

## Course Competencies Template - Form 112

GENERAL INFORMATION			
Name: Dr. Susan Neimand, Prof. Chris Migliaccio, Prof. David Moore, and Dr. Edwin Ginés-Candelaria	Phone #: (305)237-6152, (305)237-3269, (305)237-2315, (305)237-3396		
Course Prefix/Number: PCB 3043	Course Title: Fundamentals of Ecology		
Number of Credits: 3			
Degree Type	<input type="checkbox"/> B.A. <input checked="" type="checkbox"/> B.S. <input type="checkbox"/> B.A.S <input type="checkbox"/> A.A. <input type="checkbox"/> A.S. <input type="checkbox"/> A.A.S. <input type="checkbox"/> C.C.C. <input type="checkbox"/> A.T.C. <input type="checkbox"/> V.C.C		
Date Submitted/Revised: 03/13/08	Effective Year/Term: Fall 2008-1		
<input type="checkbox"/> New Course Competency <input checked="" type="checkbox"/> Revised Course Competency			
Course to be designated as a General Education course (part of the 36 hours of A.A. Gen. Ed. coursework): <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
The above course links to the following Learning Outcomes: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Communication  <input checked="" type="checkbox"/> Numbers / Data  <input checked="" type="checkbox"/> Critical thinking  <input checked="" type="checkbox"/> Information Literacy  <input type="checkbox"/> Cultural / Global Perspective         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Social Responsibility  <input type="checkbox"/> Ethical Issues  <input type="checkbox"/> Computer / Technology Usage  <input type="checkbox"/> Aesthetic / Creative Activities  <input checked="" type="checkbox"/> Environmental Responsibility         </td> </tr> </table>		<input type="checkbox"/> Communication <input checked="" type="checkbox"/> Numbers / Data <input checked="" type="checkbox"/> Critical thinking <input checked="" type="checkbox"/> Information Literacy <input type="checkbox"/> Cultural / Global Perspective	<input type="checkbox"/> Social Responsibility <input type="checkbox"/> Ethical Issues <input type="checkbox"/> Computer / Technology Usage <input type="checkbox"/> Aesthetic / Creative Activities <input checked="" type="checkbox"/> Environmental Responsibility
<input type="checkbox"/> Communication <input checked="" type="checkbox"/> Numbers / Data <input checked="" type="checkbox"/> Critical thinking <input checked="" type="checkbox"/> Information Literacy <input type="checkbox"/> Cultural / Global Perspective	<input type="checkbox"/> Social Responsibility <input type="checkbox"/> Ethical Issues <input type="checkbox"/> Computer / Technology Usage <input type="checkbox"/> Aesthetic / Creative Activities <input checked="" type="checkbox"/> Environmental Responsibility		
Course Description (limit to 50 words or less, <b>must correspond with course description on Form 102</b> ):  This is a foundations course in ecology. In this course, students will learn the basic principles of ecology at organismal, population, community, and ecosystem levels, including consideration of Florida's ecosystems and human impact on those systems.			
Prerequisite(s): BSC2011 and BSC2011L	Corequisite(s):		

**Course Competencies:** (for further instruction/guidelines go to: <http://www.mdc.edu/asa/curriculum.asp>)

Competency 1: The student will demonstrate knowledge of the scientific process and the study of natural phenomena by:

1. Describing the history of ecology and explaining its relationship to other natural sciences.
2. Determining the relevance of ecology to human affairs.
3. Describing how the scientific method is applied to ecological problem solving.
4. Designing and completing an ecological investigation that includes quantitative and qualitative data.
5. Explaining the importance of modeling in ecology.

Competency 2: The student will demonstrate knowledge of the fate of energy in the ecosystem and the basic structure and function of an ecosystem by:

1. Identifying the source and fate of the energy that drives ecosystems.
2. Discussing how differences in solar radiation striking the Earth and Earth's rotation and revolution affect seasonal temperature changes, global patterns of atmospheric heating and cooling, ocean currents, and air circulation.
3. Defining ecosystem and identifying an ecosystem's basic structural components.
4. Defining primary production and identifying the factors that contribute to variation in productivity among ecosystems.

Revision Date: \_\_\_\_\_

Approved By Academic Dean Date: \_\_\_\_\_

Reviewed By Director of Academic Programs Date: \_\_\_\_\_

5. Explaining how abiotic and biotic factors contribute to the development of the various types of soils.
6. Comparing various explanations for worldwide trends in biodiversity.
7. Explaining the role of fire in maintaining the health of some ecosystems.

Competency 3: The student will demonstrate knowledge of factors contributing to changes in population growth and distribution by:

1. Defining population and discussing its relevance in the hierarchy of biological organization.
2. Identifying and describing the factors that contribute to changes in populations over time: birth rate, death rate, immigration, emigration, and dispersal.
3. Identifying the different types of population distributions and the factors contributing to such patterns.
4. Describing how life tables are used to track population growth.
5. Distinguishing exponential and logistic population growth by comparing their growth curves, and discussing the factors that control growth.
6. Defining carrying capacity and explaining its relationship to the logistic growth curve.
7. Identifying and evaluating the factors that contribute to species extinction.
8. Explaining the factors that limit population growth, including density dependence, density-independence, predator-prey and competitor relationships, and social dominance.
9. Comparing the characteristics of *r*-selected and *k*-selected reproductive strategies.

Competency 4: The student will demonstrate knowledge of the basic structure and function of a community and of the energy flow through it by:

1. Describing how the First and Second Laws of Thermodynamics govern energy flow in an ecosystem and help determine the efficiency of energy transfer.
2. Comparing biomass and energy pyramids.
3. Describing the energy flow through trophic levels.
4. Illustrating a food web comprised of local examples of flora and fauna.
5. Explaining how keystone species and ecological dominants influence community structure.
6. Discussing the factors that contribute to species biodiversity in terrestrial and aquatic ecosystems.
7. Describing various types of community architectural elements in terrestrial and aquatic communities with particular emphasis on South Florida.
8. Distinguishing between an edge, a gap, and an ecotone and explaining why edges are species-rich.
9. Describing the stages of ecological succession in a local ecosystem and the resulting changes in species diversity.
10. Identifying the abiotic and biotic factors that result in community changes over time.
11. Discussing the significance of the Lotka-Volterra model and identifying the four potential outcomes of interspecific competition according to this model.
12. Defining niche as an *n*-dimensional hypervolume.
13. Discussing the need and benefits of ecological community restoration programs, particularly in South Florida.

Competency 5: The student will demonstrate knowledge of the relationship(s) between humans and nature, and of the importance of environmental sustainability by:

1. Explaining why a new paradigm for the relationship between humans and nature is necessary for long-term ecosystem stability.
2. Identifying the roots of human attitudes towards nature and the resulting environmental consequences.
3. Describing several alternatives towards non-Western views of nature.
4. Listing the components of a new "environmental ethic" rooted in an ecocentric cosmology.
5. Explaining why environmental sustainability is an important concern of ecology and environmental science.

Revision Date: \_\_\_\_\_

Approved By Academic Dean Date: \_\_\_\_\_

Reviewed By Director of Academic Programs Date: \_\_\_\_\_

Competency 6: The student will explain how organisms interact with one another and the physical setting by:

1. Defining and differentiating among weather, climate, and microclimate using local examples.
2. Discussing how daily and seasonal variation in light levels affect the rhythms of life.
3. Identifying and categorizing common ecological limiting factors and describing how nutrients, acidity, salinity, moisture, and temperature affect organisms.
4. Listing, describing, and giving examples of the types of community interactions that occur between two species: predation, parasitism, parasitoidism, amensalism, commensalism, mutualism, and competition.
5. Identifying the strategies that predators use to capture prey.
6. Identifying plant and animal defensive strategies against predation.
7. Identifying the factors that affect the success of introduced species.

Competency 7: The student will relate concepts in environmental biology to contemporary, historical, technological, and societal issues by:

1. Summarizing the impacts of a growing human population and hyper-consumption on the planet and on South Florida, including impacts on living space, agriculture, water, and soils, animal and plant populations, the atmosphere, the oceans, and ecosystems.
2. Predicting the long-term implications should human activities continue at the present level.
3. Describing the impact of using nonrenewable energy resources (extraction, transport, processing, consumption and waste products) on ecosystems.
4. Discussing the impact of human activities upon each of the biogeochemical cycles.
5. Identifying the most important consequence of the  $I = P \times A \times T$  equation.
6. Identifying worldwide human population growth and worldwide resource consumption patterns.
7. Identifying regions of greatest population growth and greatest resource consumption.

Competency 8: The student will relate behavior to internal or external environmental stimulus by:

1. Identifying what it means for an organism to be adapted to its environment.

Competency 9: The student will demonstrate knowledge of biomes and major ecosystems by:

1. Describing how ecosystems are classified.
2. Describing how ecosystem distribution is affected by latitude and altitude.
3. Identifying the abiotic factors that influence the distribution of terrestrial and aquatic ecosystems, such as temperature, moisture, light, salinity, nutrients, and topography.
4. Describing several local ecosystems, including major geographical reference points and the abiotic and biotic factors that create and maintain them.
5. Identifying the biotic and abiotic characteristics, characteristic flora and fauna, and geographical locations of the tundra, taiga, deciduous forests, grasslands, savannahs, chaparral, tropical rainforests and deserts.

Revision Date: \_\_\_\_\_

Approved By Academic Dean Date: \_\_\_\_\_

Reviewed By Director of Academic Programs Date: \_\_\_\_\_

Competency 10: The student will identify major biogeochemical cycles and processes by:

1. Illustrating the biogeochemical cycles of oxygen, carbon, nitrogen, phosphorus, and water, using local examples and identifying biotic and abiotic factors that influence nutrient cycling.
2. Describing the role of decomposition in the environment.
3. Distinguishing among types of decomposers based on function and size in terrestrial and aquatic environments.
4. Identifying the physical and chemical factors that influence the rate and degree of decomposition.

Competency 11: The student will conduct and complete the process of scientific inquiry by:

1. Designing an ecological investigation that quantitatively measures hypothesized patterns of species-abundance and distribution of a natural area and measures potential abiotic and biotic factors affecting species-abundance and distribution.
2. Examining and graphing measured patterns of species-abundance and distribution.
3. Relating measured patterns of species-abundance and distribution to measured abiotic and biotic factors.
4. Documenting the determined patterns of species-abundance and distribution relative to measured abiotic and biotic factors.

Revision Date: \_\_\_\_\_

Approved By Academic Dean Date: \_\_\_\_\_

Reviewed By Director of Academic Programs Date: \_\_\_\_\_