Summer 2002

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NSU Oceanographic Center

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The Oceanographic Center—
Reaching Out and Going the Distance

By Jane Dougan

Friends of the Oceanographic Center already know of its wide-ranging research and study activities in marine biology and observational and theoretical oceanography. They may be interested, however, to learn of some new ways Oceanographic Center courses are reaching out and connecting with students and instructors across the world via distance learning, and what this really means in practice.

Since 1993, the Institute of Marine and Coastal Studies at the Oceanographic Center has taken on the challenge of developing and delivering flexible, relevant, and effective environmental distance learning courses, primarily for graduate students and working professionals, but also for undergraduate and general interest study. In this, NSUOC has a considerable base of support from the main campus; NSU was the first university in the United States to offer graduate programs online, and to use the Internet in distance learning.

At the Oceanographic Center, this is taking shape in a variety of ways. Our new flexible four-course distance learning graduate certificate in coastal studies may be taken as a stand-alone graduate certificate or potentially as a stepping-stone toward an online M.S. in coastal zone management, now in preparation.

Additionally, there is potential for the Oceanographic Center’s new study abroad program to include distance-learning components, together with place-based research and study. This innovative new M.S. degree in marine biology (conferred by Nova Southeastern University) is being jointly taught by faculty at NSUOC and from the University of London, and will bring together graduate students from across Europe and the United States. The initial research and study will be completed at the University Biological Station Millport (Scotland), field station of the University of London, and will allow for hands-on learning regarding temperate marine biology. In the second phase, students will be based at the Oceanographic Center, off the subtropical east coast of Florida.

How might online distance learning play a part in the study abroad program? Preliminary structured distance learning activities and communication can help to make international place-based study more effective. Students meet virtually in online discussion, get to know one another, and start to investigate common research and study interests. By the time they meet to begin intensive place-based study, many cultural and social barriers have dissolved, and there is a solid base in place from which to move forward as colleagues and colearners. Online learning can also help to keep students connected and on track between sessions, and fill in any gaps that there is not time to cover on-site.

There is exciting potential for distance learning to play an important role in bridging international and national environmental communication and learning. Increased concerns regarding the world’s oceans and freshwater bodies highlight a critical need to share knowledge of water issues and solutions regionally and globally, and to raise awareness of this among the general population. The argument has been made at high levels internationally that such efforts should include civil society, the private sector, grassroots and non-governmental organizations, and local communities as well as academia, and must relate to real situations and action. By 2025, projections are that almost two-thirds of the world’s population will be urban or suburban, and already 60 percent

A proposed online master of science degree in education with specialization in environmental education would be offered through the National Graduate Teacher Education Online program and in cooperation with the Fischler Graduate School of Education and Human Services. With a possible start-date of January 2003, the degree would be awarded on a 36-credit program of study within a one-year time frame.

(Continued on page 2)
of the world’s population lives within 100 km of a coastline. There are related calls for increasing communication with and within the South (i.e., developing countries); to date the bulk of environmental research, information, and literature has originated from Northern (i.e., developed) countries.

Through the use of tools such as the World Wide Web and the Internet, geographically and/or culturally disparate distance learners can use online technology to share their knowledge, experiences, and discussions; create perceptual immediacy and intimacy; and in the process actively contribute toward course content. There is increasing scope for the direct involvement of teachers and students from a diversity of experiences and places, some of whom might otherwise have little or no way of contributing to formal academic environmental learning outside of their own local community. This image of learners collaborating with the medium and the instructor to shape dynamic, timely and individually relevant learning contrasts with stereotypical notions of distance learning in which canned instruction is delivered to the learner.

Oceanographic Center distance learning courses have already connected interested, environmentally literate, and active students from across the United States and Canada, as well as at locations throughout Europe, Asia, and the Americas; countries north and south, rural and urban.

Distance learning is not a panacea, neither is it a replacement for classroom-based education. But it does present some intriguing and worthwhile environmental learning opportunities in its own right, on its own, and in combination with site-visits. If we can provide any more information about present and potential distance learning programs at the Oceanographic Center, please do not hesitate to get in touch.

People on the Move

Charles Messing, Ph.D., recently gave an invited talk at the 11th Symposium on the Geology of the Bahamas (June 6–10) at the Gerace Research Center, San Salvador Island, Bahamas, titled: “Biozonation on deep-water carbonate mounds and associated hardgrounds on the western margin of Little Bahama Bank, with notes on other deep Bahamian bank-margin assemblages.”

Richard Dodge, Ph.D.; Kevin Kohler; Bernhard Riegel, Ph.D.; Ryan Moyer; and Brian Walker all were invited to attend The Future of Decision Support for Coral Reef Management Agent-based Modeling and Interdisciplinary Research meeting held at the University of Miami’s RSMAS campus July 23–25.

Richard Dodge, Ph.D.; Brian Walker; and Ryan Moyer attended the Marine Habitat Classification Workshop held at the Florida Marine Research Institute (FMRI) July 25. The purpose of the meeting was to discuss a draft classification system proposed as a method of standardizing habitat classification efforts in Florida.

Edward O. Keith, Ph.D., attended the XXVII International Annual Meeting for the Study of Marine Mammals held May 12–15 in Veracruz, Mexico, where he presented a poster entitled “A matrix model of the population of California sea lions (Zalophus californianus) at Los Islotes, B.C.S.” His coauthors on the poster were Claudia J. Hernández-Camacho and David Auriholes-Gamboa, both who are with the Centro Interdisciplinario de Ciencias Marinas, Instituto Politécnico Nacional, in La Paz, Baja California Sur, Mexico. Additionally, he presented two lectures to a class on marine mammals held on May 10–11. His lectures were entitled “United States laws that protect marine mammals” and “Universities in the United States with graduate programs in marine mammalogy,” both of which were presented in Spanish.

Keith also participated in a workshop on May 12 whose topic was manatee conservation in Mexico, held at the Veracruz Aquarium, where he was a coauthor of a presentation entitled “Achievements of the manatee conservation program in Veracruz, Mexico,” which describes ongoing manatee conservation projects in the Alvarado Lagoon System. Coauthors on this presentation were Enrique Portilla Ochoa and Blanca Elizabeth Cortina Julio, both with the Instituto de Investigaciones Biológicas, Universidad Veracruzana, Xalapa, Veracruz, Mexico; Alejandro Ortega Argueta with the Instituto de Ecología, AC, Xalapa, Veracruz, México; and Fabián Vanyoe Lara, with the Acuario de Veracruz, Veracruz, México.

Jane Dougan, coordinator of distance learning, The Oceanographic Center.

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Email: dougan@nova.edu or visit our Web site at www.nova.edu/ocean and follow the link to “Distance Learning.”

Publications


An article in the July issue of *Southern Boating* described the work being carried out by NSU’s National Coral Reef Institute (NCRI). Titled “Life Support for Ailing Reefs” (by Jan Gerner), the article described the destruction of coral reefs off Dania Beach in 1993 by the USS *Memphis* that has become part of a scientific research project and restoration effort by NCRI and is the basis for Ph.D. student Pat Quinn’s dissertation research. The researchers are using Reef Balls made of concrete suitable for the marine environment that allow tiny marine organisms to easily attach and also have holes of various sizes and cavities that mimic nature, providing shelter for fish and marine invertebrates.

Richard Spieler, Ph.D., is the principle investigator of the project that uses different sized materials in the cavities to allow for differing refuge sizes that attract and shelter fish of many varieties, much the same way natural reefs do. The scientists are studying how the differing fish assemblages interact with the settlement, growth, and mortality of coral. Richard Dodge, Ph.D., dean of the Oceanographic Center, is the executive director of NCRI.

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**Other News**

On May 9, 2002, Edward O. Keith, Ph.D., was notified that his proposal to the 2002 President’s Faculty Scholarship Award entitled “The natural history of John U. Lloyd State Park” was selected for funding. This proposal will provide support for the development of a new course by the same title in the Farquhar Center that will provide field-based instruction as required for the new biology major. It will also fund environmental survey and census activities by OC graduate students and enable Keith to write a book to be used in the course. Collaborators in the project are Bart Baca, Ph.D., and Steven Dale, assistant park manager at John U. Lloyd Beach State Park.

Andrew Rogerson, Ph.D., and Ph.D. candidate Tina Gwaltney received the President’s Scholarship Award for the project titled “Application of molecular methods to investigate the levels of fecal contamination of south Florida beaches.” The award provides $10,000 for the one-year proposed study.

Rogerson has also recently been nominated vice president of the Society of Protozoologists.

From June 21 to July 1, six high school science and social studies teachers took OCMB 9600, South Florida Marine Environments, taught by Charles Messing, Ph.D., through a special arrangement with the Broward County School Board.

(L-R) NSUOC Dean Richard Dodge, Andrew Rogerson, Tina Gwaltney, and NSU President Ray Ferrero.
Other News cont’d

In addition to lectures and lab work, the class took field trips to John Lloyd Park and Marco Island, spent three days at the Keys Marine Laboratory, and participated in a research trip to dredge the floor of the Gulf Stream aboard the Florida Institute of Oceanography's ship R/V Bellows.

Richard Dodge, Ph.D., and Peter Swart, Ph.D., of the University of Miami, have a joint NSF grant in which they are studying the paleoclimatic information extractable from coral skeletons. After initial trips to the Cape Verde Islands by Dodge, Swart, and Ph.D. students Kevin Helmle from NSU and Chris Moses from UM, additional corals were cored and collected recently. In the picture the scientists gather around the saw as those samples are processed and prepared for X-radiography to reveal annual growth bands. Cape Verde corals grow extremely slowly and therefore preserve a long record of time in a climatically sensitive area—the birth place of Atlantic hurricanes.

Bernhard Riegl, Ph.D., and Greg McIntosh went to Alaska to perform a NOAA/NMFS contract to evaluate the sensitivity of Quester Tangent Corporation (QTC) seabed classification gear to vessel stability. The Alaska Department of Fish and Game (ADF&G) provided a QTC4, deep water system and the National Coral Reef Institute team (NCRI) brought out its QTC5 shallow water gear. The purpose of the work was to compare how vessel pitch and roll impact and affect seabed classification. The ADF&G/NCRI collaborative effort was one of the first to test these impacts on the classification of seabed habitat.

NCRI may continue its collaborative work with ADF&G and NOAA/NMFS by surveying bottom types associated with spawning populations of Pacific cod at Kodiak Island and Dutch Harbor, Alaska, during the summer of 2003. NCRI has QTC data from Broward, Miami-Dade, Indian River, and Brevard Counties in Florida, as well as from Kodiak, Alaska.
Reef Fish Census and the Spiegel Grove Sinking

The scuttling of The Spiegel Grove, a 510-foot decommissioned U.S. Navy ship, in 120 to 130 feet of water just east of Dixie Shoals Reef off Key Largo provided an opportunity for Paul Arena to do a pre- and post-ship sinking fish census as part of his Ph.D. research. Arena and others from the ichthyology lab, including Dan Fahy, Brian Buskirk, Pat Quinn, Rob Baron, Fleur Harttung, Amy Hall, their professor Richard Spieler, and their Diving Safety Officer, Brian Ettinger, left for Key Largo on May 14, 2002, in order to do a series of visual fish censuses on the natural reef before the ship was sunk. Arena’s research involves comparing reef fish assemblages on shipwrecks, or vessel-reefs as they are now called, to nearby natural reefs in order to gain some understanding of the ecological role of the sunken ships. The Spiegel Grove sinking provided the opportunity to examine how fish assemblage structure changes through time on a new vessel-reef and the interaction of this change with nearby coral reef assemblages.

After a three-hour boat ride from the NSUOC, they reached the dive site only to find that the Spiegel Grove was already being maneuvered into position for sinking. Their original plan was to send a pair of divers down on the intended sinking site to census the area to see what fish were present before the sinking, but they had to postpone that dive due to ongoing work positioning the Spiegel Grove. They were able to census the fish that day at seventeen reef sites at Dixie Shoals, directly adjacent to the Spiegel Grove, in water ranging from depths of 30 feet to 85 feet.

The second day, after pleading with the authorities in charge, they were allowed to deploy two divers to complete a couple of fish counts at 120 feet directly in the area where the Spiegel Grove was to be sunk. Although there was not much to see on the sandy bottom, the divers were excited to see a 7–8 foot nurse shark cruise by. The underwater visibility started off great—around 100 feet—but diminished throughout the day. Nonetheless, the NSUOC crew was able to complete 24 more fish counts at Dixie Shoals for a total of 41 before returning home (in six foot seas). The Spiegel Grove displayed a mind of its own regarding its fate and sank prior to schedule, upside-down, the following day. After some major adjustments underwater that included refloating the ship and attempting, without success, to flip it over, the site was opened to the public on June 24.

Arena is currently planning another trip down to Key Largo to complete the next census, which will again involve both the natural reef areas in Dixie Shoals and, this time, the vessel-reef itself. Doing a census on a 510-foot vessel that extends down from 40 feet to 120 feet should prove quite a challenge.
MASTERCURRENTS
INSTITUTE OF MARINE AND COASTAL STUDIES

Fall Term 2002

Elective Courses

MARINE BIODIVERSITY (CZMT-0685, MEVS-5105, OCMB-6315)
Diversity of life on earth is now being dramatically and irreversibly altered and reduced by human activities. Because so many species are still undescribed, and the ecological roles of those that have been named are so poorly understood, the magnitude of these changes is difficult to evaluate. The course will discuss multiple aspects of marine biodiversity including definition and importance of marine biodiversity to marine conservation issues; threats to marine biodiversity including nonindigenous species introductions; impediments to marine conservation; scientific constraints; developing tools and forums for conserving marine biodiversity; and evaluating existing marine biodiversity initiatives currently in place and planned. Management approaches such as marine protected areas, no-take or completely protected reserves, and special management areas will be discussed and evaluated. The course will consist of assigned readings, extensive discussions and panel participation, review of latest developments in marine biodiversity research and conservation, and preparation of several review and planning documents. In the course, students will also incorporate emerging scientific information from taxonomy, systematics, (both morphological and molecular methods) and evolutionary theory at both macro and micro scale processes as it impacts and affects marine biodiversity. While all marine systems will be considered, the course will focus specifically on tropical marine ecosystems, especially coral reefs. Instructor: James Thomas. Meets Wednesdays, 6:30–9:30 p.m. in OSC Classroom #1.

DRY COASTAL ECOSYSTEMS (CZMT-0610/MEVS-5012)
This course focuses on the ecology of coastal (non-wetland) habitats above mean high water such as dunes, maritime forests, and hammocks. The field aspect of this course consists of Saturday field trips to our best South Florida parks, including Everglades National Park, Loxahatchee National Wildlife Refuge, and Jonathan Dickinson State Park. Instructor: Lance Robinson. Meets Thursdays, 6:30–9:30 p.m. in OSC Classroom #2.

Core Courses (required for all majors)

MARINE ECOSYSTEMS (OCOR-5602)
This class focuses on marine ecological processes and functions. The course is one of the five “Core” requirements and is common to both specialties. An overview of the basic concepts of marine ecology will be provided along with more detailed elements of the discipline including diversity of organisms, feeding relationships, ecological roles, growth, and reproduction. Emphasis will be devoted to coastal marine communities. Instructor: Curtis Burney. Meets Mondays, 6:30–9:30 p.m. in OSC Classroom #1. Lab fee $25.

PHYSICAL OCEANOGRAPHY (OCOR-5607)
This course covers basic ocean physics with a focus on the large scale circulation of the oceans and their relation to weather and climate. Topics include the physical properties of seawater, temperature and salinity structure of the oceans, major current patterns, waves and tides, influences of the wind, El Niño and tropical oceanography, and some relations to climate. This course should be appropriate for students interested in a global view of physical oceanography. Students are required to take either this course or OCOR-5601 as a core course. Instructor: Sean Kennan. Meets Wednesdays, 6:30–9:30 p.m. in OSC Classroom #1. Lab fee $100.

M.S. Degree specialties are marine biology, coastal zone management, and marine environmental science. Each course carries three credit hours or may be audited. Tuition is $499 per credit hour (50 percent less for audit). Classes meet once a week from 6:30 to 9:30 p.m. at the Oceanographic Center (unless otherwise specified.) The fall term runs from Sept. 30–Dec. 20 (unless otherwise specified). Registration ($25 nonrefundable fee) begins two weeks prior to the start of classes. For further information, call Andrew Rogerson, Ph.D., or Melissa Dore at (954) 262-3610 or 800-396-2326, or email imcs@nova.edu. More information can be found on the Web site: www.nova.edu/ocean/
A Note on Coastal Policy Internship Class
By Steffen W. Schmidt

How would you like to go to Ecuador for a short internship with a Non-Government Organization Foundation (NGO) and travel to the rainforest and explore the impact of the oil industry on the local environment; search for private funding opportunities and write two proposals (one for sea turtles has been submitted); study the differences between marine and coastal ecosystem management in United States and Ecuador; accompany the local NGO project director and a documentary producer from the BBC to interview local people on the environment; and investigate several coastal shrimp farm facilities studying problems and solutions? (Oh, I forgot, you also get to ride horses on the beach!) This was one of several NSUOC internships that I recently supervised in CZMT-0664, Internship in Coastal Policy (three credits). Students may register for internships any time during the year. Other internships have included helping an endangered sea turtle project in Hawaii sponsored by a major international environmental foundation; an internship with a private company executing a contract for beach renourishment on the east coast of Florida; working for a resort in Roatan, Honduras, studying issues of environmental impact, reef preservation, and the evolving Honduran government program for integrated coastal zone management for the country (and diving in a great area almost every day); and working with the Florida Marine Research Institute’s (FMRI) Stock Enhancement Research Facility (SERF) experimenting with a large-scale redfish stock enhancement project in Tampa Bay, Florida.

These projects were all done with great dedication and enthusiasm by NSUOC students. Their work was tightly assessed by an onsite supervisor and by myself as the for-credit supervisor. Students are required to keep an academic journal of their daily internship experience and must submit interim reports (transcripts of the journal) to me every two weeks by email. They must also think hard about how what they are seeing and doing on their internship helps them understand the impact of their work on coastal zone management and on the professional and scientific responsibilities of their own academic work. At the end of the internship, each student submits a final report and the on-site supervisor fills out a complex assessment report.

Why do I demand so much written work? Because internships can yield a great deal of professional growth experience only if students are prepared to keep meticulous field notes and reflect on the larger meaning of the work they are doing. Judging from the feedback I’ve gotten, this model is working; and students are getting a valuable and fun hands-on experience as a supplement to their regular academic lab and classroom studies.

Winter Term 2003 (January 6–March 28)

ASPECTS OF MARINE POLLUTION
CONCEPTS OF PHYSICAL OCEANOGRAPHY
COASTAL OBSERVATIONAL SYSTEMS
GIS
SCIENTIFIC WRITING
AQUACULTURE SYSTEMS
Graduate Certificate in Coastal Studies Program

Beginning in the Spring 2002 semester, the Institute of Marine and Coastal Studies at the Oceanographic Center, will offer a distance learning graduate certificate in coastal studies. The Institute of Marine and Coastal Studies currently offers graduate degree (M.S.) programs in marine environmental science, marine biology, and coastal zone management.

Enrollment in the Certificate program is designed for those who do not wish to enroll in the graduate program of study at this time. The flexible format of the certificate program makes it ideal for working professionals and college graduates in a variety of fields related to the coastal zone as well as for general interest adult learners. Distance courses bring the learning to the student, whether online, by CD-ROM, or through written materials. The graduate certificate in coastal studies will be awarded on successful completion of four of the Oceanographic Center’s graduate distance learning courses. Successful completion of the graduate certificate will award the equivalent of 12 graduate credits.

Should a certificate student wish to go on to graduate study, credits can be transferred to specific M.S. programs, provided the student meets graduate acceptance criteria. The Institute of Marine and Coastal Studies is in the process of developing a distance-learning-based M.S. in coastal zone management, for students wishing to complete their graduate degree via distance format.

All distance courses in the graduate certificate are delivered via widely-accessible information technologies such as Web-based courses (e.g., WebCT) and CD-ROM.

NEWS FROM OUR GRADUATES

Sea Urchin Research in China

Ray Wolcott successfully defended his thesis on May 21 and left the next day for China to join John Lawrence, Ph.D., from the University of South Florida. Lawrence, an internationally respected echinoderm authority, had been invited to China to work with Chang Ya-Ching, Ph.D., and set up sea urchin feeding experiments at the Dalian Fisheries University. Wolcott, an expert in urchin larval culturing, was invited to accompany Lawrence.

China presently produces approximately 20 million sea urchins for domestic consumption and export each year. The availability of adequate feed and the need to develop a land-based, closed cycle system have limited the growth of this industry. Artificial feed has been successfully used to grow shrimp in many countries, including China. Experiments conducted by Lawrence, Wolcott, and others have shown that juvenile and adult sea urchins can be successfully reared using an artificial feed formulated by Lawrence and produced by Wenger Manufacturing, Inc., in Kansas.

The two Americans assisted Chang and his students to initiate feeding experiments for larvae, juveniles, and adults using both the urchin’s natural diet and the artificial feed. Sea urchin larvae have never been reared on artificial feed and no artificial feed for sea urchin larvae has been formulated. For the larval experiment, feed developed for shrimp larvae was used.

After four days, the larvae receiving the artificial diet were developing at a rate similar to those receiving natural food and both groups were more advanced as compared with those receiving no food. The juveniles were also eating the prepared food; however, the adults had not yet accepted the pellets. The Chinese will monitor the progress of each group for several weeks.

Both Lawrence and Wolcott had an opportunity to lecture to students regarding their research, the importance of learning the biology and ecology of cultured species, and the need to replenish over-harvested species. Before leaving China, they flew to Qingdao to visit with faculty members and students at the Institute of Oceanology, Chinese Academy of Sciences.

Photo at far left: Ray Wolcott selecting juvenile urchins for feeding experiment in the urchin lab at Dalian Fisheries University, China.

Photo at right: Ray Wolcott (L) with Chang Ya-Ching, Ph.D., of the Dalian Fisheries University, and John M. Lawrence, Ph.D., of the University of South Florida (R) in front of the administration building of Dalian Fisheries University in Dalian, China.
NOAA Expedition

Another of our recent M.S. graduates, Stacie Crowe, is participating on the NOAA “Islands in the Stream 2002 Expedition.” She is continuing to study commensal amphipods and has written an entry into the cruise log, which can be viewed at www.oceanexplorer.noaa.gov/explorations/02sab/logs/jul28/jul28.html

After graduating from NSU, Crowe took a job at the South Carolina Department of Natural Resources as a staff taxonomist. Crowe and NSU professor, Jim Thomas, Ph.D., will be continuing this project with some follow-up work here at the center in the coming months.

First Dive for Islands in the Stream 2002

Clear blue skies and calm seas welcomed the first full day of dive operations for Islands in the Stream 2002 expedition. During the first dive of this mission, scientists used the Johnson-Sea-Link II (JSL II) submersible’s manipulator arm to collect two specimens of the stinking vase sponge, *Ircinia campana*. These specimens were collected at a depth of 165 feet from the St. Augustine Scarp off Jacksonville, Florida. When the sponges were examined closely, several small amphipod crustaceans and polychaete worms were emerging from the oscules, large exhalent openings on the surface of the sponge. These organisms live inside the sponge in a unique commensal relationship. Commensalism is an intimate symbiotic association between two organisms where one party benefits, while the other is not significantly affected. Commensal relationships are common between sessile plants or animals, such as sponges, algae, and corals, and motile organisms, including fish and many invertebrates. Marine environments, such as coral reefs, exhibit numerous examples of these associations.

Seminars and Defenses

THESIS


CAPSTONE REVIEW


Ph.D. Degree Offered

The Oceanographic Center offers the Ph.D. degree in oceanography. The program requires a minimum of 66 credits beyond the baccalaureate, 42 of which may be applied from the master’s degree program. The remaining credits are made up of at least 24 dissertation research credits and six credits from upper-level course work, usually taught in the tutorial mode. Tuition is $3,413 per quarter.

Stacie Crowe holds the stinking sponge (*Ircinia campana*) collected during the last dive of the mission at St. Augustine Scarp. (Picture from Web site)

The JSL II being lowered into the ocean.
Abby Renegar holds Certificate of Appreciation she received at her going away party, while (L-R) David Gilliam, Brian Walker, Lance Jordan, and Carol Fretwell look on.

Kevin Kohler consults with co-PI on complex modeling issues.

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