Montgomery County Community College
BIO 256
Ecology
4-3-3

CATALOG DESCRIPTION:
This course provides students with a 4-credit lab science focusing on the interactions of organisms with their biotic and abiotic environments. It will include an overview of the various components of population, community and ecosystem-level interactions, a broad survey of the major terrestrial and aquatic biomes of the world, both local and biosphere-level anthropogenic effects, and restoration ecology. Labs will reinforce important classroom concepts and will include both computer-based mathematical models of species' interactions and in-field experiences to acquaint students with the diversity of ecosystem types and ecological processes. This course is subject to a course fee. Refer to http://mc3.edu/adm-fin-aid/paying/tuition/course-fees for current rates.

REQUISITES:
Previous Course Requirements
- BIO 152 Principles of Biology II or BIO 115 Environmental Biology and BIO 122 General Biology II

Concurrent Course Requirements
None

LEARNING OUTCOMES Upon successful completion of this course, students will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Describe important differences and similarities between the major natural ecosystems of the world in terms of productivity, biodiversity, disturbances, nutrient cycling and energy flows, and the major human perturbations that impact them.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Test Questions Lab Exercise Reports

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
2. Characterize ecosystems in various stages of primary and secondary natural succession, and apply the principles influencing succession in ecosystems to proposals for the ecological restoration of disturbed terrestrial and aquatic landscapes.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Test Questions Lab Exercise Reports
3. Describe the physical, chemical, and biological interactions that determine species' abundances and distributions across the globe, and relate the observed ecological niche to past and present evolutionary adaptation via natural selection.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Test Questions Lab Exercise Reports
4. Identify the assumptions and important variables of mathematical simulations modeling species' distributions and population growth rates, and generalize their conclusions in the contexts of the physical abiotic environment and the interactions with other species.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Test Questions Lab Exercise Reports
5. Apply principles of habitat loss and fragmentation to the design of preserves for the conservation of biodiversity, and the restoration of disturbed ecosystems.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Test Questions Lab Exercise Reports

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
6. Form and express mature and defensible opinions about pressing local, regional, national and international environmental issues in the social, political, and philosophical/ethical realms, as they are influenced by basic ecological principles.	Lectures Lab Exercises Consisting both of Computer-Based and In-Field Studies Student-Directed Research Paper Quizzes Exams	Class Discussions Test Questions Lab Exercise Reports

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

Introduction: The Realm of Ecology

- Interactions with human activities
- Contrasted with "environmentalism"

The Ecological Niche

- Geological and astronomical determinants of environment

Adaptation to the Abiotic Environment

- Energy flows and food chains/webs
- Climate, water, temperature, light, nutrient cycles

Community Interactions

- Symbiosis, competition, predation/parasitism/herbivory, mutualisms, behavioral ecology
- Community structure and stability
- Island communities, extinction and colonization rates

Ecosystem Ecology

- Primary and secondary natural succession
- Role of disturbances and gap biology
- Major biomes of the world

Population Ecology
- Population structure and genetics
- Population growth rates and models
- Population dynamics, fluctuations and cycles

Conservation and Restoration Biology
- Rare and endangered species
- Conservation strategies
- Preserve design, restoration practices

Labs may include: computer simulations of competition between species, computer simulations of population growth rates, computer simulations of predator-prey dynamics, field species-area curve investigations, laboratory soils analyses, field observations of natural succession in local "oldfield" situations, field trips to local ecological restoration sites, field monitoring of chemical and biological water quality indicators, field mark-recapture population estimate studies, field trips to regional contrasting ecosystems (e.g., NJ Pine Barrens, coastal ecosystems, etc.), and other relevant activities.

LEARNING MATERIALS:
To ensure breadth and depth of topic coverage, and to provide well-illustrated examples to reinforce material covered in lecture, an appropriate general Ecology textbook will be selected and assigned. The book in current use is: Ricklefs and Relyea, *Ecology: The Economy of Nature, 7th ed.* W. H. Freeman, 2014.

Other materials (especially current articles of relevance) may be made available directly to the student or via the College's library reserve or its computer network.

COURSE APPROVAL:

Prepared by: Jerry Coleman, Ph.D.	Date: 2/2007
VPAA/Provost Compliance Verification: Dr. John C. Flynn, Jr.	Date: 9/11/2009
Revised by: Christopher Harendza, Ph.D.	Date: 10/30/2012
Revised by: Jerry Coleman, Ph.D.	Date: 11/20/2013
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 2/26/2014
Revised by: Debbie Dalrymple	Date: 6/27/2016
VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D.	Date: 6/27/2016

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.