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Study Center in Kralendijk, Bonaire

Course name: Marine Ecology Field Research Methods
Course number: MARI 3005 BONA
Programs offering course: Tropical Marine Ecology and Conservation, Intensive Research in Coral Reef Ecology
Language of instruction: English
Semester Credits: 3
Contact Hours: 45
Term: Summer 2016

Course Description

Students apply internationally recognized field research methods in an inquiry-driven approach to understanding tropical marine ecosystems. The course focuses on training students in field observation, data collection, record keeping, and data analysis in order to study coral reef, seagrass and mangrove communities. During the course, students conduct fieldwork using SCUBA and are involved in ongoing research projects in collaboration with the Bonaire National Marine Park. Equipment commonly used includes: compasses, transect lines, quadrats, underwater videocameras, fish survey T-bars, writing slates, benthic corers, light meters and secchi disks. Students will become familiar with photographic equipment, underwater housings, and image software. In addition to this, students learn to organize, test, and evaluate data sets and present their findings. While the course introduces students to research diving knowledge and techniques with broad applications, it focuses on using scuba research techniques to better understand coral reef, seagrass and mangrove communities.

Learning Objectives

Upon completion of the course students will have:

- Gained fundamental knowledge, developed skills, and understood the research methodology necessary to conduct underwater scientific investigations, particularly, in tropical marine environments.
- Proficiency in underwater identification of Caribbean fish, corals, coral diseases, mangroves, seagrasses, algae and major invertebrate groups.
- Experience conducting globally and regionally used methodologies for the study of coral reef, mangrove and seagrass ecosystems.
- Familiarity in the use of underwater equipment and sound knowledge about their limitations, advantages and usefulness under specific conditions.

Course Prerequisites

Open water scuba certification, Advanced and Rescue diving training, AAUS dive medical exam, and DAN diving insurance.

Methods of Instruction

The course includes lectures on the various methods we will use. Each lecture is followed by a combination SCUBA dive(s), snorkeling trip(s), and laboratory sessions during which students gain experience using the method described in the lecture. Students collect their own data and write up their results in reports.

Assessment and Final Grade

1. Exam: 50%
2. ID Quizzes (3 total 2.5% each): 7.5%
3. REEF fish data collection: 2.5%
4. Short Report: 17.5%
    a. Fish behavior report (7%)
    b. Video transect, CPCe (3.5%)
    c. Endobenthos report (7%)
5. AGGRA report: 20%
6. Attendance and participation: 2.5%

Course Requirements

Exam
The exam will include multiple choice, true and false, short response, and essay questions with materials from lectures, activities, and readings.

Quizzes
A major component of the course is learning to identify Caribbean fishes, algae, corals, and other invertebrates. Students will have identification quizzes both in the classroom and in the field.

Short reports
The course includes several short reports on laboratory and field activities. These vary in topic, scope, structure, and may be completed by a group or individual. The reports are no more than one to two pages or may consist of a single excel worksheet. Given the variation among these short reports, each one is evaluated differently, but all are graded based on quality, clarity, and logic. Short reports that are turned in late will be penalized with a 10% reduction per day, i.e. an assignment turned in one day late will be graded out of 90%.

AGRRA report
The course includes one longer report on the health of the fishes and corals in Bonaire. Students will collect data using the protocol Atlantic Gulf Rapid Reef Assessment (AGRRA) over the course of two dives. The then must compile, clean, and analyze their data, create graphs from their data, and write a report on their results.

Attendance and participation
It is mandatory for students to attend lectures and activities. Additionally, students must arrive on time and participate in class discussions, activities, etc. Much of the material covered in lectures or activities cannot be found in the readings. Students that fail to attend lectures or activities, arrive late, or do not participate will be penalized at the discretion of the instructor based on the frequency of these infractions. In-class assignments, quizzes, and exams can only be made up with a valid and documented excuse, ex. doctor's note.

Students are expected to adhere to CIEE Research Station Bonaire's Academic Honesty Policy. Students found violating the conditions of academic honesty are subject to receiving an "F" for the course. The violation will also be reported to the Director of CIEE Research Station Bonaire, Dr. Rita Peachey, and may be documented on the student's permanent record at their home institution.

Weekly Schedule

Week 1

Tuesday	Lectures: Introduction to the course; Reef monitoring programs; Fish identification *Readings: http://agrra.org/ - AGRRA read the homepage and each section of 'Background' page; http://reef.org/programs/volunteersurvey - REEF*
Wednesday	Lecture: Coral identification; Coral disease, Algae identification, Invertebrate identification Activity: Algae identification lab *Readings: Humann and Deloach Coral ID; http://coralpedia.bio.warwick.ac.uk/; http://www.coral.noaa.gov/coral_disease/*
Thursday	Activity: Fish, coral, and algae identification dives

Week 2

Monday	**Fish identification classroom quiz; Coral, algae, invertebrates classroom quiz** Lecture: Reef Fish ID *Readings: http://www.reef.org/* Activity: Benthic Sampling and Transect Practice Dive
Tuesday	**Fish identification UW quiz; Coral, algae, invertebrates UW quiz**
Wednesday	Lecture: AGRRA fish methodology; AGRRA benthic/coral methodology *Readings: AGRRAv5.4 methodology* Lecture: Benthic composition methodologies *Readings: Hill and Wilkinson (2004) pp.1-20; 2005; Beenaerts and Edward Vanden Berghe (2005)*
Thursday	Activity: AGRRA Fish, benthic, coral dives
Friday	Lecture: UW video transects & video analysis Activity: - UW Housings workshop; UW Video belt transect dive *Readings: LTR video instructions and ID guide*

Week 3

Monday	Lecture: Endobenthos techniques *Readings: CARICOMP manual methods (Chapter on Seagrass)*
Tuesday	Activity: CPC Video belt transect analysis workshop
Wednesday	Activity: Endobenthos Collection
Friday	Activity: Endobenthos and granulometry lab

Week 4

Sunday	Activity: AGRRA fish, benthos, coral dives (Curacao) Lecture: Fish behavior analysis lecture
Monday	Activity: Fish behavior analysis dive; Fish behavior analysis workshop
Thursday	Lecture: AGRRA Writing Activity: AGRRA data analysis
Friday	Activity: AGRRA report writing Readings: Steneck et al. (2013) AGRRA Report due Tues Week 5 by 9AM

Week 5

Monday	Final Exam
	Exam 2 on Friday; Seagrass and algae report due Friday; Endobenthos report due Friday

Readings

There is no required textbook for the course. The readings indicated above are from peer-reviewed scientific journals or manuals on methods. They will be provided to the students electronically.