



Aging and Gerontology

Degrees and Certificates Offered: BA in interdisciplinary studies (emphasis on aging), see the “Undergraduate Education” section of the *Catalog* for more information.

Cell and Molecular Biology Graduate Program

John A Burns School of Medicine
BSB 222
651 Ilalo Street
Honolulu, HI 96813
Tel: (808) 692-1514
Fax: (808) 692-1968
Web: jabsom.hawaii.edu/departments/cmb/

Graduate Faculty

M. J. Berry, PhD (Co-chair)—selenoprotein synthesis
M. Tallquist, PhD (Co-chair)—formation and function of vasculature

Biochemistry

N. G. James, PhD—neurodegeneration, protein interactions, fluorescence micros
D. M. Jameson, PhD—energetics and dynamics of protein interactions; fluorescence spectroscopy
S. E. Seifried, PhD—molecular recognition and transcriptional control
A. Yanagihara, PhD—biochemistry of neurotoxins, neuroactive compounds in cnadarians

Cancer Biology

P. Fei, PhD—tumor suppressors function and cancer susceptibility syndromes

L. Le Marchand, MD, PhD—cancer epidemiology, breast cancer risk
M. Matter, PhD—mechanism of cancer metastasis
J. Ramos, PhD—MAP kinase pathway
J. Turkson, PhD—developing anticancer drugs
C-W. Vogel, MD, PhD—biochemistry of cellular toxins, neuroblastoma

Cardiovascular

W. Boisvert, PhD—immunologic and inflammatory aspects of cardiovascular medicine
T. Matsui, PhD—cardiovascular disease
R. Shohet, MD—cardiovascular research
L. White, PhD—gene therapy, cardiac hypoxic response

Cell Signaling

A. Fleig, PhD—excitation-contraction coupling in muscle
R. Penner, MD, PhD—calcium signaling in neurons and immune cells
H. Turner, PhD—molecular biology of ion channels in the immune and nervous system

Developmental Biology

R. Allsopp, PhD—cell biology
B. Fogelgren, PhD—renal physiology, development and disease
S. Lozanoff, PhD—developmental biology and craniofacial development
M. McFall-Ngai, PhD—symbiotic associations between animals and bacteria

Epigenetics

M. Corely, PhD—epigenetics and human disease/diabetes
A. Maunakea, PhD—epigenetics in context of diseases including autism and cardiometabolic disorders

Genetics and Molecular Biology

F. Bellinger, PhD—neurobiology of selenoproteins
M. J. Berry, PhD—selenoprotein synthesis
B. Bowen, PhD—conservation genetics
R. L. Cann, PhD—molecular and evolutionary genetics of animal populations
M. Gerschenson, PhD—infectious diseases, HIV mitochondrial medicine
D. S. Haymer, PhD—molecular genetics of Diptera
P. Hoffmann, PhD—selenoproteins as related to immunology and cardiac disease
O. Le Saux, PhD—genetic disorders, elastin, PXE, gene mapping
M. McFall-Ngai, PhD—host responses to interactions with beneficial microbes
J. Panee, PhD—selenoproteins and natural products as antioxidants
M. Pitts, PhD—behavioral neuroscience
B. T. Shiramizu, MD—pediatric cancer, immunology, neurovirology
A. J. Stokes, PhD—cardiac immunology and cell and molecular biology
Z. Stoytcheva, PhD—molecular biology of selenoproteins

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Immunology/Virology

P. Hoffmann, PhD—immunology
 L. Ndhlovu, MD, PhD—HIV immunology
 V. R. Nerukar, PhD—viral pathogens, marine virology, molecular epidemiology
 M. Tuthill, PhD—monoclonal antibodies and immunology

Matrix Pathobiology

K. Csiszar, PhD—lysyl oxidase tumor suppressor family

Neurobiology/Neurophysiology

R. Nichols, PhD—neurobiology
 A. Seale—comparative endocrinology, neurobiology
 C. Todorovic, PhD—neurobiology of learning and memory
 J. Yew—neurobiology of chemical communications/pheromones

Reproduction Function

Y. Marikawa, PhD—molecular control of the body plan of vertebrate embryos
 S. Moisyadi, PhD—mammalian transgenesis
 M. Ward, PhD—biology of reproduction
 J. Urschitz, PhD—gene therapy, obesity, pregnancy
 W. S. Ward, PhD—tertiary structure of DNA, nuclear structure, and genetic instability
 Y. Yamazaki, PhD—fetal germ cells

Degrees Offered: MS in cell and molecular biology, MS in cell and molecular biology (neuroscience), PhD in cell and molecular biology, PhD in cell and molecular biology (neuroscience)

The Academic Program

The Cell and Molecular Biology Graduate Program (CMB) in biomedical sciences represents an interdisciplinary approach to graduate education with faculty in many sub-disciplines of biology dedicated to helping qualified students pursue original research using modern approaches to cell and molecular biology. The CMB graduate program brings together faculty from three colleges and various research institutes. Planning for collaborative research is emphasized in this program, as well as solid training in a variety of laboratory techniques.

The CMB graduate program provides fellowships for PhD students in their first year, and additional support in the way of research or teaching assistantships are available for qualified applicants in subsequent years. The program is intended to prepare students for careers in academia, research institutes, and in expanding areas of biotechnology in the private sector.

Master's students fall into two categories, depending on whether they opt for a Plan A (thesis) or Plan B (non-thesis). The MS Plan B is usually a terminal degree, appropriate for professionals in medical technology, government, and related fields who wish to obtain broad training in modern cell biology to advance their credentials in their chosen fields. The completion of the MS Plan A serves as a qualifying examination for students who intend to continue toward the PhD in cell and molecular biology. It may also serve as a terminal degree for those who wish to pursue careers as research technicians, either in the public or private sector.

Advising

For complete details regarding the program, contact Lyn Hamamura at msbiosci@hawaii.edu or visit the website at jabsom.hawaii.edu/departments/cmb/.

Graduate Study

Applicants are expected to have at least a bachelor's degree emphasizing biological or physical sciences with courses in calculus, organic chemistry, biochemistry, and cellular and molecular biology. Applicants with MD degrees are welcome. Results of the Graduate Record Examination (GRE) general test should be submitted with the application, and students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL). Three letters of recommendation from former instructors or research supervisors, a CMB program graduate express form, and transcripts from previous universities or colleges attended must also be submitted.

Master's Degree

The curriculum core of the CMB program is a specialized lecture class, spanning two semesters (CMB 621-622). Additional required courses are CMB 611 Seminar in Biomedical Science, CMB 626 Ethics in Biomedical Research, and CMB 654 Genetics Seminar. The remaining credit requirements can be fulfilled by specialized courses, seminars, and research units as recommended by the particular committee and research advisor each student picks to guide their academic program. Following the completion of the two semester core course, the student is expected to pass a qualifying exam, form a committee, and then propose, complete, and defend an original research project (MS Plan A) or study plan and research paper (MS Plan B).

Doctoral Degree

PhD candidates do not need to have completed a master's degree. If an MS was not earned through the CMB program, the core lecture class is required (CMB 621-622). Formal course requirements beyond the core include additional courses specified by the dissertation committee, including CMB 611 Seminar in Biomedical Science, CMB 626 Ethics in Biomedical Research, CMB 641 Introductory Biostatistics for the Bench Biologist, CMB 654 Genetics Seminar, CMB 699 Directed Research, and three laboratory rotations. The student is expected to form a committee, propose, complete, and defend an original research project and publish at least one paper in a peer-reviewed journal during their graduate career.

Neuroscience Specialization

The Cell and Molecular Biology Graduate Program participates in the interdisciplinary "Area of Concentration in Neuroscience." This is a graduate "specialization" rather than a free-standing graduate program. CMB students interested in this specialization will take normal requirements for CMB plus additional course work as determined by the Neuroscience Specialization. They will be eligible for graduate degrees in Cell and Molecular Biology (Neuroscience), presuming that their dissertation research includes an emphasis on application of Cell and Molecular Biological techniques to a Neuroscience research issue (or vice versa).

Selected Specialized Courses

Cell Biology

- MBBE 620 Plant Biochemistry
- TPSS 614 Molecular Genetics of Crops
- TRMD 604 Concepts in Immunology and Immunopathogenesis

- TRMD 671 Advanced Medical Parasitology
- TRMD 690 Seminar in Tropical Medicine and Public Health
- ZOOL 610 Topics in Development and Reproductive Biology

Molecular Biology

- CMB 625 Advanced Topics in Genetics
- CMB 654 Genetics Seminars
- MICR 625 Advanced Immunology
- MICR 671 Bacterial Genetics
- MBBE 680 Methods in Plant Molecular Biology
- MBBE 691 Advanced Special Topics in MBBE

Neurobiology

- CMB 606 Introduction to Neurosciences
- CMB 705 Special Topics in Neuroscience
- ZOOL 712 Topics in Nerve/Muscle Physiology

Communication and Information Sciences

2550 McCarthy Mall
Honolulu, HI 96822
Tel: (808) 956-5813
Fax: (808) 956-5835
Email: cis-chair@lists.hawaii.edu
Web: www.hawaii.edu/cis

Graduate Faculty

- E. J. Davidson, PhD (Chair)—social cognitive aspects of information systems development methods
- N. Asato, PhD—Japanese/Japanese American print cultures; Asian librarianship; censorship
- A. Auman, PhD—journalism, media ethics
- K. Baek, PhD—computer vision, neural computation, machine learning
- D. Bhawuk, PhD—organizational behavior, international management
- E. S. Biagioni, PhD—networking protocol design
- K. A. Binsted, PhD—artificial intelligence, software design for mobile devices, human-computer interaction
- W. Buente, PhD—information and communication technologies
- T. X. Bui, PhD—electronic commerce, information policy
- P. Buskirk, MFA—transmedia storytelling, digital convergence, indigenous representation
- H. Casanova, PhD—high performance computing, distributed systems
- H. M. Chen, PhD—e-business, service engineering, business-IT alignment, electronic customer relationship management, multimedia database systems, software engineering, enterprise architecture, MIS
- D. Chin, PhD—artificial intelligence, natural language processing, user modeling, intelligent agents, intelligent user interfaces, intelligent software maintenance, empirical evaluation, geographic information systems
- W. G. Chismar, PhD—information technology, telecommunications, medical informatics
- M. E. Crosby, PhD—human-computer interaction, cognitive science, interface design for searching
- R. S. Gazan, PhD—social aspects of information technology
- J. S. Gorbach, PhD—journalism history, media history, literary journalism, film history, cultural history, democratic theory, mass society theory, propaganda theory, Holocaust, Jewish American studies, postcolonialism, war correspondents
- V. Irvin, EdD—reference, public libraries, youth services, literacy

- practices, practitioner inquiry
- P. M. Johnson, PhD—software engineering, high-tech entrepreneurship
- R. Kazman, PhD—software engineering, human-computer interaction
- J. Kim, PhD—strategic communication, campaign outcomes, media effects
- H. K. Kramer, PhD—intercultural communications
- J. Leigh, PhD—big data visualization, virtual reality, high performance networking, human augmentics, video game design
- D. Li, PhD—enhance privacy and security of internet of things, smart grids, software-defined networks
- L. Lim, PhD—database systems
- R. Minas, PhD—information system, virtual teams/collaboration, healthcare, decision making, individual cognition, neurals
- R. Neo, PhD—persuasive effects of social media cues on political outcomes; cross-national comparative digital media influence on political expression
- B. Oppegaard, PhD—mobile place-based media
- R. R. Panko, PhD—risks in information systems, organizational communication and technology
- D. Pavlovic, PhD—security, software, search and networks, quantum computation
- G. Poisson, PhD—cognitive informatics, bioinformatics, machine learning
- D. Port, PhD—software economics, management information systems, software engineering
- L. Quiroga, PhD—information filtering systems, virtual collaboration, information retrieval, databases, library systems
- N. Reed, PhD—artificial intelligence, autonomous agents
- S. Robertson, PhD—human-computer interaction, digital government and digital democracy
- P.-M. Seidel, DrEng habil—formal methods, computer arithmetic, computer architecture, algorithms
- N. Sitchinava, PhD—algorithms and data structures, parallel and distributed computation, I/O- and cache-efficient computation
- J. Stelovsky, DrTechSc—computer hypermedia, human-computer interaction, cognitive science
- S. Still, PhD—bioinformatics/theoretical biology, information theory, machine learning
- D. Streveler, PhD—medical informatics, international public health, issues in electronic medical record and telemedicine
- K. Sugihara, DrEng—algorithms, distributed computing and database systems, visual languages
- D. Suthers, PhD—human-computer interaction; social informatics; technology-enhanced learning
- A. Wertheimer, PhD—information science, library history, Japanese-American print culture
- J. S. Winter, PhD—communication policy and planning (Asia-Pacific)
- R. G. Worthley, PhD—statistics, information technology management
- B. Xiao, PhD—human-computer interaction, social media, social-networking, dark side of information technology, data reduction, visualization

Cooperating Graduate Faculty

- J. C. Ady, PhD—organizational communication, sojourner adjustment, international negotiation, conflict management
- D. L. Alden, PhD—marketing communications
- R. Doktor, PhD—international business, organizational behavior, strategy
- C. P. Ho, PhD—instructional technology
- N. Ordway, PhD—real estate
- J. R. Wills, DBA—technology marketing

Degree Offered: PhD in communication and information sciences

The Academic Program

The Interdisciplinary Doctoral Program in Communication and Information Sciences (CIS) offers a PhD degree integrating

and drawing faculty from the fields of communication, computer science, library and information science, and management information systems. Because of the broad knowledge base required to support this interdisciplinary approach, the program also draws on such fields as political science, economics, engineering, operations research, and behavioral sciences.

Recipients of the PhD will undertake careers in colleges and universities, industry, government, and private organizations.

Complete details on this program are outlined on the website, www.hawaii.edu/cis/.

Admission Requirements

Requirements in addition to those set by Graduate Division are:

- Master's degree in business administration, communication, library and information science, information and computer sciences, or a closely related field
- GRE or GMAT scores
- Knowledge of computing
- Demonstrated potential for conducting independent research
- Proficiency in English. Minimum TOEFL scores of at least 6600/250/100 (paper/computer/Internet based TOEFL) are required for admission.

Application Requirements

In addition to the information required by Graduate Division, the following must be sent directly to the CIS program, see www.hawaii.edu/cis/?page=application:

- CIS Preliminary Express Application
- CIS Supplementary Application, including a statement of purpose, samples of relevant published or unpublished work, and skills applicable to teaching or research assistantships
- Three letters of recommendation

Program Requirements

The student will select one primary and two secondary areas of emphasis from those currently supported: see www.hawaii.edu/cis/?page=focus. At this printing, the areas are: biomedical informatics, communication and information theories, communication policy and planning, human-computer interaction, information systems and services, management information systems, and social informatics.

Students must pass comprehensive exams in the chosen three areas of emphasis, publish a research paper, and complete and defend an original dissertation.

Course Requirements

All students are required to complete the following three core courses with a grade of at least a B:

- CIS 701 Communication/Information Theories (3)
- CIS 702 Communication/Information Technologies (3)
- CIS 703 Communication/Information Research Methods (3)

In addition, all students must:

- pass at least one approved research methods or data analysis course (in addition to CIS 703) with a grade of B or better
- enroll in CIS 699 while working with a faculty research mentor to publish a research paper
- enroll in CIS 720 Interdisciplinary Seminar in CIS (1) every semester until graduation
- enroll in CIS 800 the final semester before graduation.

Courses to be taken in preparation for the comprehensive exams are to be selected from graduate offerings in related disciplines as directed by the focus area examination committees. Recommended courses as of this printing are listed below. See the program website for other directed readings required by some committees.

Biomedical Informatics

ICS 614 Medical Informatics I (3)

ICS 675 Bioinformatics: Sequences Analysis (3)

Communication/Information Theories

CIS 701 Communication/Information Theories (3)

Communication Policy and Planning

COM 633 Information and Communication Technologies (3)

Human Computer Interaction

ICS 464 Human Computer Interaction I (3)

ICS 664 Human-Computer Interaction II (3)

ICS 667 HCI Design Methods (3)

ICS 668 Social Informatics (3)

LIS 677 Human Dimension in Information Systems (3)

Information Systems and Services

LIS 641 Digital Librarianship (3)

LIS 678 Personalized Information Delivery (3)

ICS 624 Advanced Data Management (3)

Management Information Systems

BUS 630 Managing Information Technology for Strategic Advantage (3)

ITM 660 Current Topics in Information Systems (3)

ITM 685 Electronic Commerce (3)

ITM 704 Doctoral Seminar in Information Systems (3)

Social Informatics

ICS 668 Social Informatics (3)

ICS 669 Social Computing (3)

COM 634 Social Media (3)

Environmental Studies

Degrees and Certificates Offered: Undergraduate Certificate in Environmental Studies, BA in interdisciplinary studies (emphasis on environmental studies). See the "Undergraduate Education" section of the *Catalog* for more information.

Global Health Protection and Security

Office of Public Health Studies

Biomedical Sciences D204

1960 East West Road

Honolulu, HI 96822

Tel: (808) 956-8577

Email: pubhlth@hawaii.edu

Web: manoa.hawaii.edu/publichealth/certificates

Graduate Faculty

A. Katz, MD (Interim Chair)—infectious disease

E. Hurwitz, PhD—epidemiology

Y. Lu, PhD—environmental health

W. Zhang, PhD—sociology

Affiliate Graduate Faculty

J. Campbell, PhD, MPH—global health security

Adjunct Faculty

J. Hii, PhD—global health and vector-borne disease

Certificate Offered: Graduate Certificate in Global Health Protection and Security

Program Purpose and Goals

Purpose: To promote awareness, knowledge, skills and attitudes conducive to protecting the health of populations and managing global health security issues.

Goals: Within a global context, health protection is broadly linked to global security since emerging, re-emerging and pandemic infectious diseases, major chronic diseases, natural disasters and various forms of resource scarcity including food, water and energy pose innumerable threats to human health. These public health challenges slow developmental progress, disrupt or even reverse national economic development, abrogate cooperation on treaties and agreements, exacerbate civil unrest, de-stabilize regional security and lead to the collapse of governments. The GHPS certificate provides the framework for students to critically assess the effects of major global health protection challenges on demographic trends, examine the threat and intent in bioterrorism, and how the public health sector can better monitor, plan, respond and prepare for health security events.

Background

The GHPS was first established in 1969 as a graduate certificate in population studies, but shifted its focus to global health in 2009 and to global health security in 2014. The certificate appeals to students interested in how major global health challenges impact national, regional, and health security. Students find the global perspective and flexible educational approach of the GHPS a fascinating departure from more traditional public health disciplines.

The GHPS graduate certificate is used by public health and health protection professionals who seek to pursue a career in health protection or who choose to remain in their field, to further develop knowledge and skills in health protection and security. Practitioners in health protection commonly come from varied backgrounds including doctors who practice international medicine, nurses in local health protection units, epidemiologists at regional and national units and environmental health officers at local, regional, and national levels, and health security specialists. Those interested in health protection and security often complete public health training, but the health security aspect of this program is not often included. Furthermore, the health protection workforce is aligned with other professional groups whose roles include an element of health protection, but who are not health security specialists. For instance, nurses who specialize in hospital infection control, occupational health, health emergency planners, environmental health scientists, microbiologists, outbreak controllers, etc. This certificate also provides a means to qualify those already working within the sector.

Requirements

A total of 15 credits are required to graduate, 9 of which are at the graduate level.

Required Courses (9 credits):

- PH 653 Global Health and Human Security (3 credits-available online)
- PH 690 Global Health Challenges (3 credits-available online)
- GHPS 695 Independent Study Project (3 credits)

Elective Courses (6 credits)

- Graduate courses from public health or other departments may be used as electives provided that they are relevant to global health security such as emerging infectious diseases, climate change, displaced populations, transnational health, national instability, disaster management, humanitarian aid, global economics, and food security are recommended.

Double Counting Credits

Students enrolled in a graduate degree may double count approved major and elective credits in their masters or doctorate towards this graduate certificate.

Graduate Interdisciplinary Specializations

Graduate specializations offer graduate students the opportunity to complete a course of study utilizing courses and faculty from several different fields. Participants must apply for admission and be admitted to a 'regular' graduate program.

Ecology, Evolution, and Conservation Biology

St. John 101
3190 Maile Way
Honolulu, HI 96822
Tel: (808) 956-9636
Fax: (808) 956-3923
Email: eecb@hawaii.edu
Web: www.hawaii.edu/eeceb/



Graduate Faculty

- C. W. Morden, PhD (Chair)—molecular systematics and evolution of Hawaiian plants
- A. Amend, PhD—ecology and biogeography of biotrophic fungal communities
- L. Arita-Tsutsumi, PhD—behavioral ecology of insects
- A. Barley, PhD—evolutionary processes in reptiles
- K. E. Barton, PhD—evolutionary ecology
- G. M. Bennett, PhD—insect evolution, insect-microbial symbioses, insect-pathogen interactions
- B. Bowen, PhD—phylogeography, evolution and conservation, genetics of marine vertebrates
- R. L. Cann, PhD—conservation genetics and molecular evolution
- Q. Chen, PhD—field observations, GIS, remote sensing and ecological modeling for addressing key environmental challenges
- K. S. Cole, PhD—evolution of sexual patterns, behavioral ecology
- R. H. Cowie, PhD—evolutionary biology and conservation of land and freshwater snails
- C. C. Daehler, PhD—invasive plants, plant-insect interactions
- M. J. deMaintenon, PhD—evolution of gastropod organogenetic patterns
- D. Drake, PhD—plant ecology, conservation biology, plant-animal interactions

- D. C. Duffy, PhD—conservation biology (basic and applied)
 M. Hixon, PhD—marine ecology and conservation biology
 B. S. Holland, PhD—molecular ecology, systematics and conservation genetics
 N. Hynson, PhD—ecological factors that shape plant and fungal communities
 T. Idol, PhD—forest soils and nutrient cycling
 K. Y. Kaneshiro, PhD—sexual selection and biology of small populations
 M. Kantar, PhD—plant breeding, genetic/genomics, domestication, crop wild relatives
 S. C. Keeley, PhD—plant molecular systematics and evolution
 C. M. Litton, PhD—ecosystem ecology and biogeochemistry of forested systems
 P. B. Marko, PhD—evolution, biogeography and conservation
 W. J. Mautz, PhD—environmental physiology, environmental toxicology, ecological energetics, respiration physiology, and herpetology
 M. D. Merlin, PhD—biogeography, ethnobotany, Pacific natural history
 C. Mora, PhD—biogeography, threats to biodiversity, global conservation assessments and methods for macroecology
 R. Ostertag, PhD—community structure and nutrient dynamics of tropical forests
 B. N. Popp, PhD—stable isotope biogeochemistry, primarily in marine systems
 M. L. Porter, PhD—molecular evolution, visual system evolution
 F. Reed, PhD—population genetics
 D. Rubinoff, PhD—insect systematics, conservation biology, and the evolution of ecological traits
 A. R. Sherwood, PhD—evolution, systematics and population genetics of Hawaiian algae
 C. M. Smith, PhD—physiological ecology of marine macrophytes, marine ecology
 H. Spalding, PhD—deepwater macroalgal ecology and physiology
 A. D. Taylor, PhD—population and community ecology and environmental statistics
 R. Thomson, PhD—evolutionary biology, phylogenetics, and conservation
 T. Ticktin, PhD—ethnoecology and conservation biology
 R. Toonen, PhD—population biology and larval ecology of marine invertebrates
 T. Tricas, PhD—behavior and sensory biology of sharks, rays and reef fishes
 A. N. Wright, PhD—population, community, and behavioral ecology, and conservation of reptiles, amphibians, and mammals

Affiliate Graduate Faculty

- A. Allison, PhD—systematics and population biology
 C. Birkeland, PhD—coral reef ecology and management, marine community ecology
 S. Conant, PhD (Emerita)—conservation biology, life history and ecology of Hawaiian birds
 L. C. Crampton, PhD—ecology and conservation of birds and mammals
 N. L. Evenhuis, PhD—systematics and evolution of Diptera
 L. A. Freed, PhD (Emeritus)—evolutionary ecology, behavioral ecology and conservation biology
 A. M. Friedlander, PhD—nearshore fisheries
 R. A. Kinzie, PhD (Emeritus)—aquatic ecology, coral reefs and tropical streams
 D. Ragone, PhD—Pacific Island ethnobotany, especially conservation and use of traditional crops, focusing on breadfruit
 N. W. Yeung, PhD—phylogenetics and conservation of Hawaiian land snails

The Academic Program

The objectives of the interdisciplinary graduate specialization

in ecology, evolution, and conservation biology (EECB) are to:

- Use the unique opportunities that Hawai'i offers to integrate tropical population biology and natural history studies with modern laboratory techniques;
- Provide the interdisciplinary, conceptual, and technical training that will allow our graduates to participate in academic and research programs in ecology, evolution, and conservation biology; and
- Foster scholarly training in research programs involving expertise in ecology, evolution, and conservation biology.

Modern theories of ecology, evolution, and conservation biology share a core of concepts and techniques that span classical academic disciplines. This common core, coupled with the emergence of powerful new technologies, invites cross-disciplinary approaches that generate many of today's most exciting scientific advances.

The EECB program provides opportunities for students at UH Mānoa to expand their knowledge and gain experience in this integrative discipline. Our interdisciplinary graduate program brings together faculty members from graduate programs in the departments of Anthropology, Biology, Botany, Cell and Molecular Biology, Geography, Marine Biology, Microbiology, Natural Resources and Environmental Management, Oceanography, Plant and Environmental Protection Sciences, and Tropical Plant and Soil Sciences—with all their skills and technologies—to provide the training students need to contribute effectively to this research area.

EECB is implemented as a “specialization” within existing graduate programs of the departments whose faculty participate in this program. This means that the primary duties and responsibilities of each EECB student are to satisfy the requirements of their own home academic department. The EECB specialization serves to allow students to expand beyond the traditional departmental boundaries in terms of formulating research questions, choosing thesis/dissertation committee members and taking academic courses. EECB graduate students can be enrolled in either the doctor of philosophy or master of science degree in their home department.

Students accepted to the EECB graduate specialization must already have been accepted into the graduate program of the various departments participating in the EECB program. Course work in statistics, organic chemistry, biochemistry, genetics, evolution, and ecology are considered most important for preparing students for graduate studies.

Details on the EECB program and application forms can be found at the EECB website www.hawaii.edu/eecb/.

Admission Procedures and Policy

Only students that have been accepted and are currently enrolled in a graduate program in one of the cooperating academic departments at UH Mānoa can be admitted. New students applying to UH Mānoa will not be considered until they are accepted and enrolled.

All applicants must submit (by email directly to the EECB Chair):

- Letter expressing your interest in EECB (up to 3 pages), including, at a minimum
 - information on past academic experience
 - goals for graduate study in general and graduate study in EECB in particular
 - what you feel you can contribute to EECB
 - what you expect to gain by participation in EECB

■ Letter of support from your EECB faculty sponsor

Students enrolled at UH Mānoa may be admitted to EECB in either the fall or spring semester. Application deadlines are **February 1** and **October 15**. Successful applicants are admitted the following semester.

Your original UH Mānoa application may be obtained directly by the EECB office from Graduate Division and does not need to be submitted with your application to EECB.

Admission Criteria

Details can be found on the EECB website: www.hawaii.edu/eeceb/.

Course Requirements for Specialization in Ecology, Evolution and Conservation Biology

Course requirements for ALL EECB graduate students:

- Complete all degree requirements of the home academic department
- Participate in EECB activities, particularly the Evoluncheon seminar series
- One course in ecology at the 600 or 700 level (at least 2 credits with an A or B grade)
- One course in evolution at the 600 or 700 level (at least 2 credits with an A or B grade)
- One course in conservation biology at the 600 or 700 level (at least 2 credits with an A or B grade)

Acceptable graduate (600-700 level) courses currently being offered are listed below. Because some offerings change from semester to semester, consult the EECB webpage for an updated list.

In addition to course requirements for the specialization in EECB, each academic department has its own course requirements. Courses from the EECB course list that are taken to fulfill departmental requirements can also be used to fulfill EECB requirements, however, a single course can only satisfy one of the three EECB requirements.

Course Offerings

(Updated October 2013)

New courses or one-time offerings not listed here but approved by the EECB curriculum committee may also count towards the ecology, evolution, or conservation biology requirement. Please check the EECB website for updates and consult with the graduate education committee for acceptations.

Ecology

- ANTH 606 Anthropology of Infectious Disease (3)
- BOT 644 Ethnoecological Methods (3)
- BOT 651 Invasion Biology (3)
- BOT/ZOOL 652 Population Biology (3)
- BOT 676 Environmental Physiology Seminar (2)
- IS 650 Principles of Applied Evolutionary Ecology (3)
- MICR 680 Advances in Microbial Ecology (3)
- NREM 680 Ecosystem Ecology (3)
- NREM 682 Restoration Ecology (3)
- OCN 626 Marine Microplankton Ecology
- OCN 627 Ecology of Pelagic Marine Animals (3)
- OCN 628 Benthic Biological Oceanography (4)
- OCN 629 Molecular Methods in Marine Ecology (2)
- PEPS 671 Insect Ecology (3)
- ZOOL 606 Principles of Animal Behavior (2)
- ZOOL 606L Principles of Animal Behavior Lab (1)

- ZOOL 620 Marine Ecology (3)
- ZOOL 623 Quantitative Field Ecology (3)
- ZOOL 652 Population Biology (3)

Evolution

- ANTH 604 Biological Anthropology Core (3)
- BIOL 603 Molecular Ecology (3)
- BOT 661 Hawaiian Vascular Plants (3)
- BOT 669 Molecular Phylogenetics and Evolution (3)
- CMB 625 Advanced Topics in Genetics (2)
- CMB 650 Population Genetics (3)
- MICR 671 Bacterial Genetics (3)
- PEPS 662 Systematics and Phylogenetics (3)
- PEPS 691 Biogeography Seminar (2)
- TPSS 615 Quantitative Genomics and Evolution (3)
- ZOOL 606 Principles of Animal Behavior (2)
- ZOOL 606L Principles of Animal Behavior Lab (1)

Conservation Biology

- ANTH 620H Theory in Social and Cultural Anthropology (3)
- BOT 651 Invasion Biology (3)
- BOT/ZOOL 690 Conservation Biology (3)
- OCN 621 Biological Oceanography (3)
- PEPS 675 Biological Control of Pests (3)
- TCBES 600 (UH Hilo) Conservation Biology and Environmental Science (3)

Content Varies (but may count towards a specific area, depending the topic)

- ANTH 620 Theory in Social and Cultural Anthropology (3)
- BOT 612 Advanced Botanical Problems (V)
- BOT 620 Perspectives in Modern Botany (2)
- BOT 654 Advances in Plant Ecology (2)
- BOT 750 Topics in Conservation Biology (V)
- GEOG 750 Research Seminar: Biogeography (3)
- GEOG 752 Research Seminar: Resource Management (3)
- GEOG 758 Research Seminar: Conservation (3)
- NREM 691 Advanced Topics in NREM (3)
- PEPS 691 Special Topics (V)
- ZOOL 714 Topics in Animal Behavior (V)
- ZOOL 719 Topics in Systematics and Evolution (V)
- ZOOL 739 Topics in Ecology (V)
- ZOOL 750 Topics in Conservation Biology (V)

Neurosciences Graduate Specialization

Graduate Faculty

R. Nichols, PhD (Chair)—Neuroscience specialization
 F. Bellinger, PhD—neurobiology of selenoproteins
 M. Berry, PhD—cell and molecular biology
 J-P. Bingham, PhD—biochemistry, peptide synthesis, conus toxins
 C. Blanchard, PhD—analysis of stress and defense; psychopharmacology
 K. Fong, PhD—cell and molecular biology
 M. Gerschenson, PhD—medicine
 D. Guendisch, PhD—drug development; CNS drugs, chemistry of drug degradation (UHH Pharmacy School)
 V. Nerurkar, PhD—tropical medicine and medical microbiology
 R. Penner, PhD—electrophysiology, intra and intercellular translation
 M. Pitts, PhD—behavioral neuroscience

B. Shiramizu, MD—medicine/pediatrics
 L. Takahashi, PhD—psychology
 C. Todorovich, PhD—neurobiology of learning and memory

Neuroscience

The purpose of this specialization is to allow graduate students pursuing masters and doctoral degrees in various disciplines (e.g., medicine, psychology, engineering, computer science, molecular bioscience, etc.) to formally specialize in neuroscience. This is accomplished by taking a minimum of 4 courses plus participate in a “journal club” focusing on neuroscience as approved by the Graduate Chair.

Courses

- CMB 606 Introduction to Neurosciences (4)
- CMB 621 Cell Molecular Biology I (4)
- CMB 622 Cell Molecular Biology II (4)
- CMB 626 Ethics in Biomedical Research (2)
- CMB/PHRM 640 Neuropharmacology (2)
- CMB 705 Special Topics in Neurosciences (V)
- PSY 622 Principles of Learning (3)
- PSY 626 Cognitive Psychology (3)
- PSY 631 Comparative Psychology (3)
- PSY 642 Cognitive Development (3)
- PSY 719 Research in Psychometrics (3)
- TRMD 607 Neurovirology (1)
- ZOOL 642 Cellular Neurophysiology (3)
- ZOOL 712 Topics in Nerve/Muscle Physiology (V)

Interdisciplinary Studies

Degree Offered: BA in interdisciplinary studies. See the “Undergraduate Education” section for more information.

International Cultural Studies

UHM/EWC International Cultural Studies Graduate Certificate Program

Burns Hall Rm 2069
 1601 East-West Road
 Honolulu, HI 96822
 Tel: 808-944-7593
 Fax: 808-944-7070
 Email: culture@hawaii.edu
 Web: manoa.hawaii.edu/internationalculture/

Faculty

W. Dissanayake, PhD (Director)—media studies
 C. Andrade, PhD—Hawaiian studies
 A. Arno, PhD—anthropology
 C. Bacchilega, PhD—English
 T. Bigalke, PhD—EWC education
 E. Buck, PhD—EWC
 G. Chan, PhD—art and art history
 M. Chapman, PhD—geography
 M. Das Gupta, PhD—ethnic studies
 K. Ferguson, PhD—political science and women’s studies
 C. Franklin, PhD—English
 C. Fujikane, PhD—English
 V. Gonzalez, PhD—American studies
 T. Gonzalves PhD—American studies
 N. Goodyear-Ka’opua, PhD—political science
 D. Grace, PhD—education



J. Hamilton, PhD—art and art history
 D. Hanlon, PhD—history
 M. Helbling, PhD—American studies
 J. Henry, PhD—English
 V. Hereniko, PhD—Pacific Island studies
 P. Ho, PhD—ethnic studies
 P. Hoffenberg, PhD—history
 R. Hsu, PhD—English
 K. Kane, PhD—political science
 J. Kaomea, PhD—curriculum studies
 N. Kent, PhD—ethnic studies
 M. Koikari, PhD—women’s studies
 K. Kosasa, PhD—American studies
 F. Lau, PhD—music
 J. Logan, PhD—languages and literatures of Europe and the Americas
 L. Lyons, PhD—English
 P. Lyons, PhD—English
 R. Mabanglo, PhD—Philippine studies
 R. Nettell, PhD—English
 J. Okamura, PhD—ethnic studies
 J. Osorio, PhD—Hawaiian studies
 K. Pauka, PhD—theater
 R. Perkinson, PhD—American studies
 R. Rath, PhD—history
 S. Reiss PhD—history
 J. Rieder, PhD—English
 A. Robillard, PhD—sociology
 S. Shankar, PhD—English
 M. Shapiro, PhD—political science
 M. Sharma, PhD—Asian studies
 N. Sharma, PhD—ethnic studies and sociology
 N. Silva, PhD—political science
 C. Sinavaiana, PhD—English
 N. Soguk, PhD—political science
 R. Sullivan, PhD—English
 T. Tengan, PhD—ethnic studies and anthropology
 R. Trimillos, PhD—Asian studies
 M. Wessendorf, PhD—theatre and dance
 T. Wesley-Smith, PhD—Pacific Island studies
 E. White, PhD—ethnic studies
 G. White, PhD—EWC and anthropology
 H. Wood, PhD—English (HPU)
 C. Yano, PhD—anthropology
 M. Yoshihara, PhD—American studies
 M-B. Yue, PhD—East Asian languages and literatures
 J. Zuern, PhD—English

Certificate Offered: Graduate Certificate in International Cultural Studies

The Academic Program

The Graduate Certificate in International Cultural Studies offers an interdisciplinary course of study that enhances existing degrees in Arts and Sciences, area studies, and the professional schools.

Given that the language of culture is increasingly heard in debates about issues as diverse as nationalism, human rights, immigration, trade, the environment, education, media, and the arts, the certificate program develops tools for a more informed and critical understanding of the role of culture in public debates and policy.

Hawai'i's location at the intersection of local, U.S., and Asian spheres of influence provides an important vantage point from which to take up the social and cultural transformations taking place in today's era of economic globalization and restructuring. Issues of cultural identity and politics are sharply drawn in the distinctive mix of indigenous, local and international communities in Hawai'i today. Program courses and activities support a variety of approaches to analyzing and understanding the significance of culture, and of cultural difference, as global flows of people, culture, and capital increase the heterogeneity and flux of everyday life throughout the world.

The certificate program brings together faculty whose research and teaching focus on the politics and production of culture in the context of local, national, and international relations. Faculty research methods and styles emphasize the interpretive approaches of the humanities and social sciences.

Certificate Requirements

The certificate program combines course work with directed research and, where possible, community involvement.

- A core of three courses (7 credits), including:
 - CUL 609 Faculty Seminar Series
 - CUL 610 International Cultural Studies: History and Theory
 - CUL 750 International Cultural Studies: Research Project. The Capstone Experience is an individual research project supervised by a participating faculty member.
- Three electives (9 credits), including two taken outside the student's department and no more than one undergraduate course.

Marine Biology

Marine Biology Graduate Program
2525 Correa Road, HIG 132
Honolulu, HI 96822
Tel: (808) 956-5651
Email: mbiograd@hawaii.edu
Web: mbiograd.manoa.hawaii.edu/

Graduate Faculty

J. Lemus, PhD (Chair)—HIMB
C. Smith, PhD (Chair)—botany
R. Alegado, PhD—oceanography
J. H. Bailey-Brock, PhD—biology
J. Beets, PhD—marine science/UH Hilo
B. Bowen, PhD—HIMB
K. Cole, PhD—biology
H. G. de Couet, PhD—biology
E. DeLong, PhD—oceanography
S. Donachie, PhD—microbiology
M. Donahue, PhD—HIMB
J. Drazen, PhD—oceanography
K. Edwards, PhD—oceanography
E. Franklin, PhD—HIMB
R. Gates, PhD—HIMB
E. Goetze, PhD—oceanography
T. Grabowski, PhD—UHH marine science
M. Hixon, PhD—biology
K. Holland, PhD—HIMB
C. Hunter, PhD—biology
P. Lenz, PhD—Bekesey Lab/PBRC
P. Marko, PhD—biology
M. McManus, PhD—oceanography
C. Meyer, PhD—HIMB
A. Moran, PhD—biology
C. Nelson, PhD—oceanography
B. Popp, PhD—geology and geophysics
M. Porter, PhD—biology
M. Rappe, PhD—HIMB
R. Richmond, PhD—Kewalo Marine Lab, PBRC
K. Selph, PhD—oceanography
A. Sherwood, PhD—botany
C. Smith, PhD—oceanography
G. Steward, PhD—oceanography
M. Takabayashi, PhD—marine science/UH Hilo
F. I. Thomas, PhD—HIMB
R. J. Toonen, PhD—HIMB
T. C. Tricas, PhD—biology
L. Watling, PhD—biology

Emeritus Faculty

W. Au, PhD
S. Conant, PhD
M. Hadfield, PhD
P. E. Nachtigall, PhD

Degrees Offered: MS in marine biology, PhD in marine biology

The Academic Program

Marine biological studies at UH Mānoa have a long history of excellent research and graduate training in the internationally recognized graduate programs in oceanography, zoology, botany, and microbiology. The School of Ocean and Earth Science and Technology and the College of Natural Sciences together sponsor a new graduate program that offers PhD and MS degrees in marine biology. This program takes advantage of the 39 faculty members at the university whose research

interests span the study of marine organisms, ecosystems, biogeochemical processes, reefs, oceanic fisheries, and human/marine interactions. It also offers research and internship opportunities with partners at state and federal agencies such as NOAA's Pacific Islands Fisheries Science Center, the Hawai'i Department of Land and Natural Resources, and the Department of Business, Economic Development, and Tourism.

The faculty and students in this program have access to one of the largest coral reef habitats in the U.S., including the Papahānaumokuākea Marine National Monument, the main Hawaiian Islands, and the U.S.-Affiliated Pacific Islands. The unique location of the Hawaiian Archipelago in the central North Pacific Ocean makes it one of the most remote locations in the world allowing the processes that govern the marine environment to be studied with minimal anthropogenic influence. The program emphasizes scientific training in marine biology as a high demand occupation for the future.

The goal of the program is to produce scientists who are experts in their research areas with a broad-based understanding of the biology, ecology, evolution, and life processes of marine organisms. This program also addresses the growing need, locally and globally, for technically trained scientists, managers, and policy makers who are needed to understand the many processes that govern tropical marine ecosystems. Sound management of marine resources is becoming critical as these resources come under mounting pressure for exploitation from human populations and increasing stress from global climate change.

Admissions Requirements

Requirements in addition to those set by Graduate Division are:

- A strong undergraduate or MS training in biological oceanography, environmental science, marine science, marine biology, zoology microbiology, botany, biology, or other life sciences
- A GRE General Test
- A strong undergraduate background in math, chemistry and physics is highly recommended

Application Requirements

Please see mbiograd.manoa.hawaii.edu/apply.html for additional program application requirements.

Program Requirements

The student will either be admitted to the MS or PhD program, then advance to a track upon completion of the first year of core courses. Students who fail to pass the core courses will be dismissed from the program.

Master's Degree

Only a thesis (Plan A) program is available. In addition to the thesis, a minimum of 30 credits is required, including at least 18 credits of course work and Thesis (700) work and completion of the core courses with a grade of B or above.

Doctoral Degree

Applicants can be admitted with or without having completed a master's degree. In addition to Graduate Division's requirements for doctoral candidates, students in the PhD track will need to complete the core courses with a grade of B or above, and complete additional relevant course work as

indicated by the dissertation committee. Students entering without a MS degree will be required to take a minimum of 30 graduate course credits, including at least 18 credits of formal course work and Dissertation (800). All PhD candidates will be required to demonstrate teaching experience (e.g. Teaching Assistantship) during at least one semester of graduate study.

Course Requirements

Students must pass with a B or better.

Please check the program's website for the most up to date requirements, course offerings, and admission information at mbiograd.manoa.hawaii.edu/admissions.html.

Peace Studies

Degrees and Certificates Offered: Undergraduate Certificate in Peace Studies, BA in interdisciplinary studies (emphasis on peace studies). See the "Undergraduate Education" section for more information.

Resource Management

Saunders Hall 107
2424 Maile Way
Honolulu, HI 96822
Tel: (808) 956-7381

Certificate Offered: Graduate Resource Management Certificate

The Academic Program

The Graduate Resource Management Certificate is a cooperative program primarily involving the College of Social Sciences, Department of Urban and Regional Planning (anthropology, economics, geography), College of Tropical Agriculture and Human Resources (natural resources and environmental management), and East-West Center (Program on Environment, Program on Resources: Energy and Minerals). Because of its diverse topical components, multidisciplinary faculty, and practical application throughout Asia and the Pacific, the program is ideal for students who are pursuing graduate studies in traditional disciplines and also seeking expertise in environmental resource management.

This program provides students with specialized training in an area that augments their primary field and develops their pragmatic problem-solving and decision-making skills through analysis of real-world problems. Any student who has previously been admitted as a classified graduate student at UH Mānoa is eligible to apply for admission to this certificate program. Interested applicants should contact their advisor or any representative of the program in the collaborating departments and institutions.

To earn this certificate, students are expected to complete 15 credit hours, at least 9 of which are at the graduate level. For more information, contact the Department of Urban and Regional Planning.