

## **BIOLOGY 509 - EVOLUTIONARY BIOLOGY - Fall 2009**

Dr. Kevin J. Burns

Office: 231 North Life Sciences; 594-0538

Office Hours: Wednesdays 12:00 - 1:00 p.m. or by appointment

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3.0 Credit Hours Lectures: Monday & Wednesday 10:00 am - 11:00 am; LS 269

Discussion: Monday & Wednesday 11:00 am - 12:00 pm; LS 269

### **Course Description**

Concepts of evolutionary biology including genetics of populations, speciation, systematic biology, adaptation, role of development in evolution, evolution of behavior, and comparative biology. Emphasis is placed on evolutionary biology as the central organizing principle of biology. During the course, students will develop an appreciation and understanding of how the diversity of life has been shaped by natural selection and other evolutionary processes.

### **Learning Outcomes**

Students will be able to explain basic concepts of evolutionary biology including selection, drift, mutation, non-random mating, systematics, speciation, and species concepts.

Students will be able to describe the evidence for evolution and be able to explain why the study of evolutionary biology is important to scientists and non-scientists alike.

Students will develop and use critical thinking skills through reading and discussing the scientific literature.

Students will demonstrate oral communication skills through discussion and debate about current issues in evolution.

Students will use written communication skills to synthesize the literature on a current topic in evolutionary biology.

### **Prerequisites**

Biology 352 is a prerequisite for this course. Concurrent enrollment is not acceptable. In addition, completion of writing competency requirement is necessary. These prerequisites will be strictly enforced.

### **Texts**

*Course Reader:* a collection of scientific papers for sale in the bookstore filed under my name (Burns) and course (Evolutionary Biology). These readings will form the basis for the discussions.

*Recommended textbook:* Futuyma, D. J. 2009. Evolution. Sinauer Associates (2nd edition). An earlier book that is very similar (Evolutionary Biology by Futuyma – 1997) is on reserve in the library.

*Another good textbook on reserve:* Freeman and Herron. 2007. Evolutionary Analysis. Prentice Hall (4th edition) (the 3rd edition, 2004, is on reserve)

### **Grading**

Lecture Exam 1	250 points	A = 90% - 100%
Lecture Exam 2	250 points	B = 80% - 90%
Research Paper	250 points	C = 70% - 80%
Darwin Event	25 points	D = 60% – 70%
Discussion Participation	<u>75 points</u>	F = below 60%
Total	<b>850 points</b>	<b>Note: I do not assign + or - grades</b>

### **Blackboard**

Handouts and notes for this class are available on the SDSU blackboard web site. Be aware that simply downloading the notes from the web site is not a substitute for attending class. Additions and changes will be made during class that may not be available on the web site. Attending lecture and discussion is essential to passing this course.

### **Important Dates:**

Project Proposal Due: October 14th, 10:00 a.m.

Lecture Exam 1: October 21<sup>st</sup>

**Darwin Event: November 14th, 2:30 – 6:30 pm, San Diego Museum of Natural History**

(optional Rough Draft deadline: November 30th)

Research Paper Due: December 9th, 10:00 a.m.

Lecture Exam 2: Monday, December 14th, 10:30 a.m. – 12:30 p.m.

## EVOLUTIONARY BIOLOGY CALENDAR FALL 2009

Week	Monday	Wednesday
31 August	<p><u>Lecture:</u> Introduction to Course</p> <p>What is evolution and why is it important? Evidence of Evolution</p>	<p><u>Lecture:</u> History of Evolutionary Biology</p> <p><u>Discussion:</u> Science and Philosophy</p>
7 September	<p>LABOR DAY</p> <p>No classes: University Holiday</p>	<p><u>Lecture:</u> History of Evolutionary Biology</p> <p><u>Lecture:</u> Selection</p>
14 September	<p><u>Lecture:</u> Mutation, Drift</p> <p><u>Discussion:</u> Science and Philosophy: Readings: 2, 3, &amp; 4</p>	<p><u>Lecture:</u> Non-random mating, gene flow</p> <p><u>Discussion:</u> Science and Philosophy Readings: 2, 3, &amp; 4</p>
21 September	<p><u>Lecture:</u> Population Genetics, con't</p> <p><u>Discussion:</u> The Adaptationist Program Readings: 5, 6, &amp; 7</p>	<p><u>Lecture:</u> Systematics</p> <p><u>Discussion:</u> The Adaptationist Program Readings: 5, 6, &amp; 7</p>
28 September	<p><u>Lecture:</u> Classification</p> <p><u>Discussion:</u> Population Genetics Readings 8, 9, &amp; 43</p>	<p><u>Lecture:</u> Speciation (Allopatric, Parapatric, Hybrid Zone)</p> <p><u>Discussion:</u> Population Genetics Readings 8, 9, &amp; 43</p>
5 October	<p><u>Lecture:</u> Speciation (Sympatric) and Species (Introduction)</p> <p><u>Discussion:</u> Classification Readings: 10, 11, 12, &amp; 13</p>	<p><u>Lecture:</u> Species</p> <p><u>Discussion:</u> Classification Readings: 10, 11, 12, &amp; 13</p>
12 October	<p><u>Lecture:</u> Species</p> <p><u>Discussion:</u> Two or three forms of life? Readings: 14 – 19</p>	<p><u>Lecture:</u> Species</p> <p><u>Discussion:</u> Two or three forms of life? Readings: 14 – 19</p>
19 October	<p><u>Lecture:</u> Adaptation revisited</p> <p><u>Lecture:</u> Adaptation, continued</p>	TEST #1
26 October	<p><u>Lecture:</u> Comparative Method</p> <p><u>Discussion:</u> Species Concepts Readings: 20 - 27</p>	<p><u>Lecture:</u> Behavior</p> <p><u>Discussion:</u> Species Concepts Readings: 20 – 27</p>
2 November	<p><u>Lecture:</u> Sexual Selection, Sociobiology</p> <p><u>Discussion:</u> Adaptation Readings: 28 – 34</p>	<p><u>Lecture:</u> Molecular Evolution</p> <p><u>Discussion:</u> Adaptation Readings: 28 – 34</p>

9 November	FURLOUGH Biology 509 Will Not Meet	VETERAN'S DAY No classes: University Holiday
16 November	<u>Lecture:</u> History of Life  <u>Discussion:</u> Molecular Evolution Readings: 35, 36, & 37	<u>Lecture:</u> Gradualism and Punctuated Equilibrium  <u>Discussion:</u> Molecular Evolution Readings: 35, 36, & 37
23 November	FURLOUGH Biology 509 Will Not Meet	FURLOUGH Biology 509 Will Not Meet
30 November	<u>Lecture:</u> Gradualism and Punctuated Equilibrium  <u>Discussion:</u> Punctuated Equilibrium Readings: 38 & 39	<u>Lecture:</u> Extinction  <u>Discussion:</u> Punctuated Equilibrium Readings: 38 & 39
7 December	<u>Lecture:</u> Evolution and Development  <u>Lecture:</u> Biogeography & Historical Ecology	<u>Lecture:</u> Biogeography & Historical Ecology (con't)  <u>Lecture:</u> Misconceptions and Common Themes of Evolutionary Biology  <u>Discussion:</u> Development and Evolution Readings: 40 & 41

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