

USF Sarasota-Manatee - New Undergraduate Course Proposal Form

1. College/School Contact Information

<u>Tracking Number</u> 72	<u>Date & Time Submitted</u> 2013-03-01 14:10:17.0	
<u>Discipline</u> Biology	<u>College/School</u>	<u>Budget Account Number</u> 120901704
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2. Course Information

<u>Prefix</u> PCB	<u>Number</u> 4679	<u>Full Title</u> Biology Capstone Course: Evolution	
Is the course title variable?			N
Is a permit required for registration?			N
Are the credit hours variable?			N
<u>Credit Hours</u> 3	<u>Section Type</u> Class Lecture (Primarily)	<u>Grading Option</u> Regular	

Abbreviated Title (30 characters maximum)
Biology Capstone: Evolution

5. Prerequisites
BSC 2010, BSC 2010L, BSC 2011, and BSC 2011L; Biology majors must have senior rank.
6. Corequisites
none
7. Co-Prerequisites
none
8. Course Description
Principles of evolutionary theory are examined in the context of biological systems at all organizational levels. Required capstone course for Biology majors.
9. **Justification**

(This section is critical since the APC members will make their decision based on the information provided here. The information should be in the following outline form.)

A. Indicate how this course will strengthen the Undergraduate Program. Is this course necessary for accreditation or certification?

All biology students need to understand the process of evolution and how it functions at different levels in populations of living organisms. This course will provide students with an opportunity to connect what they have learned in other biology courses to the concept of evolution. Additionally, this course will

also strengthen our program because it will allow the biology faculty to assess what students have learned while pursuing a B.S. in Biology at USFSM. Students who take this course will take the ETS Major Field Test in Biology which will assess how well our students comprehend concepts in the fields of cell biology, molecular biology and genetics, organismal biology, and population biology, evolution and ecology. Because evolution connects each of these disciplines it makes sense for students to take this course as their capstone experience during their senior year.

B. What specific area of knowledge is covered by this course which is not covered by courses currently listed?

This course will cover patterns of evolution and adaptation in detail. We will also examine the genetic principles of evolution, including mutation and genetic variation as they relate to the concept of natural selection and change in populations. The evolution of behaviors will also be discussed. Students will learn about the mechanisms of speciation in depth and will trace the history of life from its origins to modern times. Human evolution and how evolution applies to human health will also be explored.

C. What is the need or demand for this course? (Indicate if this course is part of a required sequence in the major.) What other programs would this course service?

This course is the required capstone course for the B.S. in Biology program. This course will primarily serve Biology majors, however any student who has completed the prerequisite courses will be allowed to enroll.

D. Has this course been offered as Selected Topics/Experimental Topics course? If yes, what was the enrollment?

No

E. How frequently will the course be offered? What is the anticipated enrollment?

Two sections will be offered each spring semester. Each section will have 24 students. Each year we expect 48 students to enroll in this course.

F. Do you plan to drop a course if this course is added? If so, what will be the effect on the program and on the students? (If dropping/deleting a course please complete the nonsubstantive course change form.)

No. This course is part of the curriculum that is planned for the B.S. in Biology.

G. What qualifications for training and/or experience are necessary to teach this course? (List minimum qualifications for the instructor.)

Ph.D. in a biological science

10. Other Course Information

A. Objectives

The subject of Evolution is a little more abstract than some of the more fact-laden biological disciplines such as cell biology, microbiology or genetics. Therefore, it may place slightly different demands on the students cognitive abilities and may require a different approach when studying the material. This course is meant to challenge students and ensure that they have mastered the Core Concepts and Core Competencies for biological literacy (see below). Foundations of Undergraduate Biology The National Science Foundation (NSF) and the American Association for the Advancement of Science (AAAS), in collaboration with faculty and administrators from colleges and universities across the country, recently identified the Core Concepts for biological literacy and the Core Competencies (and disciplinary practices) that young biologists need in order to be successful in pursuit of basic science, and in preparation for professional training. The final report generated by this collaboration is entitled, Vision and Change in Undergraduate Biology Education: A Call to Action, and serves as a framework for the University of South Florida Sarasota-Manatee Biology curriculum. The Core Concepts that students are exposed to as part of the USFSM Biology Curriculum, and were expected to learn while pursuing the biology major, include the following: 1. Evolution: The diversity of life emerges over time by processes of mutation, selection, and genetic change. 2. Structure and Function: Basic units of structure define the function of all living things. 3. Information Flow, Exchange, and Storage: The growth and behavior of organisms are activated through the expression of genetic information in context. 4. Pathways and Transformations of Energy and Matter: Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamics. 5. Systems: Living systems are interconnected and interacting. Students currently should have a working knowledge of all of these Core Concepts based on their previous biology courses. This class will help to reinforce this knowledge and assist students in understanding how Evolution underlies all the biological sub-disciplines that they have studied. The Core Competencies that we expect Graduates with a Biology Major to possess are: The ability to & 1. Demonstrate knowledge in three major sub-disciplines of biology: cellular and molecular biology, organismal biology, and ecology and evolution. 2. Demonstrate an understanding of the ways in which biology interrelates with other sciences, disciplines, and society. 3. Demonstrate the ability to engage in the scientific process through the planning, execution, and interpretation of laboratory or field studies. 4. Demonstrate understanding of the ethical challenges and practices in the biological sciences. 5. Demonstrate critical thinking in both qualitative and quantitative analysis and evaluation of scientific information. 6. Demonstrate oral and written skills in the assembly and presentation of scientific reports on biological investigations. In this course, students will have the opportunity to further practice these abilities so that when they graduate with a Biology Degree, they will have been given sufficient opportunity to master all 6 of these Core Competencies.

B. Learning Outcomes

Upon completion of this course, successful students will demonstrate&. 1. An understanding of evolutionary principles and terminology and be able to apply

them in appropriate situations. 2.An understanding for the scientific process of inquiry and how it is used in the study of evolution. 3.An understanding of the historical basis of the discipline of evolution (Darwins contributions for example). 4.An understanding of the role evolution plays in governing the unity and diversity of life. 5.The ability to differentiate between micro and macro evolution. 6.The ability to explain the mechanisms of evolution and their impact on populations. 7.The ability to explain the mechanisms of speciation and illustrate with examples. 8.The ability to interpret and create phylogenies. 9.The ability to utilize algebra and probability in mathematical modeling of evolution. 10.An understanding of social behaviors such as kin selection, altruism, and reciprocity. 11.The ability to devise an experiment to determine whether a trait is an adaptation. 12.An understanding of human evolution and its consequences pertaining to health, future survival, and physical materialism.

C. Major Topics

This course will cover the following content areas: 1. Evolutionary Thinking 2. Patterns of Evolution 3. Darwinian Natural Selection 4. Estimating Evolutionary Trees (Phylogenies) 5. Mutation and Genetic Variation 6. Migration, Genetic Drift, and Mating 7. Adaptation 8. Sexual Selection 9. Kin Selection and Social Behavior 10.Evolution and Human Health 11.Phylogenomics 12.Mechanisms of Speciation 13.Origins of Life 14.Precambrian Evolution 15.The Cambrian Explosion 16.Development and Evolution 17.Human Evolution

D. Examples of Course Textbooks and Course Readings

Evolutionary Analysis by Freeman and Herron, Prentice Hall, 2007. Hens Teeth and Horses Toes by Stephen Jay Gould, WW Norton, 1994.