

SCI 336 - Ecology for K-8 Pre-Service Teachers (4 Credits)

Description: Ecological concepts for pre-service teachers. Includes ecosystems, energy flow, evolution, population dynamics, community ecology, and human impacts on the environment. Course is intended for Integrated Science Majors. Does not fulfill requirements for a biology major or minor. Content reflects National and Michigan science standards.

PROFESSOR:

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REQUIRED TEXT:

Essentials of Ecology 2nd edition
G. Tyler Miller, Jr.
Thomson – Brooks/Cole, U.S.

Biology Labs On-Line – Ecology Version

You can purchase the Ecology Version (which includes a lab manual and online access to the 5 Ecology labs for \$16.00) at <http://www.biologylabsonline.com> (this is the same place you access the online labs).

PREREQUISITES: BIO 121, 206, GEO 202, GEO 203, PHY 201 (GEO 201 Recommended)

Course Overview:

This course is designed to help you gain an understanding of ecological concepts with a specific focus on the Michigan Science Curriculum Standards and Benchmarks. Throughout the course you will practice scientific inquiry to learn science content. In doing so, you will gain a better understanding of the nature and methods of science. Thus, as you learn science content, you will also learn how to do science and learn about the nature of science. More specifically, you will:

1. Develop scientific knowledge of major principles in the life sciences, including cells, organization of life, heredity, evolution, and ecosystems.
2. Apply unifying concepts and processes of science, such as systems, order, models, change, measurement, and correlation of structure and function.
3. Construct an understanding about the nature of scientific inquiry and clarify what constitutes scientific knowledge.
4. Design and conduct extended investigations to answer scientifically oriented questions.
5. Communicate the findings of your investigations, explaining conclusions based on the collection and analysis of evidence.

At the same time, you will gain experience in learning through a variety of teaching methodologies such as concept mapping, small group presentations, internet exploration, and learning logs. Although this is NOT designed specifically as an educational methods class, hopefully you will find many of the activities could be modified to be used in an elementary classroom.

If there are any students in the class who have special needs because of learning or physical disabilities, please contact Disability Support Services (DSS) at 331-2490.

Course Objectives:

1. *You will be able to DO science.*
 - a. Students will show how new scientific knowledge is constructed through asking questions, developing solutions, collecting data, and interpreting results. (Strand I.1, MDE Content Standards)
2. *You will be able to UNDERSTAND science.*
 - a. Students will examine scientific knowledge by reading research articles, popular press, or fellow student writing and evaluating the strength of the claims for scientific merit contained within. (Strand II.1., MDE Content Standards)
3. *You will KNOW basic ecological concepts.*
 - a. Students will be able to explain various ways in which organisms influence or are influenced by their environment. (Strand III.4 and Strand III.5, MDE Content Standards)
 - b. Students will be able to describe how parts of an ecosystem are related and interact. (Strand III.5, MDE Content Standards)
 - c. Students will be able to explain how energy and matter is distributed and cycled within an ecosystem. (Strand III.5, MDE Content Standards)
 - d. Students will describe how communities of living organisms will change over time. (Strand III.5, MDE Content Standards)
 - e. Students will identify resources to continue learning ecological concepts.
4. *You will be able to RELATE ecological concepts to your life.*
 - a. Students will identify how humans and the environment interact. (Strand III.5, MDE Content Standards)
5. *You will be able to DESCRIBE methods for teaching ecology to elementary and middle school students.*
 - a. Student will be able to describe, create, use a variety of teaching strategies useful in presenting science concepts especially ecological concepts.

Assessment of Learning:

As a future teacher, you will find that assessment has multiple roles beyond just providing students with a grade. From a practical standpoint, it will be necessary to establish some criteria by which to measure YOUR learning improvement. This will be done using exams, quizzes, and lab reports as well as homework assignments such as concept mapping, internet assignments, writing a review of a news article, summarizing current literature, designing a lesson on a chosen topic, etc.

Potential Schedule of Topics (T/R – Lecture Days and W – Laboratory)

Week		Topic
1	Lec	Introduction to Ecology, Tragedy of the Commons
	Lec	Chance, change and evolution, Specied Diversity, and Distribution
	Lab	Online labs – Natural Selection and Evolution
2	Lec	Energy flow in ecosystems
	Lec	Nutrient cycling in ecosystems
	Lab	Angus Field Trip – Lake Michigan
3	Lec	Climate, Biomes, and Biodiversity
	Lec	Process of Science – Group Research Project design
	Lab	Group Research Project – Data collection and report
4	Lec	Adaptations to life in aquatic environments
	Lec	Adaptations to life in terrestrial environments
	Lab	Zoo Field Trip – Adaptations
5	Lec	Variations in the physical environment
	Lec	Exam 1
	Lab	Stream ecosystem sampling and impacts from human disturbance
6	Lec	Niche and Limiting Factors – physical environment
	Lec	Niche and Limiting Factors – Plants
	Lab	Stream ecosystem sampling and impacts from human disturbance
7	Lec	Niche and Limiting Factors - Animals
	Lec	Designing an ecology lesson for middle school
	Lab	Ravines Field Trip – Species interactions
8	Lec	Predation and Herbivory
	Lec	Symbiotic Relationships
	Lab	Research Presentations
9	Lec	Life History and Evolutionary fitness
	Lec	Population Growth and Structure
	Lab	Online labs – population ecology
10	Lec	Exam 2
	Lec	Human Populations
	Lab	Cemetary Field Trips – Human populations and structure
11	Lec	Community Structure, Development, and Change
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	Lab	Rosy Mound Field Trip - Succession
12	Lec	Biogeography and community structure
	Lec	Human impacts to ecosystems
	Lab	Diversity and Disturbance
13	Lec	Biodiversity, Extinction, and Conservation
	Lec	Biodiversity, Extinction, and Conservation
	Lab	Island Biogeography Theory and Conservation of Biodiversity
14	Lec	Teaching Presentations
	Lec	Teaching Presentations
	Lab	Biodiversity and Human Ecology: The Meridonalis Simulation - Debate