



Item: VIII. AS: A-1

Wednesday, March 19, 2008

**SUBJECT: Proposed Ph.D. Program in Geosciences**

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**PROPOSED BOARD ACTION**

Approval of a new Ph.D. program in Geosciences.

**BACKGROUND INFORMATION**

The Department of Geosciences in the Charles E. Schmidt College of Science proposes to offer advanced graduate training in a program leading to the degree of Doctor of Philosophy (Ph.D.) in Geosciences. A professionally oriented program, it will combine department specialties in geography and geology with other cognate areas in the College and the University. It will build upon successful undergraduate and master's degrees in geography and geology already offered through the department at FAU, and will provide advanced research and technical training to allow its graduates to find solutions to problems.

The proposed degree program will be an innovative professional degree which answers the call from employers in the South Florida area and throughout the state that have a growing need for highly trained individuals in advanced technology and field applications in the geosciences. A program that will be designed for both full-time and part-time students, it will bring educational opportunities to professional geoscientists in the South Florida region who are interested in combining geography, geology and cognate areas at an advanced graduate level and cannot abandon their current employment to pursue doctoral programs in other parts of the state. It will be the only advanced degree program in Florida with a combined geography/geology focus.

Local job markets are increasingly highly geared towards environmental analysis; planning due to the scarcity of water resources and water contamination; the problem of unsustainable management of natural resources; pollution; and the disintegration of ecological functions. The aim of the program is to provide professionals with the knowledge and skills necessary to contribute, directly and indirectly, to the conservation and prudent use of natural resources for the benefit of society, as this will foster independent scientific and technical research, not to mention comprehensive assessments on major environmental issues. These aims are imbedded in the goals set forth in both the BOG and FAU strategic plans.

## **IMPLEMENTATION PLAN/DATE**

Fall 2008

### **FISCAL IMPLICATIONS**

Initially, funding for this program will come from reallocation of E&G funds in the college and additional support from the Office of the Provost and the Charles E. Schmidt College of Science. Program growth will depend on external support through research grants and contracts throughout the development period, and on the allocation of new state funds in years 5 and beyond as the State of Florida and state university funding increases beyond the current contraction in base budget support. FAU is committed to this support as state support increases.

## Executive Summary: New Degree Proposal for the Ph.D. in Geosciences

### Introduction

The Department of Geosciences at Florida Atlantic University proposes to offer advanced graduate training in an on-campus program leading to the degree of Doctor of Philosophy (Ph.D.) in Geosciences with an implementation date of the 2008-2009 academic year. This *professionally oriented* program will combine department specialties in geography and geology with other cognate areas in the College and the University. The program will build upon successful undergraduate and master's degrees in geography and geology, already offered through the department at FAU, by integrating these two disciplines. The program will provide advanced research and technical training to allow its graduates to find *solutions* to problems especially in Florida. The doctorate will be an *integrated* program, whereas existing doctoral programs in the State of Florida related to this proposal are largely *discrete* (i.e. solely focused on either geography or geology) and are designed largely for the traditional academic career track. The proposed degree program will be an innovative *professionally oriented degree* which answers the call from employers in the South Florida area and throughout the state, such as the Florida Department of Environmental Protection, the South Florida Water Management District, Broward County and Palm Beach County Planning Agencies, the Army Corp of Engineers, the U.S. Geological Survey, Coastal Planning and Engineering, Inc. and a variety of other local agencies and environmental consulting firms that have a growing need for highly trained individuals in advanced technology and field applications in the geosciences. While the main focus of the degree will be on traditional, full-time students, the degree program will also welcome part-time students who wish to maintain their professional employment while earning their doctoral degree. Thus, the degree program also brings educational opportunities to professional geoscientists in the South Florida region who are interested in combining geography, geology and cognate areas at an advanced graduate level and cannot abandon their current employment or move from the South Florida area to pursue doctoral programs in other parts of the state.

The program will require students to complete 90 credit hours beyond the baccalaureate degree with a cumulative GPA of at least 3.0. The Department expects doctoral students in the program to specialize in one of the following areas:

**--GIScience.** Applied and theoretical research in spatial information technology, particularly reconstructing past environments and analyzing present environments utilizing satellite imagery, aerial photographs and archival research as well as extracting environmental information from advanced and specialized remote sensing imagery for mapping and modeling of vegetation, ecosystems and natural resources. This research area will combine coursework and faculty expertise in geography, geology, biology and urban and regional planning.

**--Hydrology and Water Resources.** Research in the areas of hydrology and water resources aimed at developing a more complete understanding of both surface and sub-surface processes and their practical applications, especially dealing with flow issues, supply issues and water quality. Studies also include coastal and wetland environments. This research area will combine coursework and faculty expertise in geology, geography, biology, civil and ocean engineering and chemistry.

**--Urban Development and Sustainability.** Research on urban land use change, urban environmental systems and urban economic development utilizing geographic information science and other spatial analysis tools to incorporate sustainable urban development in the subtropical environment of the everglades ecosystem. This research area will combine coursework and faculty expertise in geography, geology, biology and urban and regional planning.

**--Cultural and Spatial Ecology.** Research focused on the biogeography of natural ecosystems as well as ethnobotanical studies focused on the cultural variations in human uses and sustainability of plants. This research area will combine coursework and faculty expertise in geography, geology, anthropology and biology.

**--Marine Paleontology.** Research in marine paleontology, particularly molluscan paleoecology, leading to a better understanding of past oceanic environments and climates in both high and low latitude areas. This research area will combine coursework and faculty expertise in geology, geography, anthropology, and biology.

### **Program Delivery**

Most of the coursework for the proposed program will be traditional delivery courses on the Boca Raton campus. Students taking courses from the approved cognate list within the Urban and Regional Planning Department will take some traditional delivery courses at the Tower campus, where that program is housed. As the program grows, distance learning options shared with other FAU campuses, centers, and other private and public universities in Florida and beyond will be explored, including distance learning technologies shared with the Los Alamos National Lab in New Mexico as one of the special initiatives of the Charles E. Schmidt College of Science. The Department has already begun to foster the Los Alamos relationship. Also, our relationship with USGS is expected to grow along with the program, offering research and internship opportunities for both graduate and undergraduate students, as well as expanded teaching opportunities with USGS faculty as adjuncts or research faculty. The Department fully expects our relationship with the Harbor Branch Oceanographic Institute to grow and flourish and can certainly envision HBOI faculty participating in distance learning education in the program and dissertation committee work as the proposed degree program grows.

### **Impetus for the Proposal**

The lack of a combined geography/geology focus in other advanced degree programs in the State of Florida is of serious concern to the environmental professional community, as the letters of support included in the proposal strongly attest. What makes this integration even stronger is the combination of geography and geology with other specialties such as field biology, anthropology and urban and regional planning, thus creating true, well-rounded geoscientists. The professional community in South Florida is very excited about this integration and has argued that the degree will appeal to a wide audience. This is **NOT** yet another doctoral program in geography or geology being proposed in Florida, it is a *geosciences* doctoral program, which implies much more.

Demand for the proposed degree was gleaned by numerous discussions by the Chair of Geosciences with geoscience professionals in the South Florida area over the 2006-2007 planning year. This led to the creation of the Geosciences Professional Advisory Board which further fine-tuned the curriculum and the proposed degree program in general. The initial advisory board comprised of three highly accomplished geoscientists was appointed by the Dean of the Charles E. Schmidt College of Science to help oversee the planning of the program, and this group will make up the first professional members of the Geosciences Graduate Program Committee discussed in the proposal.

### **Institutional and State University System Missions:**

The proposed Ph.D. in Geosciences fits with the goals and mission statements of both the SUS (<http://www.flbog.org/StrategicResources/>) and Florida Atlantic University (<http://www.fau.edu/strategicplan/mission.php>; <http://www.fau.edu/strategicplan/goals.php>). The proposed offering of the degree has been formally presented to the FAU Board of Trustees by the Dean's office as an important special initiative of the Charles E. Schmidt College of Science.

The Ph.D. in Geosciences will complement and support the strategic goals of Florida Atlantic University (FAU) and the State University System (SUS). The four, broader goals set forth by the SUS include:

- GOAL 1: Access to and production of degrees,
- GOAL 2: Meeting statewide professional and workforce needs,
- GOAL 3: Building world-class academic programs and research capacity, and
- GOAL 4: Meeting community needs and fulfilling unique institutional responsibilities.

The 7 goals within the FAU Strategic Plan are

- GOAL 1: Providing increased access to higher education,
- GOAL 2: Meeting statewide professional and workforce needs,
- GOAL 3: Building world-class academic programs and research capacity,
- GOAL 4: Meeting community needs and fulfilling unique institutional responsibilities,
- GOAL 5: Building a state-of-the-art-information technology environment, and
- GOAL 6: Enhancing the physical environment,
- GOAL 7: Increasing the university's visibility.

As already discussed in the introduction section of this summary, the Ph.D. in Geosciences will not find itself in direct competition with other more traditional geography and geology doctorate programs in the state which are focused largely on traditional academic career tracks. The proposed degree program will be a professional degree (SUS Goal 2, FAU Goal 2) which answers the call from state and federal employers in the area, other local agencies and environmental consulting firms for more highly trained individuals in the geosciences. These entities have a growing need for a workforce trained in advanced technology and field applications in geosciences in order to study and solve various environmental problems in South Florida and beyond. The program will emphasize higher level *integration* of conventional disciplines such as geography, geology, and earth sciences with technical and field based

sciences, and will thus provide access to a different type of doctoral degree program not currently available in the state of Florida (SUS Goal 1, FAU Goal 1). The program will welcome part-time applicants from the geoscience professional community in South Florida, making advanced educational and research opportunities available to a wider constituency in the FAU service region (SUS Goal 1, FAU Goal 1).

Doctoral students from the program will specialize in hydrogeology/water resources, GIS/Remote Sensing technologies, or various areas within environmental analysis (such as paleoenvironments, coastal environments, biogeography, ethnobotany, and urban land-use change and sustainability). These areas emphasize skill sets that are required by local job markets, which address socio-economic concerns to scientific issues (e.g., weighing the costs and benefits of tourism to environmental protection). Thus, the program will make an important contribution towards FAU's strategic goal of committing academic and fiscal resources to meeting Florida's need for trained professionals in areas that implement advanced technologies, and help prepare students for emerging trends in the labor force in general (SUS Goals 2 and 4, FAU Goals 2 and 4). In this way, the department is demonstrating its commitment to recruiting and preparing students for professions vital to the sustainability of Florida.

The Department is at the forefront of geoscience research and technologies and encourages fieldwork and the attainment of skills in applied tools such as quantitative and theoretical techniques, geographic information systems, hydrologic modeling and remote sensing (FAU Goal 3). Students have the opportunity to be trained in specialized research facilities, such as the Geo-Information Science Center and the proposed Hydrology and Water Resources Center (SUS Goal 3). These centers provide services to a variety of clients, including the National Science Foundation, South Florida Water Management District, Florida Department of Environmental Protection, and various municipal agencies.

Inclusion of a Ph.D. in Geosciences will allow the Department, College and University to expand its graduate and overall research presence in environmental conservation and sustainability, and in the work associated with one of the world's largest environmental restoration projects (i.e., Comprehensive Everglades Restoration Plan - CERP), thus adding to the greater visibility of the university in the area of environmental research (FAU Goal 7). The program will meet community needs and fulfill unique institutional responsibilities in the seven-county service region (SUS Goal 4 and FAU Goal 4) by offering specialty programs to address local geoscience issues, such as coastal processes and water resource planning and restoration, and applied modeling. Local job markets are highly geared towards environmental analysis, contamination and planning due to the relative scarcity of water resources and water contamination; and the problem of unsustainable management of natural resources, which hampers human development and urbanization efforts. Pollution, the depletion of natural resources, and the disintegration of ecological functions are matters of local, regional and global concern. Economic development and more rigorous environmental standards not only in South Florida, but the world over contribute to the urgency of the offering of this doctoral program. The aim of the program is to provide professionals with the knowledge and skills necessary to contribute, directly or indirectly, to the conservation and prudent use of natural resources for the general benefit of society, as this will foster independent scientific and technical research, not to mention comprehensive assessments on major environmental issues.

### **Fiscal Implications**

With the recent faculty hires between 2005 and 2007, faculty staffing in the Department is adequate to initiate the program. No additional space, special equipment or library resources are needed to implement the program. It is important to note that most of the cost of implementing the program is merely reallocated dollars from current salary resources, therefore providing an important educational opportunity for FAU's service area at a very minimal additional cost. The new costs of implementing the program will be tied to graduate assistantships. The proposal calls for no new graduate assistantships, but merely the resources to convert master's level graduate assistantships to doctoral level assistantships.

The Department's graduate program will change in emphasis from the master's programs to the doctoral program as being the primary research degree in Geosciences. This is consistent with the College's outlined objectives in support of FAU's Strategic Plan and Goals, that is "*The Charles E. Schmidt College of Science will orient its graduate programs primarily to doctoral degrees.*"

There are no plans to abandon the master's programs, but to retool the master's programs towards professional or terminal degree programs geared towards developing specific job skills in geography and geology. We will encourage non-thesis work at the master's level and will combine doctoral and master's students in many graduate courses. Thus the major adjustment for the master's programs will be largely additional students (FTE) in graduate classes, and perhaps less opportunity for all but the highest caliber of master's students to do thesis work. Provision of assistantships will shift to doctoral students, but we anticipate that due to the increased research activity in the Department that the doctoral program will bring, there will be increased funded research opportunities for master's students as well as doctoral students. It is also important to note that the increase in stipend from master's to doctoral level in funding is more than compensated for by the fact that Ph.D. students are SACS-eligible to be responsible for courses for almost all of their period of support, while master's students are not. Therefore, these doctoral students will be able to replace adjuncts in lower level courses and create savings for the university by reducing adjunct costs.