Request to Plan a Doctoral Program in Integrated Biosciences at North Carolina Central University

Introduction

This is a request from North Carolina Central University for approval to plan a doctoral program in Integrated Biosciences (CIP 26.9999).

Program Description

This proposed program will be multidisciplinary and will utilize expertise and resources from the College of Science and Technology (CST), School of Library and Information Sciences (SLIS), the Julius L. Chambers Biomedical Biotechnology Research Institute (BBRI), and the Biomanufacturing Research Institute and Technology Enterprise (BRITE) partially funded by the Golden LEAF Foundation. The curriculum will include subject matter from the life sciences, mathematics, computation and information sciences, pharmaceutical sciences, and physical sciences.

The educational objectives are to prepare graduates who are qualified to:

(1) Design and conduct high quality multidisciplinary and translational research;
(2) Understand the relationships and values of multiple disciplines as they relate to their specific area of interest;
(3) Form collaborations and partnerships and work effectively as members of translational research teams;
(4) Contribute substantially to scientific discussions and inquiries related to research on health disparities and drug discovery; and,
(5) Serve as leaders in facilitating community-engaged research focused on health disparities.

The programmatic objectives of the Integrated Biosciences Ph.D. degree are to:

(1) Prepare the next generation of doctorally-trained biomedical scientists focused on health disparities and drug discovery research;
(2) Prepare students to investigate biologically relevant research questions through the mastery of physical, mathematical, computational, informational, and biological sciences; and,
(3) Enhance career opportunities for graduate students through the development of a multidisciplinary educational program focused in the integrated biological sciences.

During the last ten years, NCCU has made significant advances in strengthening its research activities by recruiting and hiring faculty and staff that have the credentials to conduct doctoral level mentoring and secure external funding for research grants and contracts. As of FY 2011, NCCU has approximately 30 principal or co-investigators with extramural funding engaged in research projects directly related to biomedical and pharmaceutical sciences.

The proposed doctoral program is also a product of North Carolina's investment and commitment to NCCU's research enterprise: BBRI (1998), Mary M. Townes Science Complex (2004), and BRITE (2006). The current research programs in BBRI focus on areas of health disparities: cancer, neuroscience, and cardio-metabolic disorders. NCCU has funding from the National Institutes of Health National Institute of Minority Health and Health Disparities (P20 Grant). NCCU scientists this year have been awarded approximately $24 million in sponsored research and programs; of that, $14.6 million is directly related to health disparities. The College of Science and Technology (CST) is housed in the Mary M. Townes Science Complex, which will serve as the academic home of the doctoral program. Its research efforts are concentrated in biomedical, pharmaceutical, computational, nanotechnology, and physical sciences. CST is also home to both the National Science Foundation (NSF)-funded Center for Research Excellence in Science and Technology (CREST) and the NASA Center for Aerospace Research and Education. The research programs in BRITE focus on drug discovery and biopharmaceuticals. As all of this information demonstrates, over the past decade NCCU has been aggressively expanding and strengthening its capabilities in the areas of science and technology, and as a result the institution is well positioned to offer its first doctoral program, the Ph.D. in Integrated Biosciences.

Research opportunities for students in the proposed program will be centralized in defined research disciplines — Cancer Biology, Neuroscience, Cardio-metabolic Biology, Developmental Biology, and Genomics. The major focus of the Integrated Biosciences program will be to elucidate the cellular, molecular, and genetic basis of health disparities in human disease and to investigate the associated targeted drug therapies.

A total of 38 credit hours of didactic course work will be required in the program. Of these, 16 credit hours will be core curricula and 16 credit hours dedicated to domain (major track) courses. In addition, six (6) hours of elective courses may be chosen from the non-domain list with advisor's permission. Students must complete a minimum of 32 credit hours of research and a minimum of two (2) credit hours of dissertation to fulfill the 72 credit-hour degree program.

In conjunction with current research strengths at NCCU, the program will have two tracks (or domains): the Biomedical Sciences Track and the Pharmaceutical Sciences Track.

UNC Tomorrow Relevance

This proposed program would address several Recommendations within the UNC Tomorrow Report including the components to enhance our Global Readiness (Recommendation 4.1.), Our Citizens and Their Future: Access to Higher Education (Recommendation 4.2), Our Communities and Their Economic Transformation (Recommendation 4.4), Our Health (Recommendation 4.5), and Our University's Outreach and Engagement (Recommendation 4.7).

Disciplinary Panel

The panel included faculty members from ASU, ECU, FSU, UNCA, UNCW, and WCU in addition to the NCCU faculty presenters. Panel members asked about NCCU's current external funding that might help support the proposed program and about the comparison of the proposed program to other bioscience degree programs in the state. Panel members discussed and agreed on the importance of recruiting under-represented minorities into biomedical research programs such as this proposed one.

Response
The campus provided satisfactory responses to the questions raised in the disciplinary panel. In FY 2009 and FY 2010 NCCU scientists exceeded $21 million in sponsored research and programs each year, while in the current FY 2011, NCCU scientists have been awarded approximately $24 million in extramural funding. This capability will be utilized to provide the research and financial base for the program. Concerning other degree programs in the state, ECU, NCSU, and UNCC each offer a biomedical or interdisciplinary biological doctoral program. NCCU discussed how the proposed Integrated Biosciences program is different from these programs, primarily because of its focus on developing biomedical and pharmaceutical Ph.D. scientists skilled in utilizing a systematic approach to investigate health disparities and to identify potential novel drug targets. Overall discussion of the proposed Ph.D. program was positive, with consensus on the desirability of offering this degree program.

Student Demand
The need for graduates from NCCU's Integrated Biosciences Ph.D. program is exemplified by the dearth of African-American scientists in biomedical research. For example, findings reported by Dr. Amri Johnson *(The Scientist*, November 7, 2005) showed that at the NIH intramural campuses - the federal institution charged by the US Congress with ending health disparities - African-American scientists comprised only 1% of tenured investigators and *1.5%* of tenure-track investigators.

In a recent report published by the National Science Foundation (NSF) entitled, *Women, Minorities, and Persons with Disabilities in Science and Engineering. 2011,* the number of under-represented minorities earning doctorates in the sciences and engineering have not increased during the years 2000-2008. While in 2008 African American men were *5.8%* and African American women were 6.4% of the population of the United States, they represented only 2% and 1%, respectively, of the workforce of scientists and engineers.

According to the *2010 NSF Survey of Earned Doctorates* in the biological and biomedical sciences, 192 (3%) African Americans, 312 (6%) Hispanics and 20 (0.4%) American Indians were awarded doctorates in 2008, in comparison to 3822 (74%) Whites and *599* (12%) Asians. These data all suggest that there is an urgent need to increase the number of minority doctorates in the STEM disciplines and biological/biomedical sciences.

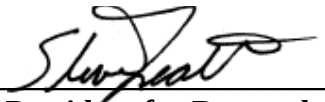
Opportunities for Graduates of the Program
The US Bureau of Labor Statistics projects strong demands in NCCU's proposed program areas, biomedical and pharmaceutical sciences, during the decade 2008-2018. This need is especially relevant to the pharmaceutical industry, an area pivotal to the economic vitality of North Carolina. NCCU believes an integrated biological sciences education will best prepare graduates for careers in emerging disciplines such as nanotechnology and health informatics. The Integrated Biosciences Ph.D. program will be designed to prepare competitive research scientists in the fields of biomedical and pharmaceutical sciences with emphasis on health disparities and drug discovery.

Resource Implications
In FY 2009 and FY 2010, NCCU scientists exceeded $21 million in sponsored research and programs each year. During the current FY 2011, NCCU scientists have been awarded approximately $24 million in external funding. The acquisition of these contracts and grants is a positive indication of NCCU's capacity to support a competitive doctoral program. This capability will be utilized to provide the research and financial base for the program. Therefore, NCCU is prepared to support the Ph.D. program with funding obtained through campus budget reallocations and from extramural sources.

The resource needs of a proposed doctoral program are typically specified more fully in the proposal for establishment. As an estimate to begin the program (based on the University funding formula), in the program's proposed first year of operation with eight full-time and no part-time students, the estimated cost to be provided by State funding would be approximately $183,000 if fully funded by the General Assembly. When the program is fully operational after four years, the program plans to enroll 20 full-time and no part-time students.

Recommendation
The staff of the General Administration recommends that the Board of Governors approve the request from North Carolina Central University to plan a doctoral program in Integrated Biosciences.

Approved to be Recommended for Planning to the Committee on Educational Planning, Policies, and Programs



Vice President for Research and Interim Vice President for Academic Planning **May 26, 2011**

General Information Template for Academic Program Review

Degree Area and Level:

Ph.D. in Integrated Biosciences (CIP 26.9999) at NCCU

Addressing UNC Tomorrow:

This proposed program would address several Recommendations within the UNC Tomorrow Report including the components to enhance our Global Readiness (Recommendation 4.1.), Our Citizens and Their Future: Access to Higher Education (Recommendation 4.2), Our Communities and Their Economic Transformation (Recommendation 4.4), and Our University's Outreach and Engagement (Recommendation 4.7).

Role of Program in Relation to State and Regional Needs:

According to the proposal, "The proposed new Ph.D. program is consistent with the mission of NCCU to provide professional development and access to under-represented minorities as well as first generation students. Further, the proposed Ph.D. program is well aligned with the University's Priority Areas (2) Enhancing the Academic Distinction and Distinctiveness of NCCU and (5) Teaching, Learning and Research. The proposed program will address issues of national and global health disparities. And will provide additional professional opportunities for residents of North Carolina and stimulate the state's economic landscape."

US Labor Department Analysis:

– *Summary* – Employment of biological scientists is projected to grow 9 percent over the 2006-16 decade, about as fast as the average for all occupations, as biotechnological research and development continues to drive job growth. The Federal Government funds much basic research and development, including many areas of medical research that relate to biological science. Recent budget increases at the National Institutes of Health have led to large increases in Federal basic research and development expenditures, with research grants growing both in number and dollar amount. Nevertheless, the increase in expenditures has slowed substantially and is not expected to match its past growth over the 2006-16 projection period. This may result in a highly competitive environment for winning and renewing research grants.
Source: http://www.occsupplydemand.org/OSD_UnitOfAnalysis.aspx?CLUSCODE=095A-15&ST=NC&PathNo=1

- *Summary Data* – N/A

Availability of Program Statewide (Enrollment and Degrees Awarded in Last 3 Years):

– *Public universities* – Not available
– *Private universities* – Not available

Available or not from Academic Common Market: Not available

NCCU Campus enrollment and degrees awarded in similar programs at the Doctoral level:
(Based on two CIP digits – 26 CIP is the summary group for Biological and Biomedical Sciences under which Integrated Biosciences is a program.) NCCU does not offer any Doctoral level programs in the 26 CIP category.

Campus Average of enrollment and degrees awarded in this degree area at the Doctoral level:
(Based on two CIP digits – 26 CIP is the summary group for Biological and Biomedical Sciences under which Integrated Biosciences is a program - over the last 3 Academic Years, Fall 2007-Fall 2010.)

Campus Average			
	Number of Active Programs	Enrollment per Semester	Degrees Awarded per Year
ECU	8	13	2
NCSU	13	20	4
UNC-CH	14	58	10
UNCC	1	28	5
UNCG	2	7	Programs approved in 2008 and 2010 – No graduates yet.
UNCW	1	14	2
Campus Average		23	5

NCCU Degree Programs added in the past three years:

- *Bachelor*
  - N/A
- *Master*
  - MM Jazz Studies (01/11/2008)
- *Doctoral*
  - N/A

NCCU Degree Programs discontinued in past three years:

- *Bachelor*
  - BA Art Education (02/11/2011)
  - BA English, Secondary Education (02/11/2011)
  - BS Mathematics, Secondary Education (02/11/2011)
  - BA Music Education (02/11/2011
  - BS Physical Education (02/11/2011)
  - BS Biology, Secondary Education (02/11/2011)
  - BS Chemistry, Secondary Education (02/11/2011)
  - BA Theatre Arts Education, K-12 (02/11/2011)
  - BA French, Secondary Education (02/11/2011)
  - BA History, Secondary Education (02/11/2011)
  - BS Physics, Secondary Education (02/11/2011)
  - BS Spanish, Secondary Education (02/11/2011)
- *Master*
  - MEd Special Education, Emotionally Handicapped (03/20/2009)
  - MEd Special Education, Mentally Handicapped (03/20/2009)
  - MEd Special Education, Learning Disabilities (03/20/2009)
  - MS Biology, Secondary Education (03/20/2009)
  - MS Physical Education (02/11/2011)
- *Doctoral*
  - N/A