

## **BZ 420 Evolutionary Medicine**

**Course Description and Objectives:** Exploration of insights into medical research and practice (diagnosis and therapy) and human health from an evolutionary standpoint. Students will learn fundamentals of evolution, and the importance of evolutionary biology in building our understanding the causes of human diseases, their detection, and treatment. We will learn about the importance of integrating an evolutionary perspective with genetics, physiology, ecology and behavior into medical research. Students will become acquainted with the literature and research methods in the field, and develop their abilities to critically analyze novel approaches and to engage in scientific discourse.

### **Instructors:**

Dhruba Naug

Michael Antolin

**Meeting Time and Place:** Tuesday, Thursday, 09:30-10:45, Yates Hall 306

**Office Hours:** By appointment

**Text (required):** *Evolutionary Medicine* (2016) by Stephen Stearns and Ruslan Medzhitov, Sinauer Associates. Additional reading material will include chapters from other books, and papers from primary literature. You must read the material before coming to the class to have a productive discussion, especially on days when reading/writing assignments are due. Writing assignments (see below) include reading several research/concept publications from the primary literature and writing incisive critiques.

### **Course topics and Tentative schedule:**

1. Introductory Concepts in Evolution (Jan. 22) - Naug  
Natural selection, Neutral evolution, Adaptation
2. Patient and Disease (Jan. 29, Feb. 5) – Naug  
Human evolutionary history, Consequence of variation, Life history traits, Plasticity, Tradeoffs, Aging, Microbiome
3. Reproductive Medicine (Feb. 12) - Naug  
Pregnancy, Menstruation, Menopause
4. Lifestyle Disorders (Feb. 19, 26) - Naug  
Obesity, Diabetes, Cardiovascular disease, Autoimmune diseases
5. Mental Disorders (March 5) - Naug  
Addiction, Anxiety, Depression, Autism, Schizophrenia
6. Defense Mechanisms (March 26) - Antolin  
Physiological mechanisms, Inducible and Constitutive mechanisms, Immunity
7. Pathogen Evolution (April 2, April 9) - Antolin  
Virulence, Transmission, Antibiotic Resistance
8. Cancer (April 16, April 23) - Antolin  
Genetics and Evolution of Cancer, Immune Suppression, Chemotherapy
9. Individual versus Population Health (April 30) - Antolin  
Vaccination

10. The Big Picture (May 7) - Antolin  
Open questions

**Midterm:** March 15, 09:30-10:45; **Final:** May 14, 09:40-11:40p

**Evaluation:** You will be graded on (1) Two exams with a set of short-answer type questions, (2) Six writing assignments, (3) your participation in the class. The writing assignments will be graded upon your ability to discuss a broad topic, the specifics of some primary literature that address the topic, and your own perspective on the topic. You have to demonstrate (a) your understanding of the general topic (4 points), (b) specifics from the readings (3 points), and good writing skills (3 points). The writing should be both scientifically literate and easy to read.

**Points and Grading:**

2 exams x 60 points = 120 points (each exam for that part of the class, not cumulative, 6 short answer questions x 10 points each)

6 writing assignments x 10 points = 60 points (Readings and critiques of primary literature, numerical problems – Each 2 pages with 1 inch margin, double spaced with 11 point font size. Due: February 1, February 15, March 1, April 5, April 19, May 3)

Participation = 20 (10 + 10) points (attendance, class discussions).

A - 90-100%, B - 80-89%, C – 70-79%, F – below 60%.

Academic Integrity is integral to scholarship and true learning. By signing on for this class you are pledging that you will not receive or give any unauthorized assistance in exams and other assignments. You can learn about what constitutes academic integrity at:

<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity>, the class will adhere strictly to these university policies.