Course information:

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1. Course name: Evolutionary Biology

2. Department: Biology

3. Number: 437

4. Cluster requirement: Science in the Engaged Community

Faculty information:

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5. Name: Guillermo Paz-y-Mino

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7. Phone: 8226

Required components:

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8. Master syllabus: [http:///webroots/www.umassd.edu/genedchecklist/holding/master\_syllabusbio4372b.docx](http://webroots/www.umassd.edu/genedchecklist/holding/master_syllabusbio4372b.docx)

9. Course overview statement:

BIO 437 is an upper-level elective offered to biology majors. It is cross-listed as BIO 537 for graduate students. It is offered in spring semesters and enrolls an average of 12 students (ranging from 8 to 15) per year. The first half of the course introduces fundamental theories and concepts in evolutionary biology, while the second half deals with application of evolutionary theory to problems in medicine, psychology, and human origins (the evolution vs. creation/design debate). Thus, a large portion of this course addresses the Cluster 2B objectives.

No lectures are given in BIO 437. Instead, the course is based entirely on discussions of books, articles from scientific journals, and current new stories involving evolution. These discussions are led primarily by the students enrolled in the course. Students demonstrate their preparation for class in frequent written assignments which meet the third objective of express scientific ideas in writing, and allow assessment of the first two objectives.

10. Signed faculty and chair sponsor sheet: sent separately.

11. Official course catalog description for the course:

An overview of contemporary evolutionary biology with an emphasis on micro and macro evolutionary processes. An advanced and in depth study of the evolutionary forces of mutation, natural selection, gene flow and genetic drift. A comprehensive analysis of evolutionary theory, its paradigms, scientific evidence and controversies.

12. Course approval form: not entered.

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**Master Syllabus**

**Course: BIO 437, Evolutionary Biology**

**Cluster Requirement: 2B, Science in the Engaged Community**

This University Studies Master Syllabus serves as a guide and standard for all instructors teaching an approved in the University Studies program. Individual instructors have full academic freedom in teaching their courses, but as a condition of course approval, agree to focus on the outcomes listed below, to cover the identified material, to use these or comparable assignments as part of the course work, and to make available the agreed-upon artifacts for assessment of learning outcomes.

**Course Overview:**

Evolutionary Biology is an overview of contemporary evolutionary biology with an emphasis on micro and macro evolutionary processes; an advanced and in‐depth study of the evolutionary forces of mutation, natural selection, gene flow and genetic drift; a comprehensive analysis of evolutionary theory, its paradigms, scientific evidence and controversies. The course is based on discussions of scientific articles, weekly outlines of scientific readings, weekly book reviews, oral presentations of scientific articles, summary handouts by discussion moderators, review papers, take‐home assignments, and class participation.

**Learning Outcomes:**

Course-Specific Learning Outcomes:

After completing the course, students will be able to:

1. Discuss processes contributing to micro- and macro-evolution.

2. Analyze evolutionary theory and the evidence and controversies surrounding it.

3. Read, with critical understanding, scientific articles and books dealing with evolution.

4. Present the findings of scientific articles relating to evolution to others.

University Studies Learning Outcomes: Cluster 2B, Science in the Engaged Community.

After completing the course, students will be able to:

1. Analyze and evaluate the use of scientific information in the context of social, economic, environmental or political issues.

2. Apply scientific theories and knowledge to real‐world problems.

3. Effectively communicate scientific information in writing.

**Examples of Texts and/or Assigned Readings:**

Examples given below are assigned for one week in Topic Three (see schedule below), focusing on evolution and medicine. Readings and assignments for the remainder of Topic Three and for Topic Four all address the 2B outcomes.

Books:

Gluckman, P., Beedle, A. & Hansosn, M. 2009. *Principles of Evolutionary Medicine*. Oxford University Press, New York, 296 pp.

Trevathan W. et al. (Eds). 2007. *Evolutionary Medicine And Health: New Perspectives*. New York: Oxford University Press, 544pp.

Barnes, E. 2005. *Diseases and Human Evolution*. University of New Mexico Press, Albuquerque, 484 pp.

Articles:

Antolin MF. 2009. *Evolutionary biology of disease and Darwinian medicine*. 281‐298. In Ruse M & Travis J(eds) Evolution the First Four Billion Years. The Belknap Press ofHarvard University Press, Cambridge, 979 pp.

Casas Selves M. &Degregori J. 2011. *How cancer shapes evolution and how evolution shapes cancer*. Evolution Education & Outreach 4: 624‐34.

Gluckman, P., Beedle, A. & Hansosn, M. 2009. *Evolutionary principles applied to medical practice*, 257‐276. InGluckman, P., Beedle, A. & Hansosn, M. (authors) *Principles of Evolutionary Medicine*. Oxford University Press, New York, 296 pp.

Hanley KA. 2011. *The double‐edged sword: how evolution can make or break a live‐attenuated virus vaccine*. EvolutionEducation & Outreach 4: 635‐43.

**Example Assignments:**

Assignment 1: Book reviews

Students in Evolutionary Biology are required to conduct a 1-page written and 5-min oral ‘*book review’* (two – three books/student-group/semester) at the beginning of class. This review represents 5 percent of the final grade. The books for Topics Three and Four relate evolution to social issues (disease, psychology, morality, the evolution/creation debate). The books are  written for the general public, with the purpose of educating the reader in evolution and connecting him/her with the issues discussed in society. Reviews include a summary of the book’s content, including how the book connects evolution with the relevant social issue. This assignment addresses Objective 1.

Assignment 2: Weekly summaries

Individual students lead discussion of scientific articles. All students in class (except speakers/discussion moderators) prepare weekly outlines of the assigned articles plus 5 questions per reading to be answered – or at least addressed – during each class discussion (10 percent of the total grade). Outlines for papers in Topics Three and Four require students to apply evolutionary concepts to real-world problems (for example, understanding cancer or vaccines), addressing Objective 2.

Both assignments require students to express information on evolution in writing, addressing Objective 3.

**Sample Course Outline:**

TOPIC ONE: Molecular Evolution, Micro‐evolution (Feb 3 – 21)

TOPIC TWO: Macro‐evolution (Feb 24 – Mar 21)

TOPIC THREE: Applications of Evolutionary Biology (medicine, psychology) (Mar 24 – Apr 11)

TOPIC FOUR: The Controversy Evolution, Creationism, Design‐Creationism (Apr 14 – May 5)