

## **BIOL 265 Ecology and Evolutionary Biology**

62299 \* 03 Credits

<b>INSTRUCTOR:</b>	David A. Krupp, Ph.D.
<b>OFFICE:</b>	Hale 'Imiloa 121A
<b>OFFICE HOURS:</b>	MW 10:30 – 11:30 a.m. TR 8:30 – 9:30 a.m.
<b>TELEPHONE:</b>	(808)-236-9121
<b>EMAIL:</b>	krupp@hawaii.edu
<b>EFFECTIVE DATE:</b>	Fall 2009
<b>COURSE WEBSITE:</b>	krupp.wcc.hawaii.edu/BIOL265/biol265.htm

### **WINDWARD COMMUNITY COLLEGE MISSION STATEMENT**

*Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.*

### **CATALOG DESCRIPTION**

Principles of ecology and evolution for life science majors stressing integrated approach and recent advance. (3 hrs. lect.)

### **PREREQUISITES**

- Credit for BIOL 171/171L and 172/172L; or one year of introductory college biology plus labs; or equivalent preparation; or consent of the instructor
- Concurrent registration in BIOL 265L (co-requisite).

### **STUDENT LEARNING OUTCOMES**

*By the end of this class, the student should be able to*

- Apply the appropriate terminology when describing, explaining, and applying ecological theory.
- Summarize abiotic environmental features including climate, soil and geographical structure.
- Identify the biological and physical structures of ecosystems, major biogeochemical cycles, and energy flow.
- Examine the basic principles of population dynamics including birth and mortality rates, population growth models, life history strategies, competition and carrying capacity.
- Define the interactions within communities including interspecific competition, predation, and mutualism.
- Describe the evolutionary adaptations of organisms to their environment.
- Give examples of evolutionary principles that produced unique island communities.
- Evaluate the impact of habitat alteration and destruction, loss of biodiversity, and effects of alien species.
- Interpret and produce tabular and graphical representations of information, including tables, graphs, and maps.
- Locate and critique the value of printed and online resources.
- Evaluate the consequences of population growth, increased resource use and pollution on global ecosystems.

## COURSE CONTENT

### *Course Content and Topics*

- The history of the fields of evolution and ecology.
- Definitions of evolution, evolution as the unifying principle of biological science, and microevolution versus macroevolution.
- Natural selection, Darwin's theory for a mechanism of evolutionary change.
- Sexual selection, a special case of natural selection.
- Units of selection: group and kin selection, selection on species and clades.
- Species concepts and speciation (mechanisms and patterns).
- Common ancestry, the evidence of homology, and adaptive radiation.
- The history of life on earth, the fossil record, patterns of evolutionary change, pace and tempo of evolutionary change, role of extinction, and patterns and causes of extinction.
- Human evolution.
- Principles of heredity as they apply to evolutionary change.
- Genetics systems (e.g., different genetic systems, the role of sex and genetic recombination, and the cause and maintenance of genetic diversity, etc.).
- Change in gene frequencies (e.g., deviations from Hardy-Weinberg equilibrium, founder effect, genetic drift, etc.)
- Genetic and molecular evidence in the establishment of evolutionary relationships and rates of evolutionary change.
- Cladistics and biological classification systems.
- Characteristics of the abiotic environment that affect living things and the adaptations and physiological adjustments (acclimations) organisms exhibit that allow them to cope with this environment.
- Role of environmental factors (e.g., temperature, rainfall, etc.) In determining global patterns of species distributions and abundance, and biome classification.
- Organism life histories (reproductive modes and patterns, energy allocation, generalists vs. Specialists, r and K selection, senescence, etc.).
- Characteristics of populations (e.g., models of population growth, age structure, life tables, dynamics, density-dependent vs. density-independent factors influencing population growth, human population growth, etc.).
- Species-to-species interactions (e.g., competition, predation, symbioses, etc.).
- Characteristics of communities (e.g., structure, food chains and food webs, succession, effects of disturbance, etc.).
- Characteristics of ecosystems (e.g., energy flow, biogeochemical cycles, biodiversity, complexity vs. stability, etc.).
- Island biogeography with special emphasis on Hawai'i.
- Applying the concepts of evolution and ecology to conservation biology with special reference to Hawaiian flora and fauna.
- Contemporary issues in ecology and evolution through assigned readings from recent literature and specific writing assignments.

## COURSE TASKS, ASSESSMENT AND GRADING

**QUIZZES.** The student will take a minimum of ten quizzes (15 points each; 150 points total) administered through the Internet (Laulima) during specified time periods (but not during class sessions). These quizzes will address the detailed content and major concepts presented in the

lectures, lecture outlines, text readings, and study guide activities. If the student takes more than ten quizzes, only the best ten quiz scores will be used in calculating the student's total points. Since these quizzes may be taken using home computers connected to the Internet, students may refer to instructional resources (text, study guide, lecture notes, etc.) while taking the quizzes. However, the quizzes will be timed, the student having only 20 minutes to complete each quiz. Regardless of the reason, make-up quizzes will not be allowed.

**EXAMINATIONS.** The student will take two non-cumulative midterm examinations (100 points each) and a cumulative final examination (150 points) to demonstrate understanding of information presented primarily during lectures. The first midterm examination will cover information presented during the first third of the course. The second midterm examination will cover information presented during the second third of the course. Two thirds of the final examination will emphasize the final third of the course, while one third of the final will draw on information covered during the first and second thirds of the course. The closed-book, proctored examinations will be administered through the Internet using Laulima at your campus' Learning Center. **NO RETESTS** will be given. A student missing an exam because of a documented illness or emergency may be allowed to take a make-up exam. In such a circumstance, the student should make every reasonable attempt to contact the instructor before the exam is administered to the class (or as soon as possible). While make-up exams will cover the same content area as a missed exam, the exam format and specific questions may be different.

***The assignment of points will be according to the following protocol:***

Quizzes	150	points
Midterm Examinations	200	points
<u>Final Examination</u>	<u>150</u>	<u>points</u>
<b>TOTAL</b>	<b>500</b>	<b>points</b>

***Letter grades will be assigned as follows:***

<b>A</b>	90% or above in total points and not missing more than one scheduled laboratory activity.
<b>B</b>	80-89.9% of total points and not missing more than one scheduled laboratory activity.
<b>C</b>	65-79.9% of total points and not missing more than one scheduled laboratory activity.
<b>D</b>	55-64.9% of total points and not missing more than one scheduled laboratory activity.
<b>F</b>	Below 55% of total points or informal or incomplete official withdrawal from course, or if a student misses more than one scheduled laboratory activity for reasons other than documented illness or emergency.
<b>I</b>	Incomplete; given at the <b>INSTRUCTOR'S OPTION</b> when student is unable to complete a small part of the course because of circumstances beyond his or her control. It is the <b>STUDENT'S</b> responsibility to make up incomplete work. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change for "I" to the contingency grade identified by the instructor (see catalog); may be issued if documented serious illness or emergency forces a student to miss more than one scheduled laboratory activity.

<b>CR</b>	65% or above in total points; the student must indicate the intent to take the course as <b>CR/NC</b> in writing by the end of the 10th week of classes (see catalog).
<b>NC</b>	Below 65% of total points; this grade only available under the <b>CR/NC</b> option (see above and see catalog).
<b>N</b>	<b>NOT GIVEN BY THIS INSTRUCTOR EXCEPT UNDER EXTREMELY RARE CIRCUMSTANCES</b> (e.g., documented serious illness or emergency that prevents the student from officially withdrawing from the course); may be issued if documented serious illness or emergency forces a student to miss more than one scheduled laboratory activity; never used as an alternative for an "F" grade.
<b>W</b>	Official withdrawal from the course after the third week and prior to the end of the 10th week of classes (see catalog).

Waiver of minimum requirements for specific grades may be given only in unique situations at the instructor's discretion.

Students involved in academic dishonesty will receive an "F" grade for the course. Academic dishonesty is defined in WCC's college catalog.

## LEARNING RESOURCES

Smith, T.M., and R.L. Smith 2009. *Elements of Ecology*. 7<sup>th</sup> Edition. Benjamin Cummings, San Francisco.

Freeman, S., and J.C. Herron 2007. *Evolutionary Analysis*. Custom Edition for University of Hawai'i at Mānoa. Pearson Custom Publishing, Boston.

Study guides, PowerPoint slides, and other resources will be made available at the course website and the course Laulima site.

## STUDENT RESPONSIBILITIES

The student is expected to attend and actively participate in all course lectures and activities, and complete all quizzes and examinations on time.

The student is expected to be prepared in advance before the class sessions. Being prepared includes the following: having read text materials (e.g., textbook readings, and study guides) assigned for that day's activities and bringing required work materials (e.g., textbook, handouts, writing supplies, etc.) to the session.

Any changes in the course schedule, such as examination dates, deadlines, etc., will be announced ahead of time in class or on the course Laulima site. It is the student's responsibility to be informed of these changes. Students should visit the course Laulima site at least twice per week.

It is the student's responsibility to be informed about deadlines critical to making registration changes (e.g., last day of erase period and last day for making an official withdrawal).

The student should understand that BIOL 265 is designed for students intending to major in biological science. Students should expect a level of difficulty comparable to other 200-level science classes intended for majors in the discipline. When difficult concepts and detailed information are presented, it is the student's responsibility to take the appropriate steps to learn and understand these concepts and information.

Science courses at W.C.C. generally require two to three hours of independent private study time for each hour in class. However, because of the nature of the material presented in BIOL 265, more study time may be required (depends upon the student's science/biology background). It is the student's responsibility to allocate the appropriate time needed for study in an environment conducive to quality study. The student must budget time efficiently and be realistic about all personal and professional commitments that consume time.

### **HOW TO SUCCEED IN THIS CLASS**

Understanding biological science involves understanding many difficult concepts and vocabulary, not just knowing facts. The student should know that the details to these concepts are important. In addition, the student will be introduced to hundreds of new words. In some cases, words that are familiar in a context other than biology will be introduced in the context of biology. The student will need to understand and use these terms in a biological science context.

While the student will have study guides (downloadable from the website or via Laulima), the student will not succeed in this class without taking careful lecture notes and reading the corresponding material in the textbook. The guides are not to be used in place of the student's own note taking. As soon as possible (best if done on the same day), the student should copy over these lecture notes filling in gaps and missing information by referring to the lecture outlines and textbook. The student should carefully review these rewritten lecture notes as often as possible. In addition to reviewing these notes before an exam, it would be useful for the student to try to rewrite these notes from memory.

In addition to copying over lecture notes, study activities should include drawing labeled diagrams or graphs that illustrate important biological phenomena (e.g., the internal structure of the cell, the stages of cell division, or the anatomy of the heart). These diagrams need not be works of art, but should clearly illustrate significant information. Before an exam, it would be useful to redraw these labeled diagrams and graphs from memory.

The student should make flashcards for each new vocabulary word presented (refer to lecture outlines for a lists of required terms). On one side of the card, write the word. On the other side, write the appropriate biological science definition for the word. The student should use these card for self-testing as often as possible. The student should also practice using the words to explain biological concepts.

The student should do all of the recommended study guide activities and review all of the Internet resource materials provided.

The textbook and the lecture outlines include useful study questions. The student should write out answers to all of these questions as though they were required assignments. Students could exchange these answers and provide constructive feedback to each other.

The student should read the textbook materials corresponding to a particular lecture before and after that lecture.

Students are recommended to establish study groups and study together. The students in these groups may test each other's knowledge and understanding of the information. They may also take turns teaching each other.

The student should ask the instructor to explain the things that the student does not understand.

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### **DISABILITIES ACCOMMODATION STATEMENT**

*If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, [lemke@hawaii.edu](mailto:lemke@hawaii.edu), or you may stop by Hale 'Akoakoa 213 for more information.*