

From: Peter Lahanas
Subject: Coral Reef Ecology Field Course in Panama

2017 WINTER COURSE ANNOUNCEMENT (Dec. 20-Jan. 9)

FIELD COURSE IN CORAL REEF ECOLOGY (CRE W-17)

COURSE LOCATION: Bocas del Toro Biological Station, Boca del Drago, Isla Colon, Republic of Panama. The biological station is located on a hill facing the Caribbean Sea. Coral reef, sea grass and mangrove ecosystems are in front of the station and lowland tropical forests lie directly behind. This juxtaposition of the two most biologically diverse ecosystems provides tremendous opportunities for education and research. See <http://www.itec-edu.org/> for details.

INSTRUCTOR: Dr. Alfred Beulig, Institute for Tropical Ecology and Conservation, and New College of Florida, 5800 Bay Shore Rd., Sarasota, FL 34243, email: beulig@ncf.edu
Specialties: Behavior of fish, reef morphology, hydrodynamics, reef symbioses, reef trophic dynamics, behavioral ecology of reef organisms.

COURSE DESCRIPTION: This course is designed to provide the student with a sound foundation in ecological concepts, techniques and experimental design in field research as applied to coral reef ecosystems. The material covered is equivalent to a university upper level course in coral reef field ecology.

The course will begin with a global ecosystem perspective and then will progressively narrow to assess the way in which local reefs are influenced by both global and local phenomena. We will focus in depth on Caribbean reefs using the reef at Bocas del Toro as an example. We will provide a brief introduction to plate tectonics as a basis for understanding the production of substrate for reefs and their distribution in the biosphere. In this context we will discuss several theories of the origins of reefs and characterize a general reef community. The major reef biota that inform the character of reefs will be discussed in terms of their anatomy, physiology, ecological requirements, roles on the reef and overall impact. We will examine and discuss some controversial formulations of community structure such as the role of competition, stochastic vs deterministic models in reef organization, diversity/stability relationships and trophic dynamics. Sampling methodology will be discussed with regard to the peculiar demands of the reef setting and we will examine several experimental designs and sampling schemes with regard to their strengths and weaknesses as well as their theoretical bases.

NOTE: Diving certification is not necessary to enroll in this course, but is recommended. For SCUBA-certified (PADI, NAUI, or SSI certified) students who will be diving, there is a \$100 Lab Fee with this course which covers dive tank air fill costs. Students with SCUBA certification are expected to bring their own BC, regulators, mask/fins/snorkel and proof of certification.

FORMAL LECTURES: Lectures will present topics that provide a background for the fieldwork in an interactive discussion format. Topics are selected to permit students to develop an awareness of the objectives of research on coral reefs as well as an appreciation of current theoretical and practical issues in ecology.

FIELD WORK BRIEFINGS: Prior to departing for the reef site, dive teams will be formed and the objectives for the day will be outlined and discussed. Assignments will be made to

the dive teams and coordinated.

READINGS: Assignments relating to lecture topics will be made from the texts and supplementary research articles provided in the library as well as journal articles.

REQUIRED TEXTS

Garrison, Tom. Oceanography Latest Ed., Wadsworth, New York.

Humann, Paul. Reef Coral Identification, New World, Jacksonville, FL.

Humann, Paul. Reef Creature Identification, New World, Jacksonville, FL.

Humann, Paul. Reef Fishes Identification, New World, Jacksonville, FL

(Note: Instructor will provide list of other important books on coral reef ecology on request.)

GROUP EXERCISES: During the first week, students will visit several sites in the vicinity of the station to familiarize themselves with the area and to do reconnaissance observations that may lead to hypotheses that could be tested in individual projects. Students will be organized into dive team groups and will carry out field observations or data collection by which they will gain experience in the local area to help decide upon a likely study site. These experiences will prepare students to carry out individual research projects. In the evenings, students will participate in "debriefing sessions" during which they will try to identify the reef organisms they saw during the dives of the day and record the common name and scientific name of the species in a debriefing log.

INDIVIDUAL RESEARCH PROJECTS: Each student will be expected to prepare a grant proposal for an original project in consultation with faculty. Projects may be suggested by observations made during group exercises or from the research literature, and will be evaluated on the basis of feasibility in the available time, soundness of experimental design and concept. During the final week of the course, data analysis and writing of project reports will be carried out and students will present their results orally in an end-of-course symposium. They will present the research report on their findings in the form of a journal article for evaluation.

FORMAL LECTURE TOPICS

- Fundamentals of oceanography, global ecology.
- Plate tectonics, formation of ocean basins, continents and ocean currents.
- Evolution of Caribbean and tropical Central American environment.
- Reef morphology, distribution of reef systems.
- Coral reef community study - sampling methods, distribution and abundance of organisms.
- Biology of coral reef organisms: Porifera and crypto-fauna.
- Biology of coral reef organisms: echinoderms, arthropods and annelids.
- Biology of coral reef organisms: fishes.
- Biology of coral reef organisms: algae and plants.
- The coral reef as ecosystem: How are reefs organized?
- Competition theory, diversity.
- Ecosystem stability: are coral reefs more stable than temperate ecosystems?
- Stability, resilience and fragility; are these concepts relevant to reefs?
- Anthropogenic effects on reefs.
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BOQUETE CLOUD FOREST FIELD TRIP: This field trip will allow students the opportunity to visit other areas of Panama, to experience Panamanian culture, and to visit tropical cloud and seasonal forests first hand. We travel in ITEC boats to the mainland and then by chartered bus to Boquete which lies at the base of 11,000 ft. Volcan Baru. The bus trip will take us up and over the central mountain range and through Palo Seco National Park. Several stops will be made in route.

COURSE LENGTH: ITEC Winter field courses are about three weeks in length. The CRE W-17 will run from December 20, 2017 through January 9, 2018.

TUITION: \$2150 USD. Tuition fee includes all lodging, meals and airport transfers in Bocas del Toro. The tuition also covers transportation and lodging during the 3-day cloud forest field trip on the mainland.

REGISTRATION DEADLINE: November 20, 2017. The course is limited to 10 students and applications will be evaluated as they arrive. Applications can be found at <http://itec-edu.org/education-programs/application/>. If you believe that your application may arrive late, notify ITEC.

GRADING and COURSE CREDIT: Grades will be assigned based on attendance at lectures, exams, reports, proposals, as well as by less tangibles such as personal attitude, motivation, and contribution to the course. The instructor will provide a breakdown of points earned and final letter grade to your academic institution. The student is to provide direct evidence of course participation such as the syllabus, schedules, handouts, lecture notes, proposals, reports, etc. Course credit must be arranged through the student's institution and academic advisor. Contact ITEC for details.

CONTACT: **Institute for Tropical Ecology and Conservation**, 2911 NW 40th PL, Gainesville, FL 32605, phone: 352-367-9128, email: itec@itec-edu.org, web: <http://www.itec-edu.org>. ITEC is a 501(c)(3) non-profit organization founded in 1996.

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