THE GRADUATE SCHOOL - UNIVERSITY OF RHODE ISLAND
CURRICULAR REPORT FROM THE GRADUATE COUNCIL TO THE FACULTY SENATE
REPORT NO. 6, 2009-2010; 15 March 2010

The following matters were approved by the Graduate Council on MARCH 15, 2010 and are presented to the Faculty Senate for confirmation.

New Courses:

1) College of Engineering

Department of Electrical, Computer, and Biomedical Engineering

ELE 561 Physiological Modeling and Control (3)
Principals of physiological modeling and control of linear and nonlinear systems, stability analysis, root locus, Bode plots, linearization. Pre: Graduate standing in electrical engineering or permission of instructor.

2) College of Arts and Sciences

Department of Physics

PHY 545 Nanotechnology in Imaging and Therapy (3)
Nanomaterials: physical properties, application in drug delivery and diagnostics, nanodevices, nano-oncology. Pre: MTH 244

PHY 550 Introduction to Radiation Physics and Dosimentry (3)
Basic principles of radiation physics: radioactivity, the physics of ionizing radiation, radiation dosimetry, imaging equipment, radiation therapy equipment and radiation detectors. Pre: PHY 210 or permission of instructor

PHY 552 Radiobiology (3)
Basic principles of radiation biology: factors that modify radiation response; linear energy transfer; relative biological effectiveness; tissue radiosensitivity; time-dose and fractionation; radiobiological modeling. Pre: PHY 210 or permission of the instructor.

PHY 555 Radiation Oncology (3)
Practical aspects of radiation oncology medical physics: operation of radiotherapy equipment and dose measuring devices; radiation beam measurement techniques;

commissioning and quality assurance for clinical radiation equipment. Pre: PHY 550 and PHY 552

PHY 565 Photomedicine (3)
Interaction of light with matter, use of light in the diagnosis and treatment of diseases, physical principles of optical imaging with biomedical applications, photodynamic therapy. Pre: PHY 322 and PHY 331 or permission of instructor

Additional Matters for Approval

1. College of the Environment and Life Sciences

Proposal for the consolidation of two Ph.D. programs and four M.S. programs in the College of the Environment and Life Sciences

The College of the Environment and Life Sciences currently offers a broad portfolio of M.S. and Ph.D. programs. This proposal focuses on changes to two of the Ph.D. graduate programs, Biological Sciences and Environmental Sciences, and four of the M.S. graduate degree programs, Biological Sciences; Cell & Molecular Biology; Environmental Sciences; and Fisheries, Animal & Veterinary Science. We propose the following changes to these two Ph.D. and four M.S. degree programs:

• the two existing Ph.D. degree programs, Biological Sciences and Environmental Sciences, would be consolidated to form one interdisciplinary Ph.D. program in Biological & Environmental Sciences (BES-Ph.D.);

• the four existing M.S. degree programs, Biological Sciences; Cell & Molecular Biology; Environmental Sciences; and Fisheries, Animal & Veterinary Science, would be consolidated to form one interdisciplinary MS program in Biological & Environmental Sciences (BES-MS);

• both the MS and Ph.D. Biological & Environmental Sciences (BES) graduate degree programs would have four interdisciplinary areas of specialization – *Cell & Molecular Biology (CMB), Integrative & Evolutionary Biology (IEB), Ecology & Ecosystem Sciences (EES), and Environmental & Earth Sciences (EVES).*

Rationale. Research-based graduate programs in CELS should be organized on the basis of research and outreach strengths, critical mass of faculty, and common goals of graduate student training. Consolidation of the four M.S. and two Ph.D. programs described above into one interdisciplinary MS, and one interdisciplinary Ph.D. program in Biological & Environmental Sciences, will broaden student perspectives while training them in their specific disciplines, allow students to be part of a larger community of scholars with similar scientific interests, and stimulate interdisciplinary research that generates new knowledge and funding opportunities. The proposed MS and Ph.D. programs in Biological & Environmental Sciences include faculty from a diverse set of departments in CELS including Biological Sciences; Cell and Molecular Biology; Fisheries, Animal and Veterinary Science;

Geosciences; Natural Resources Science; Nutrition and Food Sciences; and Plant Sciences; as well as faculty from the Graduate School of Oceanography. As such, the BES programs provide an opportunity for faculty to move across the traditional departmental boundaries when conducting their research and training their students; provide more opportunities for interdisciplinary research and graduate programs; allow more flexibility in the administration of graduate education and research within CELS, thus allowing faculty to take advantage of emerging research areas and funding opportunities in a timely and effective manner; and allow faculty participating in a given undergraduate degree program to train graduate students and conduct research in other areas.

Requirements. The program requirements for the MS and Ph.D. programs in Biological & Environmental Sciences (BES) are based on the MS and Ph.D. requirements specified by the Graduate Manual and are intended to allow flexibility in the design of individual programs of studies and promote interdisciplinary interactions between the various areas of specialization.

Implementation. The effective date for implementation would be Fall 2010. Students currently enrolled in the existing programs and students entering these programs in the 2010-2011 academic year would be given the option of completing the existing programs or transferring to the Biological & Environmental Sciences MS and Ph.D. programs. No additional resources are required for the implementation of these programs and there will be no impact on library resources.

Catalog Description of the Graduate Degrees:

Master of Science (MS) and Doctor of Philosophy (PhD) in Biological & Environmental Sciences (BES)

The MS and PhD in Biological & Environmental Sciences (BES) are interdisciplinary, interdepartmental graduate degrees that involve faculty from a diverse set of departments in CELS including Biological Sciences; Cell & Molecular Biology; Fisheries, Animal & Veterinary Science; Geosciences; Natural Resources Science; Nutrition & Food Sciences; and Plant Sciences, as well as faculty from the Graduate School of Oceanography. Contact information and a list of faculty in each of these departments are provided below. Students accepted into the MS and PhD degree programs in Biological & Environmental Sciences are organized into graduate specialization groups that include Cell and Molecular Biology (CMB), Integrative and Evolutionary Biology (IEB), Ecology and Ecosystem Sciences (EES), and Environmental and Earth Sciences (EVES). These graduates specialization groups are described in more detail below, along with the admissions and degree requirements for MS and PhD students in Biological & Environmental Sciences. Prospective students are encouraged to contact individual faculty to learn more about graduate research opportunities.

Departments in CELS that train graduate students in Biological & Environmental Sciences Biological Sciences 401.874.2373, **http://www.uri.edu/cels/bio/**

Faculty: Professor Goldsmith, *chair*; Associate Professor Wilga, *director of graduate studies*. Professors, Bengtson, Bullock, Fastovsky, Kass-Simon, Killingbeck, Koske, A. Roberts, and Webb; Associate Professors Katz, Irvine, Norris, Seibel, and Wilga;

Assistant Professors Lane, Preisser, and Thornber; Adjunct Professors Carlton, Deacutis, Fogarty, Henry, Lauder, Sanford, and Schneider; Adjunct Associate Professors Bailey, Cromarty, Ewanchuk, Gemma, Orwig, T. Roberts, and Thursby; Adjunct Assistant Professor Raposa; Professors Emeritus Albert, Beckman, Bibb, Caroselli, Cobb, Costantino, Goertemiller, Goos, Hammen, Harlin, Hauke, Hyland, Lepper, and Twombly; Associate Professor Emeritus Krueger; Research Professors Heppner and Hill.

Cell and Molecular Biology 401.874.2201, **http://cels.uri.edu/cmb**
Faculty: Professor Sperry, *chair*; Professor Nelson *director of graduate studies.* Professors Chandlee, Cohen, Hufnagel, Kausch, Paquette, and Sun; Associate Professor Martin; Assistant Professors Howlett and Jenkins; Research Professors A. de Groot, L. de Groot, and Spero; Research Assistant Professor Moise; Professors Emeritus Laux and Mottinger.

Fisheries, Animal and Veterinary Science 401.874.2477, **http://uri.edu/cels/favs**
Faculty: Professor Bengtson, *chair*; Professor Gomez-Chiarri, *director of graduate studies*. Professors Bradley, Costa-Pierce, DeAlteris, Mallilo, Rhodes, and Rice; Assistant Professors Peterson and Sartini; Adjunct Professors Hoey, Klein-MacPhee, Musick, Serra, and Smolowitz; Adjunct Associate Professors Colwill and Hare; Adjunct Assistant Professors Brumbaugh, Castro, Dudzinski, Gleason, Hancock, Leavitt, Rheault, Petersson, Schwartz, and Wetherbee; Professor Emeritus Chang and Recksiek.

Geosciences 401.874.2265, **http://uri.edu/cels/geo**
Faculty: Associate Professor Veeger, *chair;* Associate Professor Boving, *director of graduate studies.* Professor and State Geologist Boothroyd; Professors Cain and Fastovsky; Assistant Professor Savage; Adjunct Professors Burks, Fischer, and Spiegelman.

Natural Resources Science 401.874.2495, **http://www.nrs.uri.edu**
Faculty: Professor Paton, *chair*; Professor Golet, *director of graduate studies.* Professors Amador, August, Forrester, Gold, Husband, McWilliams, Stolt, and Wang; Assistant Professors F. Meyerson and L. Meyerson; Adjunct Professors Lashomb, Paul, Perez, and Rockwell; Adjunct Associate Professors Abedon, Cerrato, Gorres, Groffman, Jarecki, Nowicki, and O'Connell; Adjunct Assistant Professors Bergondo, Buffum, Dabek, Daehler, Eisenbies, Eldridge, Farnsworth, Gayaldo, Hollister, Kellogg, McKinney, Milstead, Mitchell, Peters, Rubenstein, Saltonstall, Steele, and Tefft.

Nutrition and Food Sciences 401.874.2253, **http://cels.uri.edu/nfs/**
Faculty: Professor English, *chair*; Professor Greene, *director of graduate studies.* Professors Fey-Yensan, Lee, and Patnoad; Associate Professors Gerber and Melanson; Assistant Professor Lofgren; Adjunct Professor Sebelia; Adjunct Associate Professor Pivarnik.

Plant Sciences 401.874.2791, **http://www.cels.uri.edu/pls**
Faculty: Professor Maynard, *interim chair;* Professor Mather, *director of graduate studies.* Professors Alm, Casagrande, LeBrun, Ruemmele, and Sullivan; Associate

Professors Englander and Mitkowski; Assistant Professor Brown; Professors Emeriti Beckman, Hull, and Jackson; Professor in Residence Ginsberg; Adjunct Assistant Professor Gettman.

Graduate Specialization Groups

Cell and Molecular Biology (CMB): this graduate research group focuses on the molecular basis of life offering solid foundations in biochemistry, microbiology, and molecular genetics with an emphasis on interdisciplinary training. Faculty research interests are diverse and include the molecular basis of microbial colonization and virulence; the biochemistry of cellular signaling; the molecular origins of cancer; the development of vaccines against infectious disease; the roles of microbial consortia in the marine environment; comparative and evolutionary genomics; the control of gene expression by endogenous and environmental signals; the genetics of marine organisms; the molecular biology and genetic modification of plants; agricultural biotechnology; and developmental gene regulation.

Integrative and Evolutionary Biology (IEB): this graduate group focuses on the diversity of form and function of organisms from evolutionary and physiological perspectives, as well as the application of these approaches to health, agriculture, and the environment. Faculty research interests are diverse and include animal science (including reproduction, nutrition, management and health), aquaculture (including ecology, physiology, nutrition and health), cellular and behavioral neurobiology (including sensory biology and neuroethology), evolutionary biology, genomics (comparative, evolutionary and marine), morphology and development (including functional morphology, biomechanics and evolutionary developmental biology), paleontology, physiology and pathology (including environmental, stress, reproductive and comparative physiology, endocrinology, aquatic pathology), plant biology, and human health.

Ecology and Ecosystem Sciences (EES): this graduate research group focuses on patterns and processes within and among populations, communities, and ecosystems. Faculty research interests are diverse and include ecological studies across the spectrum of biological organization (molecular, organismal, population, community, ecosystem, and landscapes) that focus on the intra- and interspecific interactions of microbes, algae, plants, insects, invertebrates and vertebrates that inhabit a variety of terrestrial, coastal, freshwater, and marine ecosystems. Much of this research addresses important environmental issues with implications for public policy such as the ecology of endangered species and habitats, the biological control of algal blooms, invertebrate pests, parasites and disease, anthropogenic nutrient enrichment and bioremediation, ecohydrology of coastal wetlands, landscape change, climate change, invasive species, fisheries, and habitat restoration.

Environmental and Earth Sciences (EVES)*:* This graduate research group focuses on the history, function and condition of Earth's environments from local to global scales. Faculty research interests encompass all aspects of the natural sciences including geology, biogeochemistry, hydrology, soil science, assessment of biodiversity, microbial ecology and global change. Most of this research uses combinations of geospatial data technologies, computer modeling, state-of-the-art

analytical instruments and field investigations to advance our knowledge of Earth processes and the management of water resources, shorelines, wetlands, and terrestrial landscapes to sustain healthy environments and to rehabilitate and restore damaged environments.

Admission and Program Requirements Master of Science in Biological & Environmental Sciences (MS in BES)

Admission Requirements: Graduate Record Examination general test and a bachelor's degree in a biological or physical science, natural resources science, math, engineering or other appropriate discipline. Applicants with course deficiencies may be required to take additional undergraduate courses for no program credit, and to demonstrate, by their performance in such course work or through a qualifying exam, basic knowledge of the subject matter in the area(s) of deficiency.

Program requirements: a minimum of 30 credits beyond the bachelor's degree. This includes a minimum of 6 and a maximum of 9 thesis credits (599 courses), a minimum of 18 credits of formal course work, and a maximum of 6 credits in special problems and directed studies courses.

Doctor of Philosophy in Biological & Environmental Sciences (PhD in BES)

Admission Requirements: Graduate Record Examination general test and a bachelor's degree in a biological or physical science, natural resources science, math, engineering or other appropriate discipline. Applicants with course deficiencies may be required to take additional undergraduate courses for no program credit.

Program requirements: a minimum of 72 credits of graduate study beyond the bachelor's degree (a master's degree may count for up to 30 credits). At least 42 credits must be taken at University of Rhode Island. Required coursework and dissertation credits depend on the preparation and study plan of the individual student. All degree candidates are required to prepare a program of study in consultation with their major professor and doctoral committee. Written and oral comprehensive examinations and a defense of dissertation are required. A qualifying examination will be required for students who are admitted without a master's degree and may be required for students whose prior degrees are outside of the proposed Ph.D. field of study.