

# ECCB - ECO & CONSERVATION BIOL

## **ECCB 600/EEBL 600 Populations, Communities, and Ecosystems** **Credits 3. 3 Lecture Hours.**

Basic principles and methodologies of ecology and preparation for pursuit of advanced study in subfields such as population biology, community ecology, evolutionary ecology and ecosystem science; emphasis on population, community and ecosystem processes that also have significance and influence at landscape, regional and global scales as well as proximate to evolutionary time scales; basic principles of ecology that are critical to biological conservation and sustainable use of ecosystems and renewable natural resources.

**Prerequisites:** Graduate classification.

**Cross Listing:** EEBL 600/ECCB 600.

## **ECCB 602/GENE 648 Molecular Evolution** **Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Theory and tools used in the analysis of molecular evolutionary patterns of DNA and protein sequences; format combines lecture presentations by instructor, discussion of relevant scientific literature, computer exercises, preparation of research proposal or independent research project, and practice in peer review process.

**Prerequisite:** Basic courses in general Genetics and Evolution.

**Cross Listing:** GENE 648/ECCB 602.

## **ECCB 603 Ecological Modeling** **Credits 3. 3 Lecture Hours.**

Philosophical basis, theoretical framework, and practical application of systems analysis and simulation within the context of ecology and natural resource management; emphasis placed on development, evaluation and use of simulation models by students.

**Prerequisite:** Approval of instructor.

## **ECCB 605 The Research Process** **Credits 2. 2 Lecture Hours.**

Nature and objectives of graduate work, the scientific method and basic and applied research. Introduction to design of experiments and analysis of data; principles of organization of project proposals, theses and scientific reports.

## **ECCB 606 Quantitative Phylogenetics** **Credits 3. 2 Lecture Hours. 3 Lab Hours.**

Designed to provide the theory and tools required for inference of phylogenetic (evolutionary) relationships among biological taxa using various types of comparative data including morphological characters, biochemical and molecular characters, and DNA sequences; hands-on analysis of data using contemporary tools.

**Prerequisites:** ENTO 601 or approval of instructor.

**Cross Listing:** ENTO 606 and GENE 606.

## **ECCB 607 Terrestrial Ecosystems and Global Change** **Credits 3. 3 Lecture Hours.**

Identify the physical and biological principles governing the structure and function of terrestrial ecosystems in an earth-system context; analyze how plants and microorganisms respond to environmental change and affect global carbon, nutrient, and water cycles; evaluate ecosystem response to global change, including rising carbon dioxide, climate warming, and human impacts.

**Prerequisite:** Graduate classification.

## **ECCB 612 Agrostology**

**Credits 3. 2 Lecture Hours. 3 Lab Hours.**

Basic concepts of grass structure and classification, recent advances in agrostological research, genetic and ecological basis for patterns of variation and evolution in grasses.

## **ECCB 613 Dynamics of Populations**

**Credits 3. 3 Lecture Hours.**

Principles, models and methods for analysis of population dynamics; analysis of contemporary research emphasizing theory and its uses in evaluation and management of animal populations; laboratory emphasizes mathematical, statistical and computer modeling of population phenomena.

## **ECCB 614 Down River: Biology of Gulf Coastal Fishes**

**Credit 1. 3 Lab Hours.**

Understanding the biological complexity of Gulf Coast river systems while gaining hands-on experience in field and museum ichthyological techniques; sampling of the Guadalupe and San Antonio rivers; participation in lectures, museum preparation and archiving specimens at the Biodiversity Research and Teaching Collections (BRTC).

**Prerequisite:** Graduate classification.

## **ECCB 616 Field Herpetology**

**Credit 1. 3 Lab Hours.**

Field work involving collection and preservation of herpetological specimens; natural history, ecological relations.

**Prerequisites:** Graduate classification.

## **ECCB 620 Ecological Restoration of Wetland and Riparian Systems** **Credits 3. 2 Lecture Hours. 2 Lab Hours.**

How wetland and riparian areas link terrestrial and aquatic systems and function hydrologically and ecologically within watersheds; integrated approaches for restoration of degraded wetland and riparian systems; improving water resources through vegetation management with a special interest in rangelands.

**Prerequisites:** ECCB 205 or equivalent and RWFM 428 or equivalent.

## **ECCB 621 Physiological Plant Ecology**

**Credits 3. 3 Lecture Hours.**

Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaptation in contrasting habitats, abiotic controls on species productivity and distribution, relevant conceptual and experimental approaches, and integration among ecological scales.

**Prerequisites:** ECCB 205 or MEPS 313 or equivalent; graduate classification.

## **ECCB 622 Biogeochemistry of Terrestrial Ecosystems**

**Credits 3. 3 Lecture Hours.**

Biogeochemical cycles of carbon, nitrogen, sulfur and phosphorus and their interaction with biotic and abiotic processes; biogeochemical processes investigated at the global level and in several types of terrestrial ecosystems; addressing global climate change, deforestation, acid precipitation, ozone depletion.

**Prerequisites:** ECCB 205 or equivalent; graduate classification.

## **ECCB 626 Fire Ecology**

**Credits 3. 2 Lecture Hours. 3 Lab Hours.**

Behavior and use of fire in the management of natural resources; principles underlying the role of weather, fuel characteristics and physical features of the environment related to development and implementation of fire plans.

**Prerequisites:** Graduate classification and approval of instructor.

**ECCB 631 Ecological Applications in R****Credits 3. 3 Lecture Hours.**

Introduction to R and diversity of statistical packages available; data summary and manipulation; univariate and multivariate statistics; populations and community ecology; time-series and spatial analysis.

**ECCB 633 Coastal Processes and Ecosystem Management****Credits 3. 3 Lecture Hours.**

Exploration of current state of knowledge in coastal ecosystem science with integrated view across sub-fields of coastal ecology, geomorphology, biology, law, policy, economics and engineering; focus on techniques to manage, construct and restore ecosystems.

**Prerequisite:** Graduate classification.**ECCB 634/GENE 633 Conservation Genetics****Credits 3. 3 Lecture Hours.**

Genetic concepts and techniques relevant to management and conservation of biological diversity; research and conservation strategies within a conservation genetics framework.

**Prerequisite:** Introductory courses in genetics and ecology or biological conservation.**Cross Listing:** GENE 633/ECCB 634.**ECCB 635 Ecohydrology****Credits 3. 3 Lecture Hours.**

Framework for understanding how plants and animals affect the water cycle; examine and explore the water cycle in all of its aspects with the idea of understanding how changes in land cover may influence the water cycle; implications for both upland and riparian systems.

**Prerequisite:** Graduate classification.**ECCB 644 Remote Sensing of the Environment****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Remote sensing for the management of renewable natural resources; use of aerial photography and satellite imagery to detect, identify and monitor forest, range and agricultural resources; utilize remotely sensed data as input to computerized information management systems.

**Prerequisite:** Graduate classification.**ECCB 646 Drones for Environmental Remote Sensing****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Fundamental components of small unmanned aerial systems (sUAS), sensors and platforms, UAS operational concepts, the principles of UAS data collection, legal framework within which UAS should be operated and applied, data processing software and the generation of orthomosaics and 3D point clouds, emphasizes the use of UAS in a broad spatial sciences, technology and applications context, including vegetated ecosystems.

**Prerequisite:** ECCB 444, ECCB 644, ECCB 656, GEOG 651, or GEOG 661.**ECCB 648 Wetland Plant Taxonomy****Credits 3. 1 Lecture Hour. 4 Lab Hours.**

Interpretation of plant morphologies for keying and the identification of wetland plants from prime habitats; plant communities including the plant's adaptation to variation in salinity and soils; identification of inconspicuous flowered plant species including sedges, rushes and grasses.

**Prerequisite:** Approval of instructor.**ECCB 651 Geographic Information System for Resource Management****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Geographic Information System (GIS) approach to the integration of spatial and attribute data to study the capture, analysis, manipulation and portrayal of natural resource data; examination of data types/formats, as well as the integration of GIS with remote sensing and Global Positioning System; laboratory includes extensive use of GIS applications to conduct analyses of topics in natural resources.

**Prerequisites:** Graduate classification.**Cross Listing:** BAEN 651 and RENR 651.**ECCB 652/BAEN 652 Advanced Topics in Geographic Information Systems****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Advanced GIS topics with a focus on modeling actual GIS applications including relational and database theory, design and implementation and its connection to GIS; surface analysis with digital terrain models; and an introduction to spatial statistics.

**Prerequisite:** ESSM 651 or BAEN 651.**Cross Listing:** BAEN 652/ECCB 652.**ECCB 654 Amazon Field School****Credits 4. 4 Lecture Hours.**

Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.

**ECCB 655/RPTS 655 Applied Biodiversity Science I****Credits 3. 3 Lecture Hours.**

Study in the areas of conservation genetics, metapopulations, landscape ecology, and ecosystem management.

**Prerequisite:** Graduate classification.**Cross Listing:** RPTS 655/ECCB 655.**ECCB 656 Advanced Remote Sensing****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Advanced techniques for information extraction using airborne and satellite imagery; active and passive sensors characteristics; customizing and developing image processing tools for remote sensing applications for a broad range of sensors and applications.

**Prerequisites:** ECCB 644, GEOG 651, GEOG 661.**ECCB 658 Human-Wildlife Conflict and Coexistence****Credits 3. 3 Lecture Hours.**

Ecological, cultural, and historical dimensions of human-wildlife interactions; root causes of conflict; multidisciplinary frameworks of analysis; lessons learned from practitioners; examples of coexistence; case studies across taxa and continents.

**Prerequisites:** Graduate classification.**Cross Listing:** RWFM 658 and RPTS 658.**ECCB 660 Landscape Analysis and Modeling****Credits 3. 2 Lecture Hours. 2 Lab Hours.**

Introduction to quantitative methods of landscape analysis and modeling for applications in natural resource conservation and management; quantification of landscape composition and configuration; spatial statistical methods for characterizing landscape pattern; methods for hypothesis testing with spatial data; landscape modeling approaches and applications; current literature and software.

**Prerequisite:** Approval of instructor.

**ECCB 670 Excel Biometry****Credits 3. 3 Lecture Hours.**

Rational and mathematics behind upper level biometrical methods; construct spreadsheets and analyze a common data set; topics include multiple regressions, principle components analysis, multivariate analysis of variance and others.

**Prerequisites:** Graduate classification; STAT 651 or equivalent.

**ECCB 671 Ecological Economics****Credits 3. 3 Lecture Hours.**

Study of the relationships between ecosystems and economic systems; understanding the effects of human economic endeavors on ecological systems and how the ecological benefits and costs of such activities can be quantified and internalized.

**Prerequisite:** Graduate classification.

**Cross Listing:** AGECE 659/ECCB 671 and RENR 659.

**ECCB 681 Seminar****Credit 1. 1 Other Hour.**

Reviews and discussions of current topics and advances in Ecosystem Science and Management.

**Prerequisite:** Graduate classification.

**ECCB 684 Professional Internship****Credits 1 to 16. 1 to 16 Other Hours.**

On-the-job training in fields of ecosystem science and management.

**Prerequisite:** Graduate classification in an ecosystem science and management major.

**ECCB 685 Directed Studies****Credits 1 to 9. 1 to 9 Other Hours.**

Investigations not included in student's research for thesis or dissertation.

**Prerequisite:** Graduate majors or minors in Ecosystem Science and Management.

**ECCB 689 Special Topics in...****Credits 1 to 4. 1 to 4 Other Hours.**

Selected topics in an identified area of ecosystem science and management. May be repeated for credit.

**Prerequisites:** Graduate classification.

**ECCB 691 Research****Credits 1 to 23. 1 to 23 Other Hours.**

Research for thesis or dissertation.

**Prerequisite:** Graduate majors in Ecosystem Science and Management.