, and bodies of knowledge from various scientific disciplines, including evolutionary biology, genetics, neuroscience, physiology, nutritional sciences, and medicine.

This course has four main sections:

**Section 1** introduces students to the scientific method and evolutionary theory, and builds the foundation for the understanding the evolutionary medicine approach. Particular attention is directed towards the adaptation concept and life history theory. This section of the course also provides an introduction to human evolutionary history, concentrating on major events in hominid evolution (e.g., bipedalism and brain evolution), and to origins of modern human biological variation.

**Section 2** focuses on the basic principles of evolutionary medicine, and emphasizes differences between proximate and ultimate explanations. This section of the course also provides a basic introduction to epidemiology (the study of patterns of human disease and their causes) and a brief discussion of contemporary global health issues.

**Section 3** uses the evolutionary medicine approach to examine infectious diseases. This section of the course provides an introduction to human defenses to infectious organisms, and describes major cultural transitions in human history that altered exposure to infectious disease. This section also focuses on emerging infectious diseases.

**Section 4** applies the evolutionary medicine approach to chronic diseases, including cancers and osteoporosis. This section of the course emphasizes cardiovascular diseases (heart disease and stroke), obesity, and diabetes and uses a biocultural framework to examine the role of diet and psychosocial stress in the development and progression of these conditions.

**Format:** Lecture and required weekly laboratory sections.

**Required Readings:**

- 1) Zuk. 2007. *Riddled with Life*. Harcourt Press.
- 2) Gluckman & Hanson. 2006. *Mismatch: The Lifestyle Diseases Timebomb*. Oxford U Press. **(listed as “G&H”)**
- 3) Assorted articles and book chapters (available on Blackboard)

**Expectations and Grading:** Regular attendance at lectures and participation in laboratory sections are required. Course readings are required and are essential to passing exams, completing lab assignments, and participating in lab section activities. Your grade in the course will reflect performance on midterm and final exams, attendance and participation in required laboratory sections, and 6 short (1-2 page) lab write-ups.

Quiz (online; <b>end of week 3</b> )	10%
Midterm Exam (in class; <b>5/10</b> )	30%
Final Exam (in class; <b>6/8</b> )	30%
Lab Exercises (4 <b>short</b> lab write-ups @ 5% each)	20%
Lab Attendance	10%

Grades will be assigned as follows: A = 90-100%, B = 80-89%, C = 70-69%, D = 60-69%, F < 60% (with minus and plus grades assigned at appropriate cutoffs).

The grading system used in this course is as follows:

- A** – Outstanding performance relative to that required to meet course requirements; demonstrates a mastery of course content at the highest level.
- B** – Performance that is significantly above that required to meet course requirements; demonstrates a mastery of course content at a high level.
- C** – Performance that meets the course requirements in every respect; demonstrates an adequate understanding of course content.
- D** – Performance that is at the minimal level necessary to pass the course but does not fully meet the course requirements; demonstrates a marginal understanding of course content.
- F** – Performance in the course, for whatever reason, is unacceptable and does not meet the course requirements; demonstrates an inadequate understanding of the course content.

The midterm and final exams will cover lectures, readings, videos, and lab section material. Exams will include multiple choice, matching, and short answer (2-3 sentences) sections. The final exam will not be cumulative. Exams and assignments must be taken/turned in at the scheduled time—**under no circumstances will make-up exams or assignment extensions be given without a documented excuse** (e.g., signed note from your doctor). If you will not be able to take an exam or turn in an assignment, you **must** notify me in advance (preferably by e-mail).

**Accommodations:** Appropriate accommodations will be provided for students with documented disabilities. If you anticipate needing accommodations in this course, please make arrangements to meet with me soon.

**SCHEDULE:**

Week	Dates	Topics	Required Reading
1	3/29 3/31	<b>Course Overview and Requirements</b>  Introduction to Anthropology; The Scientific Method; Early Evolutionary Studies & the Evidence for Evolution  <b>Lab 1: The Scientific Method</b>	Futuyma 1982; Brown 2010 (Chapter 2); Wilson 2007 (Chapter 2)  <b>Lab Reading: Carroll 2009 (Chapter 8)</b>
2	4/5 4/7	<b>Evolutionary Biology, Part 1:</b> Natural Selection & Adaptation; How Evolution Works  <b>Evolutionary Biology, Part 2:</b> Evolution and Development; Human Adaptation & Adaptability  <b>Lab 2: Evolutionary Theory (Lab write-up due in lab on 4/21)</b>	G&H Introduction; G&H Chapters 1-3
3	4/12 4/14	<b>Evolutionary Biology, Part 3:</b> Human Evolutionary History; Modern Human Origins  <b>Video – <i>The Life of Mammals: Food for Thought</i> (Dr. Snodgrass at the Human Biology Association meeting in Albuquerque)</b>  <b>**Quiz on Evolutionary Biology (Online—to be taken anytime 4/15-4/18) **</b>  <b>No labs this week—Ross and Terry at the HBA meeting</b>	Gluckman et al. 2009 (Chapter 6)  G&H Chapters 4 & 5
4	4/19 4/21	The Basics of Evolutionary Medicine; Proximate vs. Ultimate Explanations  Epidemiology; The Big Picture of Global Health—Trends & Historical Patterns; Epidemiological Transitions; Health Disparities  <b>Lab 3: Discussion: Food Production &amp; Health; Paleopathology (Lab write-up due in lab the following week)</b>	Nesse & Williams 1998; Zuk Chapter 1  Larsen 2008
5	4/26 4/28	<b>Infectious Diseases, Part 1:</b> Changing Worlds & the Price of Victory; Allergy & Autoimmune Disease; Evolution of Virulence  <b>Video—<i>Rx for Survival: A Global Health Challenge – Disease Warriors</i></b>  <b>Lab 4: Video—<i>Typhoid Mary: The Most Dangerous Woman in America</i></b>	Zuk Chapters 2 & 3   <b>Lab Reading: Parmet et al. 2005</b>

Week	Dates	Topics	Required Reading
6	5/3	<b>Infectious Diseases, Part 2:</b> Evolution of Sex & Sexually Transmitted Diseases; Sex Differences in Health; Picking the Perfect Partner	Zuk Chapters 4-7
	5/5	<b>Infectious Diseases, Part 3:</b> Emerging Infectious Diseases  <b>Lab 5: Discussion: Current Issues in Public Health (Public Health vs. Individual Rights: Vaccination &amp; Quarantine)</b>	Zuk Chapters 10 & 11
7	5/10	<b>**Midterm Exam (In Class—Covers everything from Weeks 1-6)**</b>	
	5/12	<b>Chronic Diseases, Part 1:</b> Evolution of the Human Diet; The Nutrition Transition; Obesity  <b>Lab 6: Anthropometry (Body size, proportions, and composition) &amp; chronic disease risk (Lab write-up due in lab the following week)</b>	Leonard 2002; Popkin 2003
8	5/17	<b>Chronic Diseases, Part 2:</b> Cardiovascular Disease & Diabetes	G&H Chapter 7; Hossain et al. 2007
	5/19	<b>Chronic Diseases, Part 3:</b> The Effects of Chronic Psychosocial Stress on Health  <b>Lab 7: Video: Stress: Portrait of a Killer</b>	Sapolsky 2005
9	5/24	<b>Chronic Diseases, Part 4:</b> Cancers; Cancers of the Reproductive System	Nesse & Williams 1994 (Chapter 12)
	5/26	<b>Addiction, Mental Disorders, and Maturational Mismatch:</b> Alcoholism & Drug Abuse; Adolescence & the Maturational Mismatch  <b>Lab 8: Physical Activity &amp; Diet (Lab write-up due in lab the following week)</b>	G&H Chapter 6; Nesse & Williams 1994 (Chapter 14)
10	5/31	<b>No Class—Memorial Day</b>	
	6/2	<b>Death:</b> Aging & Senescence; Why Do We Get Old?  <b>Lab 9: Life and Death in the Skeleton</b>	G&H Chapter 8
	6/8	<b>**Final Exam, Tuesday, June 8, 10:15-12:15 (In Class—Covers material from weeks 7-10)**</b>	

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**Required Readings**

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- 1) Zuk M. 2007. *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press.
- 2) Gluckman & Hanson. 2006. *Mismatch: The Lifestyle Diseases Timebomb*. Oxford U Press. (listed as "G&H")
- 3) Assorted articles and book chapters (available on Blackboard)

**Week 1 Readings**

- Futuyma DJ. 1982. Scientific knowledge (Ch. 9). In: *Science on Trial: The Case for Evolution*. Sunderland: Sinauer. p. 161-174.
- Brown DE. 2010. Concepts of Evolution (Chapter 2). In: *Human Biological Diversity: An Introduction to Human Biology*. Prentice Hall. pp. 7-25
- Wilson DS. 2007. Clearing the deck (Chapter 2). In: *Evolution for Everyone: How Darwin's Theory Can Change the Way We Think About Our Lives*. Delacorte Press. pp. 11-16.
- Carroll SB. 2009 The day the Mesozoic died (Chapter 8). In: *Remarkable Creatures: Epic Adventures in the Search for the Origins of Species*. Mariner Books. pp. 142-159.

**Week 2 Readings**

- Gluckman P, Hanson M. 2006. Introduction: Our bodies and our world. In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 1-16.
- Gluckman P, Hanson M. 2006. Our comfort zone (Chapter 1). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 17-48.
- Gluckman P, Hanson M. 2006. Where have we come from? (Chapter 2). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 49-73.
- Gluckman P, Hanson M. 2006. When we were very young (Chapter 3). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 74-93.

**Week 3 Readings**

- Gluckman P, Beedle A, Hanson M. 2009. Human origins and the origins of human diversity (Chapter 6). In: *Principles of Evolutionary Medicine*. Oxford University Press, pp. 123-150.
- Gluckman P, Hanson M. 2006. Things ain't what they used to be (Chapter 4). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 94-123.

Gluckman P, Hanson M. 2006. Constrained by our pasts (Chapter 5). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 124-135.

#### **Week 4 Readings**

Nesse RM, Williams GC. 1998. Evolution and the origins of disease. *Scientific American* (Nov.): 86-93.

Zuk M. 2007. Why doctors need Darwin (Chapter 1). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 23-37.

Larsen CS. 2008. The root of the matter: Farming and its consequences (Chapter 12). In: *Our Origins: Discovering Physical Anthropology*. Norton. pp. 381-415.

#### **Week 5 Readings**

Zuk M. 2007. Friendly worms and the price of victory (Chapter 2). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 38-63.

Zuk M. 2007. Not such a bad case (Chapter 3). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 64-82.

Parmet WE, Goodman RA, Farber A. 2005. Individual rights versus the public's health—100 years after Jacobson v. Massachusetts. *New England Journal of Medicine* 352: 652-654.

#### **Week 6 Readings**

Zuk M. 2007. The race with sex that's never won (Chapter 4). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 83-98.

Zuk M. 2007. When sex makes you sick (Chapter 5). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 99-122.

Zuk M. 2007. The sicker sex (Chapter 6). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 123-141.

Zuk M. 2007. Parasites and picking the perfect partner (Chapter 7). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 142-179.

Zuk M. 2007. Bad, but not weird: The real emerging diseases (Chapter 10). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 237-265.

Zuk M. 2007. Who's in charge here, anyway? (Chapter 11). In: *Riddled with Life: Friendly Worms, Ladybug Sex, and the Parasites that Make Us Who We Are*. Harcourt Press. pp. 266-291.

### **Week 7 Readings**

Leonard WR. 2002. Food for thought: Dietary change was a driving force in human evolution. *Scientific American* (Dec.): 74-83.

Popkin B. 2009. The nutrition transition in the developing world. *Development Policy Review* 21: 581-597.

### **Week 8 Readings**

Gluckman P, Hanson M. 2006. A life of luxury (Chapter 7). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 158-177.

Hossain P, Kavar B, El Nahas M. 2007. Obesity and diabetes in the developing world—A growing challenge. *New England Journal of Medicine* 356: 213-215.

Sapolsky R. 2005. Sick of poverty. *Scientific American* (Dec.): 93-99.

### **Week 9 Readings**

Nesse RM, Williams GC. 1994. Cancer (Chapter 12). In: *Why We Get Sick: The New Science of Darwinian Medicine*. New York: Times Books. pp. 171-181.

Gluckman P, Hanson M. 2006. Coming of age (Chapter 6). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 137-157.

Nesse RM, Williams GC. 1994. Are mental disorders diseases? (Chapter 14). In: *Why We Get Sick: The New Science of Darwinian Medicine*. New York: Times Books. pp. 207-233.

### **Week 10 Readings**

Gluckman P, Hanson M. 2006. Four score years and ten (Chapter 8). In: *Mismatch: The Lifestyle Diseases Timebomb*. Oxford University Press. pp. 178-193.