

Ecology and Evolution of Sky Island Biodiversity
BISC 479 or ENVS 399
(3 credits)

University of Mississippi
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Instructor

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Course Description

The beautiful and diverse flora, fauna, and landscape of southeastern Arizona's "Sky Island" mountains and deserts will provide an inspiring and exciting setting for this course, in which students will learn about the ecological and evolutionary processes that contribute to biodiversity and community composition. This region is renowned for its diversity of habitats and unique biogeographic history, both of which contribute to its high local biodiversity, and which will make it an ideal outdoor laboratory for learning about biodiversity. Students will learn through participation in hands-on field studies of diverse organisms (potentially including studies of plants, bats, reptiles, or insects, with local researchers), with a special emphasis on birds. These field experiences will be complemented by readings from the primary literature on ecology and evolution of biodiversity, plus a visit to the world-renowned Arizona Sonoran Desert Museum.

Course Learning Outcomes

By the end of the course, students should be able to:

- Understand the major ecological and evolutionary forces that shape local biodiversity in general
- Apply their knowledge of these forces to understand the significant concentration of biotic diversity in southeastern Arizona
- Identify key species that are representative of major life zones in southeastern Arizona, from deserts to high mountains

Course Structure, Schedule, and Grading

Classroom portion in Oxford. The course will begin with 2 days of classroom instruction (May 11-12, 2015) at the University of Mississippi's main campus in Oxford, MS. During these 2 days, students will learn general principles of ecological and evolutionary processes that contribute to biodiversity and community composition, including speciation, regional community assembly, coexistence, and local species interactions. Course format on these days will be lecture and discussion, with required readings from the book Biodiversity: An Introduction (2004, 2nd edition, by K.J. Gaston & J.I. Spicer, Wiley-Blackwell). A quiz on this material will take place upon arrival in Arizona.

Field portion in Arizona. We will travel to southeastern Arizona for the remainder of the course (May 13-23), which will be based at the American Museum of Natural History's Southwestern Research Station (SWRS) in the Chiricahua Mountains. Most days at

SWRS will include both classroom time and field trips to local habitats. Classroom time will include some lecture and some student-led discussion focusing on papers from the primary literature, especially focusing on those based on studies of Sky Island biodiversity. Field trips will focus on learning representative organisms and natural history from each habitat, seeing patterns of biodiversity in the field, and applying concepts from lecture and discussions. Some field trips will include forays with scientists based at SWRS who are studying various aspects of ecology and evolution of diversity. Students will be required to keep a field notebook, including species and habitat notes, natural history observations, and notes on connections to classroom material.

Field project. During the first several days of field trips to local habitats around the Chiricahua Mountains, students will choose a species of interest on which to focus for a field study. During subsequent days, students will make natural history observations on their chosen species, to answer a scientific question agreed upon with the instructor. Possible topics for projects may include nesting ecology, territoriality, foraging behavior, species interactions, and species associations. Background information and results from the field study will be presented to the rest of the class on the final day in Arizona.

Grading. Grading will be on the +/- scale, and grades will be determined from four course components:

Quizzes: 25%

Participation and preparation for lecture, discussion, and field trips: 25%

Field notebook: 25%

Final project/presentation: 25%