

MARINELAB AP BIOLOGY COURSE

Astronomy/Plankton Tow

Summary: Astronomy will be discussed aboard the boat. Discussion will include location of Polaris and how it is used for navigation, identification of visible constellations and identification of visible planets. Definition of plankton and types of plankton will also be reviewed aboard the boat and plankton net will be towed. Collected samples will be projected under a microscope in the FCC where species will be identified.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

Cassiopeia

Summary: This lab begins with an introduction to Cassiopeia spp. and its life cycle as well as methods and issues surrounding mariculture. Students work in groups to collect embryos from Cassiopeia and place in vials. Students monitor vials throughout the week, looking for developing planula and polyps. All data from this lab will be discussed during the Summary.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

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Coral Reef Ecology

Summary: Power point discussion outlines types of coral, coral reproduction, importance of the coral reef, disturbances to the coral reef and coral management/restoration projects. Students will then go out to two coral reef sites to snorkel.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems
Outline Level 4	III.C.3.	Global issues

Everglades Hydrology

Summary: The field trip to Everglades National Park is preceded by an Everglades Hydrology Discussion which focuses on importance of the Everglades, flow of water thru FL pre 1900s versus post 1900s, and restoration efforts. Field trip involves walking along paved trails to identify trees, flowers, birds and other organisms. Additional stops are offered.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution

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Everglades Hydrology continued

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 4	III.A.4.	Evolutionary relationships
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

Field Identification of Reef Fish

Summary: Field trip to the coral reef is preceded by a discussion on how to identify coral reef fish and a slideshow with commonly seen fish.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

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Invertebrate Diversity

Summary: This lab gives students a hands on opportunity to understand the concept of diversity and its association with a healthy, stable environment. Students will "shake" invertebrates off of live rock collected from Largo Sound. Students will identify each organism found using an ID key and instructors will collect a sample of every species found. These critters will then be projected onto the TV for all to see using a microscope and a flexcam. Each species will be identified, described and classified into its phylum.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

Keys Habitats - Introduction and Summary

Summary: Two separate powerpoint discussions. The Keys Habitats discussion is at the beginning of the program outlining the main habitats that make up the Keys, where these habitats are located and how the abiotic components of each habitat influence the biotic components. The Summary Power Point will be presented at the end of the trip to review any data collected during the stay (water quality and/or Cassiopeia lab), discuss the ecology of habitats visited and why diversity varied at these locations. Required field trips include Seagrass, Mangrove and Coral Reef Ecology, while supplementary trips are Rodriguez Key Zonation, Hardbottom Shoal Ecology, Keys Survey and Backcountry. Required labs are Invertebrate diversity and Astronomy/Plankton Tow while optional supplementary labs include Water Quality, Sponge Spicule, Sea Turtle Lab, Shark Lab and Cassiopeia Lab.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline

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Keys Habitats - Introduction and Summary continued

Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems
Outline Level 4	III.C.3.	Global issues

Mangrove ecology

Summary: The mangrove lesson is taught aboard the boat en route to the mangrove snorkeling site. Lesson includes the types of mangroves found in FL, identification of the mangroves, and the ecological importance of the mangrove habitat. Stops will be made along the way to point out various features of the mangroves and the surrounding land, as well as birds and iguanas, in Adam's Cut, Blackwater Sound, and in the Grotto or Hidden Lake. Students will snorkel amongst the mangroves while the instructor snorkels and collects critters. Students will get a hands on lesson about the various organisms.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems
Outline Level 4	III.C.3.	Global issues

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Rodriguez Key zonation

Summary: Students will be introduced to the idea of an ecotone and the organisms commonly found at Rodriguez Key. Students will snorkel the algae shoal while instructors collect Goniolithonalgae. Lab will be conducted on boat where students break apart Goniolalgae, collect and identify resident species. If time allows, a second snorkel site will be visited.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.2.	Survey of the diversity of life
Outline Level 4	III.A.4.	Evolutionary relationships
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

Sea Turtle Stranding Activity

Summary: Activity is preceded by an introduction to sea turtles in Florida, as well as their life history and threats. Students will work in groups acting as members of the Sea Turtle Stranding and Salvage Network. A worksheet used by the STSSN is filled out and groups present their findings to the rest of the students.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations

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Sea Turtle Stranding Activity continued

Outline Level 3	III.A.	Diversity of Organisms
Outline Level 4	III.A.4.	Evolutionary relationships
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems
Outline Level 4	III.C.3.	Global issues

Seagrass ecology continued

Summary: Power point discussion outlines importance of seagrass, types of seagrass and algae commonly found in the Florida Keys and common marine phyla with examples of species found in seagrass from each phylum. Field trip to a seagrass bed follows. Students will snorkel while instructor gathers seagrass and algae species to present on the boat.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	I.	Molecules and Cells
Outline Level 3	I.A.	Chemistry of Life
Outline Level 4	I.A.3.	Free energy changes
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	I.	Molecules and Cells
Outline Level 3	I.C.	Cellular Energetics
Outline Level 4	I.C.1.	Coupled reactions
Outline Level 4	I.C.3.	Photosynthesis
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals

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Seagrass ecology

Outline Level 4	III.B.1.	Reproduction, growth, and development
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems
Outline Level 4	III.C.3.	Global issues

Sponge Spicule Identification

Summary: Instructor will begin by reviewing marine invertebrate phyla and associated common characteristics and defense mechanisms. Types of sponge spicules and functions of spicules are explained. Students will work in pairs to isolate spicules from various species of local sponges that have been dried. Spicule shapes are identified for each sponge species.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	II.	Heredity and Evolution
Outline Level 3	II.C.	Evolutionary Biology
Outline Level 4	II.C.3.	Mechanisms of evolution
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

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Water Quality Lab

Summary: During this lab, students will be taught about the importance of abiotic conditions such as water quality parameters (salinity, temperature, pH, dissolved oxygen, ammonia, and clarity), the healthy levels for water quality parameters, and techniques for measuring water quality parameters. Students will then get the opportunity to use the instruments to test water quality of four different samples of water, representing four different bodies of water (North Sea, South Sea, Key Largo drinking water, MarineLab fish tank). The measurements from the water samples will then be compared and explained.

Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	I.	Molecules and Cells
Outline Level 3	I.A.	Chemistry of Life
Outline Level 4	I.A.1.	Water
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.B.	Structure and Function of Plants and Animals
Outline Level 4	III.B.2.	Structural, physiological, and behavioral adaptations Response to the environment
Outline Level 1	AP.B.	Biology Topic Outline
Outline Level 2	III.	Organisms and Populations
Outline Level 3	III.C.	Ecology
Outline Level 4	III.C.2.	Communities and ecosystems

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