SYLLABUS

GENERAL INFORMATION

Course prefix & number:	**BIO 665**
Course Title:	**Advanced Study: Advanced Marine Ecology & Applied Research Methods**
Credit Hours:	**3 semester hours**
Instructor:	**Arthur W. Mitchell, Adjunct Faculty**
	MarineLab Staff as Teaching Assistants
Contact Information:	**Ginette Hughes, Senior Vice President (800) 741-1139 or ginettehughes@mrdf.org**

COURSE DESCRIPTION

This course is geared towards science teachers who are looking to increase their knowledge and understanding of marine ecosystems. This particular course is also geared towards teachers who are interested in participating in data collection for local and international research agencies and organizations. Participants will spend six days at a marine education center in Key Largo, Florida, equipped with classroom, wet labs and the necessary research tools. Ecology discussions, laboratory activities, and demonstrations of common applied research techniques in the evening will be followed by field trips to various ecological communities in the Key Largo coastal marine environment. Participants will snorkel each environment and use the discussed research methods to explore the community diversity and abiotic paraments which define each habitat. Data collection involves water quality measurements, reef fish identification, coral bleaching recognition and soil analysis. Data collected and methods applied will depend on habitat being surveyed. Data collected will be submitted to the appropriate organization.

LEARNING OUTCOMES:

Upon completion of this component, participants will:

1. Derive a definition for the term “ecology.”
2. Identify and explain the climactic transition influencing the Keys’ ecosystems.
3. Describe four edges or ecotones found in the Florida Keys and the mutual influences among these neighboring habitats.
4. Understand the concept of “abiotic factor” and
    a. estimate realistic values for five marine aquatic parameters
    b. define, explain the abiotic prerequisites for three different habitats
5. Understand the geography and geology of the Florida Keys.
6. Describe the life cycle of a marine organism and identify culturing techniques which are crucial to the successful completion of this cycle in an artificial environment.

7. Illustrate the concept of metamorphosis with five examples from the marine environment.
8. Identify six representative autotrophs and six representative heterotrophs characteristic of each of six different coastal communities.
9. Understand the concepts of diversity and abundance of population and predict their response to stress vs. stability.
10. Explain six benefits to the human population of the Keys that are contributed by healthy coastal habitats.
11. Participate in a plankton tow and identify phytoplankton, zooplankton, meroplankton and holoplankton with the aid of a dissecting microscope.
12. Differentiate and cite two examples each of meroplankton and holoplankton.
13. Demonstrate an understanding of limiting factors that affect populations in coastal habitats.
14. List characteristics which define each of the six major invertebrate phyla.
15. Understand the techniques used for evaluating water quality and demonstrate the operation of instruments for these measurements.
16. Explain, and rank order by effectiveness, characteristics utilized for the field identification of coral reef fishes.
17. Make a firsthand exploration of five different coastal habitats in the Florida Keys.
18. Explain the mutualistic relationship that allows corals to develop in an oligotrophic environment.
19. List five relationships between two organisms that are characteristic of the Florida Keys coastal environment.
20. Learn and use research techniques and methods used to study Keys habitats including water quality testing, seagrass quadrats, diversity indexing, coral bleaching and disease monitoring, mangrove soil analysis, and fish identification.
21. Collect scientific data: coral disease/bleaching for Mote Marine Lab, water quality data for GLOBE and Florida International University's Water Quality Monitoring Network, and fish count data for the Reef Environmental Education Foundation.

TEXTBOOK

The course includes a binder with various handouts and publications, derived from several different sources. No other textbook is required.

TEACHING METHODOLOGY

The course uses discussions and lectures to introduce core concepts and the marine community, followed by field trips to various sites in John Pennekamp Coral Reef State Park, Everglades National Park and the Florida Keys National Marine Sanctuary. Participants snorkel and observe firsthand the ecological communities. All teachers in this program will also be involved in data collection at each habitat visited, some of which will be submitted to local and/or international scientific agencies. Marine Resource Development Foundations has partnered with GLOBE and Florida International University and all water quality data collected using the proper protocols will be submitted to the appropriate database. We will also be following the methodology created by Mote Marine Lab to properly identify and report coral bleaching on Key Largo's reefs. Fish count information will be submitted to REEF. All data collected with be analyzed and discussed at the conclusion of the workshop.

Worksheets with vocabulary and concepts are used for review, and a written final exam is used to test their knowledge acquisition. In addition, a pre- and post-test is administered to evaluate effectiveness of methodology.

PREREQUISITES

Bachelor's degree in science or education

PARTICIPATION

Participation in all discussions, lab activities, and field trips is REQUIRED and is 50% of the grade.

GRADE COMPONENTS

Participation in all aspects of the program: 50%
Written final exam: 50%

Grading: A (90-100%), B (80-90%), C (70-79%), D (60-69%), F (<60%)

COURSE CALENDAR

DAY	TIME	ACTIVITY
Sun	**4:00 PM**	**Orientation, discussion of advanced coral reef ecology, advanced water quality lab**
Mon	**AM**	**Snorkeling orientation**
	PM	**Seagrass ecology & research methods discussion & field trip**
	EVE	**Invertebrate diversity indexing lab**
Tue	**AM**	**Coral reef ecology field trip with water quality testing, Bleachwatch**
	PM	**Coralline algae zonation community field trip with diversity indexing**
	EVE	**Field identification of reef fish discussion, morphology of macroinvertebrates lab**
Wed	**AM**	**Mangrove ecology field trip with soil analysis, water quality testing**
	PM	**Coral reef field trip with fish identification and Fish Count**
	EVE	**Sponge spicule identification lab, reef restoration techniques discussion**
Thur	**AM**	**Coral reef restoration sites field trip**
	PM	**Hardbottom shoal ecology with water quality testing**
	EVE	**Summary, discuss and analyze data**
Fri	**AM**	**Coral reef ecology field trip**
	PM	**Post test, evaluation, final exam**