



Eco-Academy 2010-2011

Learning Program Guide For Youth and Parent Educators

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ECO-ACADEMY FOR PARENT YOUTH AND PARENT EDUCATORS

The **ECO-ACADEMY** provides a hands-on curriculum to community youth and the general public in the fields of environmental sciences, biology, marine biology, zoology, ecology and endangered species and conservation. Our team is a highly trained group of individuals that is dedicated to preserve and interpret the invaluable resources found at Deering Estate at Cutler. Our Eco-brigade is prepared to interact in a fun and educational way with every group regardless of age, special interests or grade level. They will encourage student and parent educator participation during educational programs. They are trained in South Florida and the world's ecosystems. With some of the highest quality and most diverse natural resources remaining in Miami-Dade County, our **ECO-ACADEMY** also educates our community about preserving our biodiversity through environmental stewardship, environmental sustainability, and overall resource management.

ECO-ACADEMY'S sessions engage participants in an interactive, positive and balanced activity to help them understand and appreciate, as well as think critically about, the world around them. The Deering Estate staff provides participants with fossils, artifacts and tools, living exhibits, preserved specimens, photographs and simple laboratory experiments to help illustrate the key points of a specific topic. The program will accommodate up to 30 people and will be offered once a week for 30 week during the academic year for 2 hours each session. The fee is \$35 per module (5 weeks). The cost of material is included in the fee.

MODULE SESSIONS

Core Module	Sessions	Date
Natural Sciences	5 wk	August 30 th – September 30 th
South Florida Ecosystems	5 wk	October 4 th – November 4 th
Marine Biology	5 wk	November 8 th – December 16 th
Zoology	5 wk	January 10 th – February 12 th
Archaeology	5 wk	February 14 th – March 26 th
Environment and Ecology	5 wk	March 28 th – April 30 th

Natural Sciences

In science, the term natural science refers to a naturalistic approach to the study of the universe, which is understood as obeying rules or laws of natural origin.

The term **NATURAL SCIENCES** is also used to distinguish those fields that use the scientific method to study nature from the social sciences, which use the scientific method to study human behavior and society; from the formal sciences, such as mathematics and logic, which use a different (a priori) methodology; and from the humanities.

Natural sciences form the basis for applied sciences. Together, the natural and applied sciences are distinguished from the social sciences on the one hand, and the humanities on the other. Though mathematics, statistics, and computer science are not considered natural sciences (mathematics traditionally considered among the liberal arts and statistics among the humanities, for instance), they provide many tools and frameworks used within the natural sciences.

Alongside this traditional usage, the phrase **NATURAL SCIENCES** is also sometimes used more narrowly to refer to natural history. In this sense "natural sciences" may refer to the biology and perhaps also the earth sciences, as distinguished from the physical sciences, including astronomy, physics, and chemistry.

Within the natural sciences, the term hard science is sometimes used to describe those subfields which some people view as relying on experimental, quantifiable data or the scientific method and focus on accuracy and objectivity. These usually include physics, chemistry and biology. By contrast, soft science is often used to describe the scientific fields that are more reliant on qualitative research, including the social sciences.

MODULE: NATURAL SCIENCES

UNITS:

- **The Scientific Method**
- **Cell Biology**
- **Mystery Murder**
- **Weather**
- **Animal Tracks**

South Florida Ecosystems

The term **ECOSYSTEM** refers to the combined physical and biological components of an environment. An ecosystem is generally an area within the natural environment in which physical (abiotic) factors of the environment, such as rocks and soil, function together along with interdependent (biotic) organisms, such as plants and animals, within the same habitat to create a stable system. Ecosystem is a functional unit consisting of living things in a given area, non-living chemical and physical factors of their environment, linked together through nutrient cycle and energy flow.

Central to the **ECOSYSTEM** concept is the idea that living organisms interact with every other element in their local environment. Eugene Odum, a founder of ecology, stated: "Any unit that includes all of the organisms (the "community") in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e.: exchange of materials between living and nonliving parts) within the system is an ecosystem." The human ecosystem concept is then grounded in the deconstruction of the human/nature biotype and the premise that all species are ecologically integrated with each other, as well as with the abiotic constituents of their biology.

Eco-Academy Participants will discover and study the following South Florida Ecosystems:

MODULE: SOUTH FLORIDA ECOSYSTEMS

UNITS:

- **Tropical Hardwood Hammocks**
- **Pine Rock lands**
- **Salt Marshes**
- **Sea Grasses**
- **Everglades**

Marine Biology

MARINE BIOLOGY is the scientific study of organisms in the ocean or other marine or brackish bodies of water. Given that in biology many phyla, families and genera have some species that live in the sea and others that live on land, marine biology classifies species based on the environment rather than on taxonomy. Marine biology differs from marine ecology as marine ecology is focused on how organisms interact with each other and environment and biology is the study of the animal itself.

Marine life is a vast resource, providing food, medicine, and raw materials, in addition to helping to support recreation and tourism all over the world. At a fundamental level, marine life helps determine the very nature of our planet. Marine organisms contribute significantly to the oxygen cycle, and are involved in the regulation of the Earth's climate. Shorelines are in part shaped and protected by marine life, and some marine organisms even help create new land.

During **MARINE BIOLOGY module** Students will learn about:

MODULE: MARINE BIOLOGY

UNITS

- **Algae**
- **Plankton**
- **Sea Urchins**
- **Crustaceans**
- **Basic Seining and Snorkeling**

ZOOLOGY

Animals are a major group of mostly multicellular of the kingdom Animalia. Their body plan eventually becomes fixed as they develop, although some undergo a process of metamorphosis later on in their life. Most animals are motile, meaning they can move spontaneously and independently. Most animals are also heterotrophs, meaning they must ingest other organisms for sustenance.

Zoology is the branch of biology that deals with animals and animal life, including the study of the structure, physiology, development, and classification of animals. During the **ZOOLOGY** module participants will understand the difference of the major groups of animals and they will study in depth the wonderful animal kingdom and will be able to learn about:

MODULE: ZOOLOGY

UNITS:

- **Animal Classification**
- **Animal Adaptations**
- **Animal Behavior**
- **Nature Photography**
- **Visit to Zoo Miami**

Archaeology

Archaeology, or archeology is the study of past human societies, primarily through the recovery and analysis of the material culture and environmental data which they have left behind, which includes artifacts, architecture, biofacts and cultural landscapes. Because archaeology employs a wide range of different procedures, it can be considered to be both a science and a humanity, and in the United States it is thought of as a branch of anthropology, although in Europe it is viewed as a separate discipline.

Archaeology studies human history from the development of the first stone tools in eastern Africa 3.4 million years ago up until recent decades. It is of most importance for learning about prehistoric societies, when there are no written records for historians to study, and which makes up over 99% of total human history, from the Palaeolithic until the advent of literacy in any given society. Archaeology has various different goals, which range from studying human evolution to cultural evolution and understanding culture history.

The discipline involves surveyance, excavation and eventually analysis of data collected in order to learn more about the past. In broad scope, archaeology relies on cross-disciplinary research. It draws upon anthropology, history, art history, classics, ethnology, geography, geology, linguistics, physics, information sciences, chemistry, statistics, paleoecology, paleontology, paleozoology, paleoethnobotany, and paleobotany.

Archaeology developed out of antiquarianism in Europe during the 19th century, and has since become a discipline practiced across the world. Since its early development, various specific sub-disciplines of archaeology have developed, including maritime archaeology, feminist archaeology and archaeoastronomy, and numerous different scientific techniques have been developed to aid archaeological investigation. Nonetheless, today, archaeologists face many problems, ranging from dealing with pseudoarchaeology to the looting of artifacts and opposition to the excavation of human remains.

MODULE: ARCHAEOLOGY

UNITS:

- **Lessons from the Past**
- **Florida Archaeology**
- **Scientific Inquiry**
- **Archaeology Sites**
- **Protecting the Past**

ENVIRONMENT AND ECOLOGY

ECOLOGY is the scientific study of the distributions, abundance and relations of organisms and their interactions with the environment. Ecology includes the study of plant and animal populations, plant and animal communities and ecosystems. Ecosystems describe the web or network of relations among organisms at different scales of organization. Since ecology refers to any form of biodiversity, ecologists research everything from tiny bacteria's role in nutrient recycling to the effects of tropical rain forest on the Earth's atmosphere.

The understanding of ecology is found in the broader details of study, including:

- life processes explaining adaptations
- distribution and abundance of organisms
- the movement of materials and energy through living communities
- the succession development of ecosystems, and
- the abundance and distribution of biodiversity in context of the environment.

MODULE: ENVIRONMENT AND ECOLOGY

UNITS:

- **Biomes**
- **Biodiversity**
- **Urban Effects**
- **Acid Rain**
- **Nature Bike Tour**

Marine Conservation Science and Policies Learning Program



Early in 2010, the Deering Estate at Cutler received a grant from the R. J. Dunlap Marine Conservation Program to design a curriculum and lesson plans for the Marine Conservation Science & Policy Service Learning Program so that teachers, students, and staff learn collaboratively in a hands-on environment that is convenient for all. Each of five, five week lesson plans, includes in depth study in Coastal and Ocean Habitats; Sharks and Rays; Ocean Connections; Marine Issues; and Management, Conservation, Research, and Action. In partnership with the Deering Estate at Cutler (an historic flanking protected resources

of the Biscayne Bay Aquatic Preserve and listed on the National Register of Historic Places), the R.J. The MCS&P Service Learning Program partnership provides a practical, hands-on marine science education and self-initiated research project opportunities for high school, undergraduate and graduate students in the marine science field. Fostering excitement, scientific understanding and stewardship of our native habitats, coastlines and bay resources, the proposed MCS&P Service Learning Program educates our community (particularly youth) about preserving our biodiversity through environmental stewardship, environmental sustainability, and overall resource management.

This program will be taught at Deering Estate at Cutler for 30 weeks during 2 hours sessions once a week. This program is designed for youth 13 yrs old and older. Parents are not required to participate but are welcome to do it as well. The cost of the program is \$35 per module plus \$12 annual registration fee. A minimum of 25 participants is required.

Module	Classes				
Coastal and Ocean Habitats	Ocean Zones	Salt Marshes	Mangroves	Tidal Creeks	Sea Grasses
	Sandy Shores	Reefs	Coastal Dune Barrier Islands	Biscayne Bay	Everglades
Ichthyology	Introduction to Ichthyology	Structure and Form of Fishes	Bony Fishes	Cartilaginous Fishes	Shark Anatomy and Dissection
Ocean Connections	Marine Biodiversity	Species Interactions	Trophic Structures	Population Sampling	Ocean Resources
Marine Issues	Coastal Development	Fishing and Bycatch	Pollution, Water Quality and Bioaccumulation	Climate Change	Invasive Species
Management, Conservation, Research and Actions	The Scientific Method: Using Data	Fisheries and Management Strategies	Mercury Toxicity Data	Satellite Tracking Data	Principles of Conservation and Practicing Environmental Stewardship