

## **Request to Establish a Doctoral Program in Integrated Biosciences at North Carolina Central University**

### **Introduction**

Following a recommendation from the staff at UNC General Administration and from the Vice President for Research and Interim Vice President for Academic Planning, the Committee on Educational Planning, Policies, and Programs approved in June 2011 the request from North Carolina Central University to plan a doctoral program in Integrated Biosciences. North Carolina Central University now seeks approval to establish a doctoral program in Integrated Biosciences (CIP 26.9999) effective August 2012.

### **Program Description**

North Carolina Central University (NCCU) requests authorization to establish a Doctor of Philosophy (Ph.D.) program in Integrated Biosciences. The Ph.D. program specifically targets complex issues associated with the pervasiveness of diseases that contribute to an unequal health burden in underrepresented populations, known commonly as health disparities. This program will provide students from varying degree discipline backgrounds with a comprehensive approach to the study of health disparity issues.

This will be achieved through a core program which focuses solely on interdisciplinary health disparity research. Following completion of this integrated core training, students will then choose from one of two tracks (Biomedical Sciences or Pharmaceutical Sciences) in which to continue their studies and focus their research. The Biomedical Sciences concentration is designed for students with backgrounds and interests in biology, biochemistry, chemistry or related disciplines. The Pharmaceutical Sciences concentration is designed for students with backgrounds and interests in pharmaceutical sciences, pharmacology, biochemistry or related disciplines. All students will participate in a core curriculum consisting of an integrated approach to addressing health disparities in human diseases, responsible conduct of research, communication and problem solving, and research techniques. Students will also participate in health disparities research focused on cancer, neuroscience, and cardio-metabolic disorders as well as drug discovery and biopharmaceuticals. This program will prepare students to think critically and analytically and will prepare students to engage in collaborative multidisciplinary research. The program will be the first Integrated Biosciences Ph.D. program focusing on health disparities research and drug discovery in the State of North Carolina and among other Historically Black Colleges and Universities in the nation. This program is anticipated to begin in the 2012-2013 academic year.

NCCU is focusing on doctoral training in health disparities in order to address the overwhelming evidence from research data produced by the UNC Tomorrow Commission, National Institutes of Health, North Carolina Office of Minority Health and Health Disparities, North Carolina Health Disparities Initiative, and Centers for Disease Control and Prevention. Data show the strong need and demand on state, regional and national levels for biological research that can:

- lead to discovery of new drugs to prevent and eliminate disease;

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- promote better health among selected populations;
- be translated and be applied to health conditions that are more prevalent in disadvantaged communities; and,
- inform policy makers in their decisions to create policies that address health disparities.

The proposed Integrated Biosciences Ph.D. program will prepare researchers and scholars in biological and pharmaceutical sciences to address these needs. This proposed program 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.

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). In FY 2011, NCCU scientists were 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.

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 73 credit hours are required to complete the program. Of these, eight (8) credit hours will be core curricula and 14 credit hours will be dedicated to domain (major track) courses. In addition, eight (8) hours of elective courses may be chosen from the non-domain list with advisor's permission. Students must complete a minimum of 37 credit hours of research and a minimum of six (6) credit hours of dissertation in order to fulfill requirements of the program.

### **Educational Goals**

The educational goals of the program are to graduate students who will be able to:

- Design and conduct high quality multidisciplinary and translational research;
- Understand the relationships and values of multiple disciplines as they relate to their specific area of interest;
- Form collaborations and partnerships and work effectively as members of translational research teams;
- Contribute substantially to scientific discussions and inquiries related to research on health disparities and drug discovery;
- Serve as leaders in facilitating community-engaged research focused on health disparities; and
- Value the community and its contribution to solving health disparity

### **Program Review**

The review process is designed to identify strengths and weaknesses in proposed new degree programs. Proposals to establish new doctoral programs are reviewed both internally and externally. Major comments from the external reviewers are summarized below:

*External Reviewer #1: The reviewer stated that within the three areas of BRITE, BBRI, and CST, there are adequate facilities, resources, and a critical mass of research-oriented faculty to support a biosciences doctoral program whose focus is health disparities. The reviewer agreed that the curriculum is appropriate for the degree level and further mentioned that the program has an excellent chance to attract good students locally, nationally, and internationally. The reviewer cautioned that stipend compensation and benefit levels must be competitive for the program to be successful, and noted that the proposal did not directly address these issues. The reviewer also questioned the clarity of the organizational leadership structure of the proposed doctoral program.*

*External Reviewer #2: The reviewer stated the available research laboratory facilities are equipped well and that the curriculum appears sound and adequate for the degree level. The reviewer noted that the employment potential of program graduates is high and that the program faculty members are demonstrating a sufficient amount of research productivity. This reviewer also noted that student stipend and benefit amounts must be set at a competitive level in order for the program to succeed.*

### **Graduate Council**

As a basis for its consideration, the Graduate Council had the proposal to establish the program, copies of the two outside reviewer's comments, and a presentation to the Council by representatives of the program. In addition to some discussion of the issues raised previously, the following concerns/questions were expressed by Council members: recent changes made reducing the hours in the core curriculum of the program, the need for this degree program, and how the program would be supported if enrollment growth funding should not be available.

**Response**

Representatives of the program reviewed the development of the Integrated Biosciences program at NCCU and responded to the external reviewers and the issues raised by members of the Graduate Council. Chancellor Nelms discussed how originally NCCU was considering four separate doctoral programs, and under his guidance the campus decided to offer only one Integrated Biosciences program that focused on the two key areas of Biomedical Sciences and Pharmaceutical Sciences.

Representatives presented the program's plans for supporting its doctoral students. All students will receive an annual stipend of \$30,000 in addition to all tuition, fees, and benefits being paid. Following a common model for doctoral programs in the sciences, student support funding for the first two years will be paid from campus funds, while faculty research grants will be the source of the support funding for the third and later years.

Addressing the organizational leadership structure of the proposed doctoral program, NCCU explained that the Director of the program will report to the Dean of the College of Science and Technology (CST) and will actively communicate with the department chairs of the departments participating in the program. All faculty members participating in the program will continue to report to their department chair, and will be reviewed under their department's annual faculty evaluation process and guidelines.

NCCU, in response to their own external consultant's recommendations, recently decided to reduce the number of total required hours in the program from 81 to 73. This reduction will be accomplished by reducing the number of hours in the core curriculum from 16 to 8. Students will continue to receive the same amount of content under this new arrangement, but in a form and format different from a required course. For example, certain topics such as ethics will now be presented in required non-credit workshops, and laboratory rotations to introduce students to different research methodologies in the biosciences will be part of the required research courses instead of a required core course.

The Graduate Council discussed the need for this new doctoral program, and NC State University and other campuses expressed agreement that this proposed program will address a real need in North Carolina and the region.

North Carolina Central University's response to the budget questions is summarized in the "Resources" section below.

**Need for the Program**

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.

### **Resources**

At the Graduate Council meeting, Chancellor Nelms confirmed NCCU's commitment of institutional budgetary support for the proposed program. In FY 2009 and FY 2010 NCCU scientists exceeded \$21 million in sponsored research and programs each year, while in FY 2011, NCCU scientists were awarded approximately \$24 million in external funding. This extramural funding capability will be utilized to contribute to the research and financial base of the program.

Facilities, equipment, and faculty are the primary resources needed for this program and NCCU has these in place. The laboratory facilities are complete and equipped. NCCU is prepared to implement the Ph.D. program with funding obtained through campus budget reallocations and from extramural sources if enrollment growth funding should not be available.

Based on the University funding formula, when the program reaches projected full enrollment of 20 full-time students after five years, NCCU would receive additional state appropriations of approximately \$447,000 if fully funded by the General Assembly.

### **Recommendation by the Graduate Council**

After consideration of the issues raised by the external reviewers and Council members, the Graduate Council voted, without dissent, to recommend approval for North Carolina Central University to establish a doctoral program in Integrated Biosciences.

### **Recommendation**

The staff of the General Administration recommends that the Board of Governors approve the request from North Carolina Central University to establish a doctoral program in Integrated Biosciences effective August 2012 subject to the availability of funding.

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

## **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](http://www.occsupplydemand.org/OSD_UnitOfAnalysis.aspx?CLUSCODE=095A-15&ST=NC&PathNo=1)

### ***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.)*

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<b>Campus Average</b>			
	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