

Program: Tropical Marine Ecology and Conservation

Location: CIEE Research Station Bonaire

Course Title: Coral Reef Ecology

Instructors: Caren Eckrich, MS; Rita Peachey, PhD

Teaching Assistant: TBA

Contact Hours: 60

Credit Hours: 4 semester/6 quarter

Course Code: ECOL 3001 BONA

Course Description: Coral Reef Ecology introduces students to basic ecological and biological principles such as competition, diversity, symbiosis, disturbance, adaptation, reproduction, and recruitment as well as basic identification of the major taxa living in coral reef ecosystems. This course also examines the importance of seagrass and mangrove ecosystems and gives an introduction to planktonic communities. Scuba and snorkeling excursions to the coral reef and laboratory sessions supplement the lectures and introduce students to coral reef research methods.

Learning Objectives

Upon completion of the course the students will:

- Understand fundamental ecological concepts as they apply to coral reef species
- Understand the basic biology and physiology of corals
- Have an understanding of the ecological driving forces of coral reefs and their inhabitants
- Understand how coral reef ecosystems, terrestrial environments and associated marine ecosystems are interconnected
- Be able to identify major phyla and coral reef species
- Be able to use ecological metrics to analyze community structure and biodiversity
- Have experience with modern coral reef monitoring and research techniques

Recommended Textbooks:

Nybakken, J.W. and M. D. Bertness. 2004. Marine Biology: An Ecological Approach (6th Edition). Benjamin Cummings.

Birkeland, C. 1997. Life and Death of Coral Reefs. Chapman & Hall.

Davidson, O. G. 1998. The Enchanted Braid Coming to Terms with Nature on the Coral Reef. John Wiley & Sons, Inc.

Deloach, N. 1999. REEF FISH Behavior: Florida, Caribbean, Bahamas. New World Publications, Inc.

Humann, P., N. Deloach. 2002. REEF FISH Identification: Florida, Caribbean, Bahamas Third Edition. New World Publications, Inc.

Humann, P., N. Deloach. 2002. REEF CORAL Identification: Florida, Caribbean, Bahamas Second Edition. New World Publications, Inc.

Humann, P., N. Deloach. 2002. REEF CREATURE Identification: Florida, Caribbean, Bahamas

Second Edition. New World Publications, Inc.

Smith, D.L., Johnson, K. B. 1996. A Guide to Marine Coastal Plankton and Marine Invertebrate Larvae Second Edition. Kendall/Hunt Publishing Company.

Final Grade:

Midterm exam		20%
Final exam	30%	
Attendance & Participation		15%
Quizzes	10%	
Assignments	10%	
Lab practicals		15%

Exam format: Exams will be essay and short answer.

Practical format: Practical’s are divided into two sessions: One session in the field, one using Powerpoints

Lectures: Fridays from 8:30am – 9:30am and 3:00pm - 4:30pm.

Labs: Fridays from 9:45am-12:00pm

*Times will vary – labs may be scheduled in the evening instead of the morning, there may be days when there are two lectures in the morning, a lab instead of a lecture in the afternoon, etc. Weekly schedules will be posted in advance – so keep an eye on the Google calendar.

Course Requirements

Readings and short research assignments are fundamental components of the course. Students are expected to fully participate in lectures and labs and complete all reading and research assignments prior to class meetings. Data from laboratory sessions should be legible and will be collected.

Reading Assignments are listed on the syllabus and additional readings may be required. Any additional readings will be posted 1-2 weeks before the lecture in which the reading is required. You are responsible for reading the assigned papers/chapters before each lecture as discussions and group projects are based on the reading materials. All assigned readings are available as PDF files on the computers as well as in the library here at CIEE Bonaire.

	Lecture	Lab	Reading
1	Introduction to the Marine Environment – Oceans and Currents	Lab – dive Angel City Collect and analyze water samples at two depths; Use secchi disk to estimate horizontal visibility	Marine Biology: An Ecological Approach (Nybakken) Chapter 1 Introduction to the Marine Environment

2	Biodiversity & Marine Ecosystems	Dive Margate Bay List of phyla; use quadrats to estimate % coral cover visually and with photos	The Living Ocean (Thorne-Miller) Chapter 1 The Importance of Marine Biodiversity & Chapter 4 Coastal Marine Ecosystems
3	Coral Reef Development; History & Future of coral reefs; Coral Identification and Coral Disease	Dive Karpata Coral Identification; Identify coral diseases; Practice with coral watch bleaching cards	Nybakken Chapter 9 Tropical Communities (first half) p.370- 399
4	Zooxanthellae, Coral Biology and Disease	Night Spawning Dive –one week later	Reef Coral Identification (Humann) – Read overview and sections explaining identification groups; Most Common Corals in Bonaire handout; Life and Death of Coral Reefs (Birkeland) Chapter 5; Rapid Wasting Disease – Predator or Pathogen (Bruckners)
5	Coral Reef Invertebrate Biology and Identification	Dive Cliff AGGRA-coral	Life and Death of Coral Reefs (Birkeland) Chapter 9 Invertebrate Predators and Grazers
6	Coral Reef Invertebrate Ecology	Snorkel from Oil Slick to Jeff Davis Acropora snail study	Phase Shifts, Herbivory, and the Resilience of Coral Reefs to Climate Change (Hughes et al.)
7	Coral Reef Fish Ecology and Identification	REEF survey	Reef Fish Behavior (Deloach) – Life Cycle pages 32-43, Colors & Camouflage pages 86-95; Reef Fish Recruitment Community Structure (Sale)
8	Coral Reef Fish Behavior	Snorkel Andrea I – collect data on fish behavior – damselfish biting, cleaning stations, parrotfish biting and courting	Reef Fish Behavior (Deloach) – Reproduction pages 8-31; Reef Fish Identification (Humann) – Read Intro (How to Use This Book) and sections explaining identification groups; Most Common Fish in Bonaire handout
9	Student presentations on Marine Mammals	No lab	Marine Mammals of Bonaire handout; Marine Mammals*

10	Marine Reptiles	Sea Turtle capture and data collection at Lac with STCB; Sea Turtle Skeleton Reconstruction Lab	Mangroves Affect the Biomass of Coral Reef Fish (Mumby et al.)
11	Marine Algae & Plants	Snorkel Sorobon; collect and press algae; Picnic lunch; Kayak Lac	Caribbean Reef Plants (Littler & Littler) pages 5-10; Reef Coral Identification (Humann) Read section Kingdom Plantae, review section on algae; Most Common Algae in Lac Bay handout; Marine Biology: An Ecological Approach (Nybakken) Chapter 9 Tropical Communities (second half) p.399-433
12	Oceanic Nekton and Plankton	Boat blue water dive – observe planktonic organisms and possibly oceanic nekton; lab identification	Most Common Jellies in Bonaire handout; Marine Biology: An Ecological Approach (Nybakken) Chapter 2 Plankton (pp. 38-69)
13	Symbiotic Relationships and Competition	Dive Cliff Symbiosis exercise	Marine Biology: An Ecological Approach (Nybakken) Chapter 10 Symbiotic Relationships
14	Light and Life in the Sea	Fluorescence Night Dive	Internet Resource – Light and Sound in the Sea (light only); Reefs Since Columbus (J. Jackson)