

**IB 169, EVOLUTIONARY MEDICINE, Spring 2021**

**Instructor:** Tom Carlson [tcarlson@berkeley.edu](mailto:tcarlson@berkeley.edu)

Department of Integrative Biology, University of California, Berkeley

**Lectures:** 11:00-12:30 Tuesdays and Thursdays

**Carlson Office Hours:** Mondays 1:40-2:30, Tuesdays 3:40-4:30 PM, Wednesdays 11:10-12:00. Office hours will be online.

**Midterm #1** on 2/18/21 at 11:00 AM (30% of grade)

**Midterm #2** on 4/1/21 at 11:00 AM (30% of grade)

**Midterm #3/Final Exam:** 5/13/21 at 8:00 AM (30% of grade)

Each exam has 40 multiple choice questions and a 10 point essay question for a total of 50 points

**Discussion section:** (10% of course grade) = 20 points

**QUIZZES:** There will be three quizzes in the discussion section based on the material presented in the class lectures.

Discussion section breakdown of the 20 Points:

- Quiz #1: week of Feb 8-12 = 4 points
- Quiz #2: week of March 15-19 = 4 points
- Quiz #3: week of April 26-30 = 4 points
- Class presentation/paper = 4 points
- Class participation = 4 points

**TOTAL POINTS FOR COURSE**

MT#1 = 50

MT#2 = 50

MT#3/Final Exam = 50

Discussion Section = 20

**Total Course Points = 170**

**Carlson lecture PDFs and required articles will be loaded onto bcourse site**

**before each lecture.** For students who do not want to print out the pdfs, a reader with the lecture pdf slides is available at Krishna Copy at 2001 University Ave. Phone # 510-540-5959. All Carlson powerpoint presentations are in this reader.

**Exam material will be based only on material presented in the lectures.**

Required Text: Evolutionary Medicine, 1<sup>st</sup> Edition, 2016, Stephen C. Stearns & Ruslan Medzhitov, Sinauer Publishers, ISBN 978-1-60535-260-2

Optional Additional Reading: Principles of Evolutionary Medicine, 1st Edition, Peter Gluckman, Alan Beedle, & Mark Hanson, Oxford University Press, ISBN: 9780199236398

**Course Description:**

This course explores the ways that evolutionary theory can illuminate our understanding of human health and disease. The integration of evolutionary concepts into health sciences can deepen our understanding of the origins of diseases and how human populations evolve in response to these ailments. The course begins with an introduction to evolutionary medicine followed by an overview of human genetic variation and natural selection. With this foundation, we evaluate the fields of reproductive biology, gynecology, and infant/child health through an evolutionary lens. We then study the evolution of human diet, metabolic adaptation, and the evolution of human ecological relationships with the environment. Next, we explore evolutionary concepts in chronic metabolic disorders, degenerative diseases, and psychiatric conditions associated with aging, lifestyle, behavior, and social/cultural organization. Finally, we examine infectious disease ecology from the perspective of both human and microbial evolutionary responses.

**Lecture Topics** will be interspersed with **Human Clinical Cases** in the course

**Lecture Topics:** (Carlson lecture Topic PDFs loaded to bcourse site)

IB 169 Syllabus (Reader pp. 1-4)

Lecture Topic #1: Overview of Evolutionary Medicine (Reader pp. 5-25) (Text pp. xvi-xix, 84-85, 87-100, 273-274; *PNAS* Dolgin pdf; *PNAS* Nesse pdf; *PRSB* Stearns pdf)

Lecture Topic #2: Primate evolution & diversity (Reader pp. 26-46)

Lecture Topic #3: Ape evolution & diversity (Reader pp. 47-64)

Lecture Topic #4: Hominin evolution & diversity (Reader pp. 65-92)

Lecture Topic #5: Evolutionary theory (Reader pp.93-115)

Lecture Topic #6: Human migration & diversity (Reader pp. 116-131)

Lecture Topic #7: Genetics: Molecular Basis of Variation & Inheritance (Reader pp. 132-161)

Lecture Topic #8: Epigenetics (Reader pp. 162-177)

Lecture Topic #9: Life Histories, Development, & Phenotype (Reader pp. 178-202)

Lecture Topic #10: Host Microbe Interactions & Immunology (Reader pp. 202-228)

Lecture Topic #11: Cancer (Reader pp. 229-237)

**Human Clinical Case Presentations** will be presented in lecture and integrated throughout the course Lecture Topics. (Carlson Case PDFs loaded to bcourse site)

Lecture Case 1: Birth (Reader pp. 238-258)

Lecture Case 2: Blood Type (Reader pp. 259-271)

Lecture Case 3: Chest & Abdominal Pain in Sickle Cell Crisis (Reader pp.272-287)

Lecture Case 4: Intestinal Bloating with Lactose Intolerance (Reader pp.288-307)

Lecture Case 5: Skin, Vitamin D, & Folate (Reader pp. 308-330)

Lecture Case 6: Obesity & Fatigue (Reader pp. 331-368)

Lecture Case 7: RLQ Abdominal Pain (Reader pp. 369-374)

Lecture Case 8: Rectal Prolapse (Reader pp. 375-389)

Lecture Case 9: Early Menarche (Reader pp. 390-403)

### **DISCUSSION SECTION REQUIRED PRESENTATION WITH PAPER:**

Each student will give a five minute presentation on topic related to evolutionary medicine in discussion section. The student will turn in a one page (single spaced, 12 pt. font) on the presentation topic. The written paper should include three or four different citations from **peer- reviewed scientific articles**. The text with the citations should fit on a single page with single spacing using 12 font.

### **Peer-reviewed (refereed or scholarly) journals**

- In **Peer-reviewed Journals**, in order to insure the article's quality, articles are written by experts and are reviewed by several other experts in the field (peer reviewers) before the article is published in the journal.
- In academic publishing, the goal of **peer review** is to **assess the quality** of articles submitted for publication in a scholarly journal.
- Articles published in these journals are more likely to be scientifically valid and reach reasonable conclusions.
- The peer reviewers check the manuscript for accuracy and assess the validity of the research methodology and procedures.
- If they find the article to have appropriate scholarly validity and rigor, the peer reviewers may still suggest revisions.
- If the peer reviewers find the article lacking in scholarly validity and rigor, they reject it.
- Because a peer-reviewed journal will not publish articles that fail to meet the standards established for a given discipline, peer-reviewed articles that are accepted for publication exemplify the best research practices in a field.
- Typically, the peer reviewers do not know who is the author of the article, so the article succeeds or fails on its own merit, not the reputation of the expert

### **Examples of Websites to Locate Peer-Reviewed Articles**

- Google Scholar
- Pubmed
- Web of Science

### **Non-Peer-reviewed articles**

- **Newspapers, magazines, and websites** containing articles and news: Articles are written by people who may or may not be experts in the field of the article. Consequently, articles may contain incorrect information and have biases.
- **Non-Peer-reviewed Journals** containing articles written by academics and/or professionals. Although the articles are written by "experts," any particular "expert" may have some ideas that are not considered valid by the academic or professional community.

