

Marine Science

Summer 2010



UNIVERSITY
OF HAWAII
HILO



Special thanks to Walt Dudley who has dedicated over 20 years of his summers to this wonderful program.

Marine Science

On the Big Island of Hawai'i

The Marine Science program at the University of Hawai'i at Hilo is designed to take full advantage of the "Big Island" of Hawai'i's variety of marine environments ranging from deep ocean to coral reef to estuary. An exciting array of ocean activities is planned. These activities are designed to stimulate the student's interest, provide experience-oriented learning and take full advantage of the island's exotic offerings.

The Island of Hawai'i is a treasure of unique diversity. With its sometimes snow-capped mountain peaks, pasture lands, lush tropical rain forests, rainbow-arched valleys, and active volcanoes, the Big Island has been described as a tropical mini-continent. An internationally renowned site for astronomical observation the island is also home of the world-famous Hawaiian Volcanoes Observatory. The island boasts beaches of black, white or green sand providing uncrowded access to pristine waters. Scientists and visitors alike are afforded the possibility of observing glowing red lava flowing into the sea from coastal vents. The

Big Island is twice the size of all the other Hawaiian Islands put together and unsurpassed in beauty by any other island in the Hawaiian chain. From its people who carry with them the "Aloha" to the richness of its lands, the Big Island of Hawai'i is the perfect place to spend the summer learning about the wonders of the sea.

The University of Hawai'i at Hilo, fully accredited by the Western Association of Schools and Colleges, is a part of the Hawai'i system of higher education. Its programs emphasize accessibility to facilities and instructors in a small campus atmosphere. Teaching is a priority concern of all UH Hilo Faculty. Professors are encouraged to involve students in their own research and publications; as a result, UH Hilo students do very well in graduate school. UH Hilo Marine Science Faculty has tapped into the rich cultural heritage and environmental resources of the Big Island as part of the UH Hilo Marine Science Department and in such programs as the Marine Science Summer Program, the Kalakaua Marine Education Center, and the Marine Option Program.

Combining an ideal environment, excellent curriculum, outstanding instructors, and its own new laboratory, classroom building, and research/teaching vessel, the UH Hilo Summer Marine Science Summer Program is one of the best opportunities in the nation for undergraduates to study marine science. In recognition of this exceptional summer program the UH Hilo Summer Marine Science Program has received an "Award for Excellence of Program" from the Western Association of Summer School Administrators, an organization representing over 80 member universities in the western U.S., Canada, and Mexico.

For information about the 2010 Summer Session in Marine Science at UH Hilo contact the UH Hilo College of Continuing Education and Community Service (CCECS) at:

Phone: (808) 974-7664

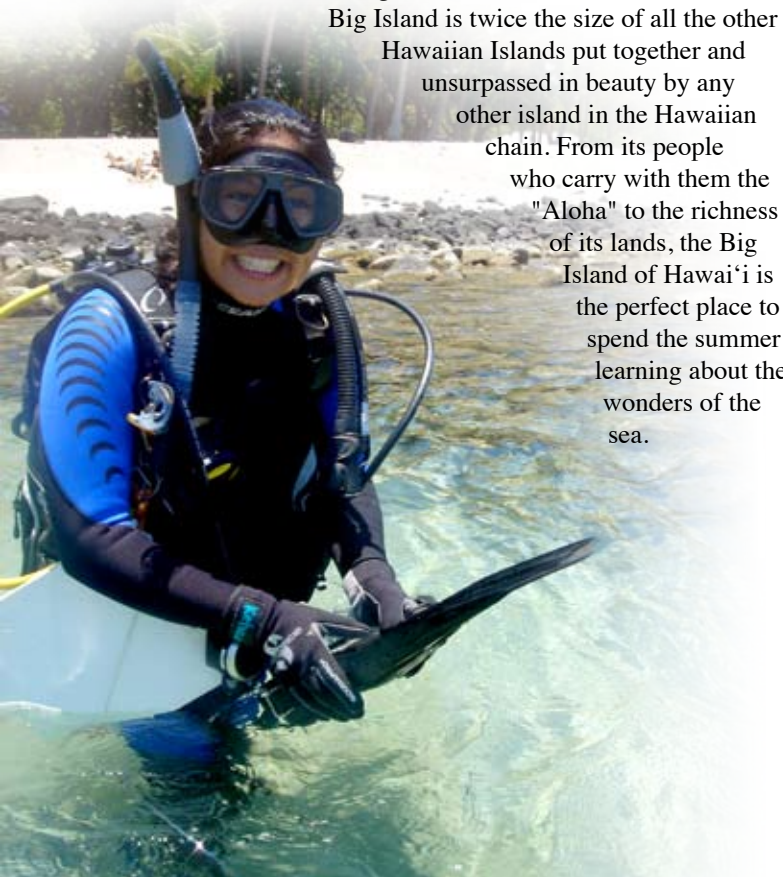
Fax: (808) 933-8863

e-mail: summer@uhh.hawaii.edu

Web site: <http://www.uhh.hawaii.edu/depts/summer> or
<http://www.kmec.uhh.hawaii.edu>

or write to:

Summer Program in Marine Science
University of Hawai'i at Hilo - CCECS
200 West Kawili Street
Hilo, Hawai'i 96720-4091





Summer 2010 Marine Science Course Offerings

CRN	Credits	Course No.	Sec	Title	Instructor	Days	Time	Dates	Location
14082	2	MARE 101L	001	Marine Science Field Lab	J Turner & J Adolf	W	1-5 pm	6/14-7/23	MSB 104
14083	3	MARE 140	001	Intro to Hawaiian Coral Reefs	JS Turner	MTRF	10-11:50 am	6/14-7/23	MSB 101
14084	1	MARE 140L	001	Intro to Hawaiian Coral Reefs Lab	JS Turner	M	1-5 pm	6/14-7/23	MSB 101
14085	3	MARE 171	001	Marine Biology - Diversity	JS Turner	MTRF	8-9:50 am	6/14-7/23	MSB 101
14086	3	MARE 194	001	Marine Environ Issues in Hawai'i	L Muehlstein			6/14-7/23	online
14087	3	MARE 240	001	Small Boat Operations/Research	M Childers	TR	1-5 pm	6/14-7/23	MSB 104
14137	3	MARE 264	001	QUEST	Team	UMTWRFS	8 am-10 pm	5/17-5/29	West HI
14088	3	MARE 294	001	Polynesian Sailing & Navigation	K Pilago	MTRF	1-2:50 pm	6/14-7/23	MSB 103
14163	1	MARE 294L	001	Polynesian Sailing & Navigation Lab	K Pilago	W	1-5 pm	6/14-7/23	MSB 103
14138	3	MARE 364	001	Adv QUEST	Team	UMTWRFS	8 am-10 pm	5/16-5/29	West HI
14089	3	MARE 390	001	Biology of Marine Mammals	J Turner	MTRF	8-9:50 am	6/14-7/23	MSB 103
14090	1	MARE 390L	001	Biol of Marine Mammals Lab	J Turner	W	8 am-12 pm	6/14-7/23	MSB 104
14091	3	MARE 394	001	Applied Methds in Phytoplankton Ecol	J Adolf	MTRF	10-11:50 am	6/14-7/23	MSB 104
14164	1	MARE 394L	001	Appl Methds in Phytoplankton Ecol Lab	J Adolf	T	1-5 pm	6/14-7/23	MSB 112
14092	3	MARE 490	001	Marine Reptile Conser & Ecology	J Turner	MTRF	10-11:50 am	6/14-7/23	MSB 103
14093	1	MARE 490L	001	Marine Reptile Conser & Ecol Lab	J Turner	F	1-5 pm	6/14-7/23	MSB 104

Summer 2010

Marine Science Course Descriptions

Mare 101L - Introduction to Marine Science Field Laboratory

Drs. Jason Adolf and Jason Turner

Map the sea floor of Hawai'i's bays from aboard a UH Hilo research vessel. Collect samples of marine sediments using a corer and investigate ocean currents by tracking drogues as they drift along the island's shores. Plot oceanographic data on a computer and interpret the results using the latest scientific software. Map the temperature and salinity patterns in scenic Hilo Bay. Collect plankton from a UH Hilo research vessel and identify them in the laboratory. Learn to identify many of the common Hawaiian reef fishes, and have the opportunity to practice *in situ* techniques used to visually census fishes. Conduct snorkel surveys of green sea turtles (*Chelonia mydas*), as part of an ongoing study to assess their health, population numbers, and movement patterns. This is an introductory first course, with no prerequisites.

Mare 140 & 140L, Introduction to Hawaiian Coral Reefs

Ms. Jennifer Turner

Explore the underwater world of the Big Island of Hawai'i while learning about unique marine ecosystems found nowhere else on Earth. Students will acquire an appreciation for local aquatic fauna in the classroom including the basics of marine biology and natural history. Then they will enter the natural laboratory that is Hawai'i and investigate coral reefs, coastal beach, and tide pool systems with mask, snorkel, and fins. Learn to identify common marine inhabitants while enjoying an unparalleled educational experience under the sea. This is an introductory course and lab with no prerequisites. Concurrent enrollment in lecture and lab is required.

Marine 171, Marine Biology

Ms. Jennifer Turner

This course provides a comprehensive examination of the exciting world beneath the waves. Subjects will include an introduction and history of marine biology, how organisms deal with the marine environment, marine ecological concepts, and factors involved with reproduction, migration, and dispersal of marine larvae. Important marine taxonomic groups and

processes will be investigated across a diverse landscape of aquatic habitats including open ocean, deep sea, benthic, and coastal ecosystems including coral reefs, seagrasses, mangroves, and estuaries. Aspects of human impacts upon the marine environment and the management and conservation of marine resources will be discussed. This is an introductory course, however a previous biology course is recommended.

Mare 194, Marine Environmental Issues in Hawai'i: Past, Present & Future

Dr. Lisa Muehlstein

Examine a diversity of issues from Hawai'i perspectives of environmental, ecological and cultural impacts to the marine environment, primarily to the island of Hawai'i, but also to other Hawaiian Islands and the Pacific region. Investigate aspects of global warming, invasive species, coastal development, over-fishing, fish ponds, water quality plus other local topics as viewed from the perspectives of Hawai'i and its people. The historical record, current situation, as well as solutions for issues related to the marine environment will be examined in detail. As an online course, student will be exposed to unique ways of engaging in active learning including group presentations, viewing and discussing films, online chats, and one-on-one discussions. This is an introductory course, with no prerequisites.

Mare 240, Small Boat Operation in Marine Research

Captain Michael Childers

This course is intended to provide the novice boater with the skills needed to safely operate and conduct research from a small boat. Topics include: boating terminology, state and federal regulations, safety, weather, lines and knots, Rules of the Road, navigation, small boat handling, and conducting research operations including the support of SCUBA diving, the use of portable electronic sampling gear, and the collection of samples. The course will consist of lectures, lab sessions, and time on the water in a small boat. Participants must be able to swim. Admission by advance consent of the instructor.



MARE 264, Quantitative Underwater Ecological Survey Techniques (QUEST)

Team

Students who enroll in QUEST will learn commonly utilized nearshore underwater ecological surveying techniques and then apply these in the field using SCUBA as a research tool. Students will review the identification of common Hawaiian reef invertebrates, fishes and seaweeds. They will be introduced to scientific diving methodology and a variety of surveying techniques including: visual surveying of fishes, surveying of benthic invertebrates, and photographic surveying of fishes and invertebrates. Additional lectures will cover basics in experimental design, statistical analysis, data reduction, graphic representation, reef geomorphology, sedimentology and physical oceanography. Students will utilize SCUBA in the field to survey the coral reefs on the Kona side of Hawai'i. Data will be analyzed and presented in both oral and written reports. This class affords students a unique opportunity to learn and apply diving research techniques in a truly beautiful environment. Admission by advance consent of the instructors and authorization as a scientific diver in training before the start of the course.

MARE 294, Polynesian Sailing & Navigation (Papa Wa`akaulua - Hawaiian Double-hulled Canoe Sailing)

Mr. Kaleo Pilago

This introductory course will focus on traditional and contemporary Polynesian double-hulled canoe sailing culture. Topics include: Hawaiian seafaring, canoe building, celestial navigation, oceanography, protocols, and related *mo'olelo* (stories). Prerequisites: Basic knowledge of Hawaiian language and culture (and/or willingness to learn), and current First Aid and CPR certifications.

MARE 294L, Polynesian Sailing & Navigation Laboratory (Papa Wa`akaulua - Hawaiian Double-hulled Canoe Sailing)

Mr. Kaleo Pilago

Introduction to basic Polynesian double-hulled canoe sailing principles, safety procedures/precautions, protocols, ocean skills development, and sailing techniques. Prerequisites: Concurrent registration in MARE 294 and basic swimming skills (must be able to swim 100M and thread water for 15 minutes). All students will be required to complete swimming assessment.

MARE 364, Advanced Quantitative Underwater Ecological Survey Techniques (QUEST)

Team

Students who have completed MARE 264 with at least a "B" grade may apply for admission to Advanced QUEST. Applicants who are accepted, will be assigned as dive team leaders for the basic QUEST course (MARE 264) and will be trained in team leadership and management skills. In this leadership role, advanced QUEST students will work with the diving safety officer and course faculty to monitor the safe diving practice of each member of their team. Team leaders will also assist in training students in identification of organisms. They will supervise the dive team's recording of data in the field as well as subsequent data analysis, and anchor the team's written report and oral presentation, and provide leadership for the team in all aspects of the QUEST experience. Admission by advance consent of the instructors and authorization as a scientific diver in training before the start of the course is required.

MARE 390 & 390L, Biology of Marine Mammals

Dr. Jason Turner

This course will study a diverse group of highly adapted marine vertebrates which cover several taxonomic groups and span all ocean systems. Comprehensive investigations of cetaceans, pinnipeds, sirenians, as well as the representative mustelid and ursid will be conducted. Subjects will include evolution, taxonomy, anatomy and physiology, behavior, reproductive ecology, diving adaptations, echolocation, conservation and management, and the history of human interactions with these unique mammals. Lecture will include discussions of current research papers along with group research projects. Laboratory sessions will enable students to participate in the field and lab techniques throughout the Big Island of Hawai'i employed by professional marine mammal biologists. Prior college-level marine biology recommended. MARE 390 & 390L must be taken concurrently.

MARE 394 & MARE 394L, Applied Methods in Phytoplankton Ecology

Dr. Jason Adolf

Phytoplankton are the microbial primary producers in marine ecosystems and are a sensitive indicator of ecosystem change. This lecture-, laboratory-, and field-based course will give students hands on experience isolating and growing local phytoplankton cultures; examining phytoplankton using light- and epifluorescent microscopy techniques; producing surface maps of phytoplankton abundance and water quality using

small boats and DATAFLOW techniques; and working with UH Hilo's real time continuous monitoring buoy and data telemetry system in Hilo Bay. MARE 394 & 394L must be taken concurrently.

MARE 490 & 490L, Sea Turtle Conservation & Ecology

Dr. Jason Turner

This course gives students an all-encompassing look at the exceptional natural history of these ancient marine vertebrates. Topics will include investigations of all seven species of sea turtle along with sea snakes and marine iguanas throughout the world. Subjects will include conservation and management, human impacts, reproductive and feeding ecology, evolution, taxonomy, and anatomy and physiology of these inimitable marine animals. Lecture will include discussions of current research topics and conservation efforts along with group research projects. Laboratory sessions will enable students to participate in cooperative field research studies of endangered green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles. Prior college-level marine biology recommended. MARE 490 & 490L must be taken concurrently.





Summer Session in Marine Science

Sample Schedule

Summer session students should take no more than eight or nine credit hours of course work, not counting QUEST.

Sample courses loads are shown below:

Example A - Introductory Courses - Marine Biology Focus

1) Marine Biology (MARE 171)	3 credits
2) Introduction to Hawaiian Coral Reefs (MARE 140)	3 credits
3) Introduction to Hawaiian Coral Reefs Lab (MARE 140L)	1 credit
	Total = 7 credit hours

Example B - Introductory Courses - Oceanography Focus

1) Marine Science Field Lab (MARE 101L)	2 credits
2) Small Boat Operation in Marine Research (MARE 240)	3 credits
	Total = 5 credit hours

Example C - Introductory Courses - Hawaiian Focus

1) Polynesian Sailing & Navigation (Papa Wa'akaulua - Hawaiian Double-hulled Canoe Sailing) (MARE 294)	3 credits
2) Polynesian Sailing & Navigation (PapaWa'akaulua - Hawaiian Double-hulled Canoe Sailing Lab (MARE 294L)	1 credit
	Total = 4 credit hours

Example D - Advanced Courses

1) Biology of Marine Mammals (MARE 390)	3 credits
2) Biology of Marine Mammals Lab (MARE 390L)	1 credit
3) Applied Methods in Phytoplankton Ecology (MARE 394)	3 credits
4) Applied Methods in Phytoplankton Ecology Lab (MARE 394L)	1 credit
	Total = 8 credit hours

Faculty

The UH Hilo Summer Marine Science faculty exemplifies the best in national educators

Dr. Jason Adolf, Assistant Professor of Marine Science, is a phytoplankton ecologist who has worked in Chesapeake Bay, the Mid-Atlantic Bight, Southwestern Australia and the U.K. His current research on the phytoplankton dynamics in coastal waters of Hawai'i Island uses real time continuous monitoring buoys and high-speed surface mapping of water quality, in addition to traditional techniques, to investigate the natural and anthropogenic forces shaping coastal phytoplankton populations. Dr. Adolf strongly believes that hands-on learning is critical to science education and his classes reflect that philosophy. jadolf@hawaii.edu

Website: <http://www.plankton.uhh.hawaii.edu/>

Captain Michael Childers, Instructor of Marine Sciences, is Master of the UH Hilo research/education vessel, *Makani 'Aha*. In addition to his Captain's license, he has a degree with honors in marine science and is a recipient of the Mae Mull Naturalist Award and the Anna Toy Ny Scholarship. mchilder@hawaii.edu

Captain John Coney is staff coordinator of the UH Hilo Marine Option Program, Educational Specialist for the Kalakaua Marine Education Center and Manager of the UH Hilo scanning electron microscope laboratory. He has a degree in computer science and serves as staff computer expert, supervising field instrumentation and computer data logging onboard the *Makani 'Aha*. Born in Hawai'i, he is an experienced sailor, power boat operator and licensed captain. Mr. Coney is also the Unit Diving Coordinator for all scientific diving operations at UH Hilo and a NAUI Dive Instructor. jconey@hawaii.edu

Dr. Walter Dudley* has been a shipboard scientist on more than a dozen major oceanographic research expeditions including submersible dives and deep sea drilling aboard the *Glomar Challenger*. Dudley has published articles in geological, chemical and physical oceanography including the marine science entries in the *Cambridge General Encyclopedia* and co-authored the book *Tsunami!*, now in its 2nd edition. He has been featured in more than 30 television documentaries dealing with oceanography including *National Geographic Explorer*, *Nature and Discover Magazine*. dudley@hawaii.edu

B. K. Griesemer is a Professor of Psychology at Maui Community College. She holds a masters in Psychology as well as an MBA. She is a QUEST graduate and has been on the QUEST faculty for over 10 years working mainly with the MARE 364 (Advanced QUEST) student team leaders. She is a mediator and facilitator for a community mediation center and has consulted widely in leadership, team building, management and communications. bkg@hawaii.edu

Jeff Kuwabara is the campus coordinator for the UH Manoa Marine Option Program (MOP). He completed a BS in Zoology, a Marine Option Program Certificate at UH Manoa in 1995, and a Master's degree in Public Administration. As an education specialist, Kuwabara played a major role in developing UH Sea Grant's Hanauma Bay Education Program from 1996 – 2003. He then went on to manage NOAA's discovery center on the Northwestern Hawaiian Islands on Hilo's bay-front where he developed educational, volunteer, and community outreach programs. In 2005, Jeff took his current position with MOP where he helps students navigate their way to a MOP Certificate. Mr. Kuwabara has been actively involved with QUEST since 1992





and is an avid diver and longboarder and an amateur underwater photographer. manoamop@hawaii.edu

Dr. Lisa Muehlstein is a marine scientist working in the Department of Marine Science at UH Hilo. She has conducted research throughout the Caribbean on seagrasses and coral reef ecosystems, and has collaborated with Virgin Islands National Park Service scientists and resource managers to derive long-term management programs. Dr. Muehlstein has published numerous papers from her research. Her research interests in Hawai'i are focused on algal interactions on coral reefs. Dr. Muehlstein's passion is science education for students of all ages and improving literacy in science. One mechanism for accomplishing this goal has been in the successful development of introductory online college courses in marine science at UH Hilo. lm@hawaii.edu

Kaleo Pilago works as a Student Development Specialist under the Department of Student Affairs for the Kipuka Native Hawaiian Student Center. He has a B.A. in English Literature from UH Hilo and is entering the Masters of Education Program in Spring 2010. Kaleo also has a current Lifeguard Certification and has held a Captain's License since 1997. His voyaging

experience includes 15+ years on Hawaiian double-hulled sailing canoes. The vessels that he has crewed include *E'ala*, *Höküle'a*, and most recently *Hökūalaka'i*. Kaleo has sailed several times around the State of Hawai'i, and in 2007, voyaged to Nihoa and Moku-manamana in the Northwestern Hawaiian Islands. Currently, he is the Captain of two double-hulled sailing canoes, 27' *Ho'okena* and 33' *Lauhoe*. Both vessels have been used directly for education and community development for the past 11 years. Before working for the UH Hilo, Kaleo was, for four years, the Coordinator for a leadership program that used the double-hulled canoe as the training platform. In addition to sailing, Kaleo is a cultural practitioner, avid surfer, diver, subsistence fisherman, and father of two sons, 10 and 15 years old.

Dr. Misaki Takabayashi is a marine molecular ecologist in the Marine Science Department at UH Hilo. She was educated in Australia and has worked extensively on coral reefs in the wider Pacific as well as in the Caribbean. She has published numerous papers from her work on ecology, physiology and genetic diversity of corals and symbiotic algae, zooxanthellae as well as marine diatoms. Dr. Takabayashi is currently conducting a wide variety of research projects, ranging from corals to microbes, around the island of Hawai'i. misakita@hawaii.edu

Website: <http://weblog.uhh.hawaii.edu/~misaki/Welcome.html>

Ms. Jennifer Turner is a broadly trained biologist working at UH Hilo in the Departments of Marine Science and Biology. She has been working in biological research and academics for the past 14 years, with a Bachelor's Degree in Marine Biology and a Master's Degree in Environmental Biology. Jennifer has been involved in a wide variety of research programs including medical research, shrimp mariculture, molecular and population genetics, and marine mammal biology. turnerjs@hawaii.edu

Dr. Jason Turner** is a marine biologist in the Marine Science Department at UH Hilo. He has conducted research on marine mammal biology, connectivity of aquatic food webs and feeding studies in larval and juvenile fishes, and has conducted fisheries surveys throughout the Gulf of Mexico. Dr. Turner has published research results in scientific papers in marine biology, marine ecology, and marine mammal journals. jpturner@hawaii.edu

Website - <http://www.foodweb.uhh.hawaii.edu/>

*Recipient of the University of Hawai'i Board of Regents Medal for Excellence in Teaching.

**Recipient of the University of Hawai'i Frances Davis Award for Excellence in Teaching.

What Marine Science Summer session students have to say about the program:

"It was a wonderful experience, I learned so much."

"Instead of just staying in the classroom, we were able to get out and have hands on experience."

"Professors were excellent and very friendly and personable. They added so much to the class material."

"I think that the subject matter was perfect."

"I loved being on the boat!"

"Great classes!"

"My favorite classes that I've ever taken."

"Awesome"





Summer Splash

Special thanks to John Coney and the students of the UH Hilo Marine Science Program for the use of photographs for this publication.

