

**Request for Authorization to Establish a  
Master of Science (M.S.) in Biomedical Engineering (CIP 14.0501) at  
East Carolina University**

**I. Program Highlights**

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- 32 credit hours
- Opportunity for advanced undergraduates to pursue integrated bachelor's/master's starting junior year
- 20 full-time, 4 part-time students projected at steady state
- Start-up costs include salary and benefits for four FTE (including faculty, postdoctoral associates, lab assistant and administrative assistant), graduate stipends, supplies and materials, and some travel, contracts and equipment.

**II. BOG Academic Program Planning Criteria (UNC Policy 400.1)**

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- 1. Existing Programs (Number, Location, Mode of Delivery).** Three master's level programs exist across the system in CIP 14.0501 (Biomedical Engineering), two of which are the components of the Master of Science (M.S.) in Biomedical Engineering offered jointly between NC State University and UNC Chapel Hill. The joint program is delivered face-to-face. The other is NC A&T State's M.S. in Bioengineering, established in 2010, also a face-to-face program conducted in close collaboration with the partners and activities of NC A&T's NSF Engineering Research Center on metallic biomaterials. Duke University and Wake Forest University also offer bioengineering programs at the graduate level.
- 2. Relation to Campus Distinctiveness and Mission.** ECU offers academic programming in engineering, medicine, dentistry, nursing, allied health and business on one campus. The proposed program aligns with key components of the campus mission to serve through education, to serve through research and creative activity, and to serve through leadership and partnership. The proposed program also aligns with elements of the strategic plan, ECU Tomorrow, such as developing programs that respond to changing demands of the twenty-first century economy, investing in programs that will develop a competitive workforce for North Carolina, expanding research in biomedical and health sciences, and investing in resulting innovations that emphasize physical health of our citizens.
- 3. Demand (Local, regional, state).** The US Department of Labor reports that, unlike many other engineering disciplines, a graduate degree is required for many entry-level positions in biomedical engineering. The National Science Foundation notes biomedical engineering graduate programs among the fastest growing science and engineering fields, increasing from 3,200 to 8,500 graduate students between 2000 and 2010. Existing biomedical engineering programs in North Carolina accept 15-24% of qualified applicants to their respective degree programs. ECU's bachelor of science program in engineering, enrolling approximately 500 undergraduates, has offered a concentration in biomedical engineering since 2009-2010. The first ECU graduating class with the biomedical concentration graduated in 2011, and 33% of them have pursued graduate degrees, including at NC State University and Wake Forest University. Concentration enrollments doubled from 10 in 2009 to 20 in 2012. Approximately

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34% of ECU's entering class of engineering undergraduates in 2012 indicated an interest in the biomedical engineering concentration. These students are anticipated to be a key pipeline for the proposed program.

- 4. Potential for Unnecessary Duplication.** The majority of applicants are expected to be from Eastern North Carolina and surrounding regions, therefore providing access in an area unserved by current face-to-face programs.
- 5. Employment Opportunities for Graduates.** According to the US Department of Labor, the number of biomedical engineering jobs is expected to increase much faster than the average for all other occupations, specifically by 62% from 2008-2018. The Labor Market Information Division of the Employment Security Commission of North Carolina lists biomedical engineering as the fastest growing occupation in the state with a 77% predicted increase from 2008-2018. Recent searches for biomedical engineering on Monster.com showed that 30% of jobs advertised required a master's degree. Local and regional industry, clinical and academic partners that serve on ECU's Engineering Advisory Board provided support letters noting known employment opportunities for biomedical engineering professionals and proposed program graduates.
- 6. Faculty Quality and Number.** The program will engage ten faculty from the Department of Engineering, as well as nine joint faculty from disciplines including dental medicine, cardiovascular sciences, bioethics and interdisciplinary studies, nursing, physical therapy, kinesiology and physics. Of note is the 2012 induction of a core faculty member in the National Academy of Inventors.
- 7. Availability of Campus Resources (library, space, etc.).** No new library resources, facilities, or information technology infrastructure and services are needed to launch the program.
- 8. Relevant Lower-level and Cognate Programs.** The majority of applicants are expected to be from Eastern North Carolina and surrounding regions. Applicants with an undergraduate degree in engineering and meeting other requirements are eligible for unconditional admission. Applicants from disciplines other than engineering may find it necessary to complete prerequisites and will be eligible for provisional admission. Advanced undergraduates may also apply for an integrated bachelor's/master's program in the junior year.
- 9. Impact on Access and Affordability.** Addition of the program would provide access in an area of the state not currently served by existing programs.
- 10. Expected Quality.** The strategic plan of the College of Technology and Computer Science, home to the Department of Engineering, targets growth of the undergraduate engineering program from 500 to 750 students in the next 4-5 years. Therefore, the institution is positioned to invest in and support growth in this area.
- 11. Feasibility of Collaborative Program.** The proposed program is a highly collaborative endeavor that spans the resources and expertise resident in seven partnering units within ECU. The program will encourage and allow up to 6 hours of transfer credit for students interested in supplementing the ECU curriculum with courses available at other UNC institutions. The joint program between NC State and UNC Chapel Hill is particularly interested in the ECU master's

program serving as a pipeline into their doctoral program offerings. The joint program also plans to establish a video broadcast of its graduate biomedical engineering seminar series to ECU which is anticipated to promote additional video broadcast courses.

**12. Other Considerations.** None.

**III. Summary of Review Processes**

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**Campus Review Process and Feedback.** The proposed program was reviewed and approved by faculty and administrative committees at the department, college/school, and university levels in accordance with the current ECU Faculty Manual. All committees approved the proposal without dissent or opposition expressed. The proposal was strengthened at various stages of campus review to address issues such as comparison of credit hours with other similar programs; greater emphasis on state and regional employment demand; clarification on applicant pool and impact on assistantships; source of assistantships; faculty teaching loads; emphasis on track record with biomedical device development; and others.

**UNC General Administration Review Process and Feedback.** Prior to UNC Graduate Council review, ECU responded to questions from UNC General Administration staff on demand evidence, collaborative opportunities, program administration, and resource needs. The proposal was then reviewed by twenty-five faculty and graduate program administrators from seven UNC campuses. Reviews consistently noted strong program alignment with ECU's mission and represents strong collaboration between units in ECU and between ECU and industry. All reviews found faculty sufficiency to be acceptable with exception of one review that questioned this as well as administrative structure for the program (with no biomedical engineering department). ECU responded that of the 24 existing FTE faculty in the Department of Engineering, ten faculty currently support the undergraduate biomedical engineering concentration and will continue their engagement at the master's level. Four of those faculty have primary research interests in biomedical engineering. Strategic new faculty hires in the Department include individuals with experience in biomedical imaging, biomedical signal processing, and biomechanics and fluid dynamics. ECU noted that the current administrative structure works to support the undergraduate program and collaboration across the partnering units. The structure would continue to be monitored to ensure effective program delivery and support upon implementation of the master's program. Several reviews recognized the current plan to support student assistantships is dependent upon extramural funding and that a contingency plan was needed should anticipated extramural funds not be awarded. ECU reported that the Division of Research and Graduate Studies has committed to support graduate assistantships to the amount of \$100,000 per year, phasing in the support over the first two years of the proposed program. Program faculty have been successful in securing funds for undergraduate research from NSF and others and anticipate continued success in obtaining external support for graduate-level research and educational objectives.

Benefits of program approval include new capacity to meet demand in a growing field and that is not currently met by existing programs. NC State's College of Engineering provided a letter of support for the proposed program, and both UNC Chapel Hill and NC State reviews received through the UNC Graduate Council process unequivocally supported the program. For these reasons, we do not recommend any alternatives to implementing the degree program. The

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commitment by the Division of Research and Graduate Studies to provide assistantship support addresses the main potential weakness of this proposed program. Extramural funds to support additional students should and will be additionally sought. As already noted, the Department of Engineering, currently named to administer the program, may find with their campus partners that new or different organizational structures are needed to sustain the collaborative and communicative network required.

### **IV. Recommendation**

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It is recommended that the Board of Governors approve University of North Carolina at Chapel Hill's request to establish a Master of Science (M.S.) in Biomedical Engineering degree program (CIP 14.0501) effective April 2014 for fall 2014 admissions.

**Request for Authorization to Establish a  
Master of Professional Science (M.P.S.) in Toxicology (CIP 26.1004) at  
University of North Carolina at Chapel Hill**

**I. Program Highlights**

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- 42 credit hours
- Core science courses, toxicology seminars, and professional skills courses
- Industry practicum and capstone project required (for all Professional Science Master's programs)
- 14 full-time, 3-6 part-time students projected at steady state
- Minimal start-up costs include partial salary and benefits for PSM Director, salary for adjunct instruction of professional skills courses, some supplies and advertising.

**II. BOG Academic Program Planning Criteria (UNC Policy 400.1)**

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- 1. Existing Programs (Number, Location, Mode of Delivery).** UNC Chapel Hill and North Carolina State University both have non-terminal master's level toxicology degree programs (CIP 26.1004) in place that do not directly admit students but are vehicles to award a master's degree, when appropriate, to students who must exit the PhD programs in toxicology. North Carolina State University offers a Professional Science Master's in Environmental Assessment, which includes some instruction in toxicology and is delivered online. The proposed UNC Chapel Hill program will be delivered face-to-face and, building on institutional strengths, would emphasize toxicological effects in human health.
- 2. Relation to Campus Distinctiveness and Mission.** UNC Chapel Hill's 2011 Academic Plan emphasizes interdisciplinary teaching and scholarship as a key strategic aim. The proposed program would be delivered through the existing Curriculum in Toxicology, which is highly interdisciplinary and collaborative between UNC Chapel Hill's School of Medicine, Gillings School of Global Public Health, and Eshelman School of Pharmacy. The program will also cooperate with established investigators at NIEHS, US EPA, the Hamner Institutes and others.
- 3. Demand (Local, regional, state).** The proposed program will target applicants interested in full-time training and short time-to-degree. Enrollment projections were conservatively based on inquiries received to date. The high demand for Professional Science Master's programs in general, however, is another indicator of student demand. In 2012-2013, the 18 PSM programs in NC drew 3,680 applicants and admitted 1,381 students. While the program differs in delivery mode and toxicological areas of emphasis, NC State's Environmental Assessment program's success in attracting applicants is also indicative of the strength of the potential applicant pool for the proposed program; NC State has received 147 applications in three years.
- 4. Potential for Unnecessary Duplication.** The proposed program and the NC State Environmental Assessment master's program differ substantially in instructional approach and potential applicants served.

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- 5. Employment Opportunities for Graduates.** A 2013 report of the NC Biotechnology Center shows our state ranks third in the nation in number of biotechnology companies, with over 500 companies employing more than 58,000 people. These companies are potential sites for internships, as well as future employers, of graduates of the proposed program. At the time of proposal, CareerBuilder, Glassdoor, Monster, and Careerjet each listed over 100 positions that program graduates would be qualified to fill. At the time of proposal, the Society of Toxicology listed 20 active postings (48% of all postings) for which graduates of the proposed program would be competitive, including positions of health scientist, product safety specialist, regulatory toxicologist, toxicology manager, and ingredient safety manager. External Advisory Committee members from GlaxoSmithKline and Syngenta also provided support letters indicating program graduates would qualify for upcoming open positions in their companies.
- 6. Faculty Quality and Number.** The UNC Chapel Hill Curriculum in Toxicology includes eighteen faculty, all currently participating in the PhD program in toxicology. Professional skills courses and seminars would be taught by experienced professionals including speakers from academia but also toxicologists working in non-academic settings.
- 7. Availability of Campus Resources (library, space, etc.).** No new library resources, facilities, or information technology infrastructure and services are needed to launch the program.
- 8. Relevant Lower-level and Cognate Programs.** Applicants are anticipated to hold bachelor's degrees in biology, biochemistry or chemistry. A pre-requisite course in biochemistry will be needed for successful completion of the proposed graduate courses and can be taken at UNC Chapel Hill. The program is expected to attract new bachelor's degree recipients as well as entry-level professionals already employed by industry in the Research Triangle Park.
- 9. Impact on Access and Affordability.** The addition of the program will provide access to early-career professionals in the Triangle area who are not seeking an online degree experience. The program is seeking an \$8,000 per student per year differential tuition amount, which was determined to be consistent with tuition charged for other Professional Science Master's programs nationwide and with existing professional graduate degree programs at UNC Chapel Hill. One national survey from 2011-2012 reported entry-level (3-5 years of experience) master's degree holders in toxicology had a mean salary of \$99,000 and median of \$110,000.
- 10. Expected Quality.** The program has buy-in and support of industry partners in the Research Triangle.
- 11. Feasibility of Collaborative Program.** The proposed program is a highly collaborative endeavor that spans the resources and expertise resident in three partnering schools within UNC Chapel Hill. UNC Chapel Hill, NC State and others already partner through statewide events such as the Careers in Toxicology workshop. UNC Chapel Hill plans to collaborate with NC State's Environmental Assessment program in delivery of its seminar series and professional skills courses. Specifically, NCSU faculty and program contacts could participate as presenters in the seminar series through use of real-time videoconferencing with option to tape and archive presentations for a wider distribution.
- 12. Other Considerations.** *Our Time Our Future* identifies Professional Science Master's programs, which meet identified industry needs, as an area of targeted growth in graduate education.

### III. Summary of Review Processes

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**Campus Review Process and Feedback.** UNC Chapel Hill follows a two-stage review similar to the system requests to plan and to establish; therefore, the proposed program was reviewed and approved twice by the faculty bodies and deans office of the academic sponsor (School of Medicine), the Graduate School, Provost, and Chancellor. All reviews for the program were favorable. No opposition was stated against the proposal. The campus review process allows for the Provost or Chancellor to forward new degree proposals to the Faculty Council for further discussion if warranted, but that step was not deemed necessary in this case. Throughout the two-stage review process, the proposal was strengthened to include additional detail about industry ties and structure of the PSM Advisory Board, to confirm curricular structures and degree requirements, to clarify the administrative support of the Graduate School and budget needs, to detail collaborative efforts with other toxicology-related degree programs in the state, and to provide market data related to student demand and employment prospects.

**UNC General Administration Review Process and Feedback.** Prior to UNC Graduate Council review, UNC Chapel Hill responded to questions from UNC General Administration staff on demand evidence, collaborative opportunities, and resource needs. The proposal was then reviewed by twenty-three faculty and graduate program administrators from seven UNC campuses. Reviews consistently noted strong program alignment with UNC Chapel Hill's mission and the potential to leverage local business relationships. With one exception, reviews in all categories were either "acceptable" or "acceptable with some considerations." The review of "not acceptable unless significant deficiencies are addressed" was received regarding the demand evidence presented and that it was too generic to PSMs and not specific enough to the demand for toxicology program graduates. UNC Chapel Hill provided information from the Bureau of Labor Statistics, where toxicologists are included in the "Medical Scientists, except Epidemiologists" category projected to experience 13.3% growth from 2012-2022 (355,000 new job openings nationwide). NC Department of Commerce sources ([www.ncworks.com](http://www.ncworks.com)) also returned dozens of open positions such as Toxicologist Manager, Environmental Exposure Scientist, Laboratory Sales Manager-Toxicology, and others. UNC Chapel Hill noted that skill sets for these positions included "excellent project management and teamwork skills" and "excellent interpersonal, written/oral communication and presentation skills," which are the types of professional skills developed through PSM programs. The bulk of UNC Graduate Council review comments were regarding the curriculum design and delivery, specifically about structure of the seminar series, the biochemistry course as an admission requirement, and use of adjuncts to deliver the professional development courses. UNC Chapel Hill provided the detailed course description for the seminar series, which is moving through campus approvals. They also clarified that professional skills courses provided through the PSM Office are intended to serve students enrolled in different MPS tracks planned and will provide broad exposure to skills adaptable to a variety of job settings.

Benefits of program approval include addition of an industry-responsive program that leverages collaboratively the toxicological expertise across UNC Chapel Hill. The director of the NC State Environmental Assessment program provided a letter of support for the proposal. For these reasons, we do not recommend any alternatives to implementing the degree program. UNC Chapel Hill anticipates that the proposed degree program will not impact applications to its PhD

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program but should monitor enrollment trends and impact of the new program on other degree program enrollments. While the UNC Graduate School has committed some of the resources necessary for implementation in the first years, the differential tuition is required to launch and sustain the program. In the event that the differential tuition request is not approved, UNC Chapel Hill has indicated that the program will not be implemented.

### **IV. Recommendation**

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It is recommended that the Board of Governors approve University of North Carolina at Chapel Hill's request to establish a Master of Professional Science (M.P.S.) in Toxicology degree program (CIP 26.1004) effective April 2014 for fall 2014 admissions.



**Request for Authorization to Establish a  
Bachelor of Science in Healthcare Administration at  
Fayetteville State University**

Fayetteville State University requests authorization to establish a Bachelor of Science in Healthcare Administration degree program (CIP 51.0701).

**I. Program Highlights**

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- Currently offered as a Concentration in Healthcare Management in the B.S. in Business Administration degree program
- Curriculum follows guidelines of the Association of University Programs in Healthcare Administration (AUPHA) and American College of Healthcare Executives (ACHE); program will pursue AUPHA certification upon BOG approval
- 121 semester credit hours
- 100 full-time, 30 part-time students projected at steady state
- Because this is currently a fully operating program as a Concentration (with 82 majors), there are no additional funding resources needed to implement the new degree.

**II. BOG Academic Program Planning Criteria (UNC Policy 400.1)**

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- 1. Existing Programs (Number, Location, Mode of Delivery).** Four baccalaureate programs exist in CIP 51.0701 (Healthcare Administration): Appalachian State University's B.S. in Healthcare Management, East Carolina University's B.S. in Health Services Management, UNC Chapel Hill's B.S. in Public Health in Health Policy and Management, and Winston-Salem State University's B.S. in Health Care Management. ECU's program is offered completely online.
- 2. Relation to Campus Distinctiveness and Mission.** Nationally, there is a recognized lack of minorities and women among health care managers: minorities currently account for 15% of managerial positions in healthcare, while only 2% of senior leadership in healthcare management is nonwhite. FSU, as an HBCU, is well-positioned to respond to this need. FSU also serves the largest percentage of military students in the UNC System, and programs such as the one proposed are attractive to military students because of national applicability and national employment opportunities.
- 3. Demand (Local, regional, state).** Enrollment in Healthcare Administration programs within the UNC System is increasing: For the three existing Bachelor of Science programs in CIP 51.0701, enrollment has increased by 107 students (47%) from Fall 2008 to Fall 2012. In addition, the Concentration in Healthcare Management is currently the most rapidly growing program in the School of Business and Economics at FSU, with enrollment increasing continuously by 35 students (74%) to 82 majors from Fall 2009 to Fall 2013. Furthermore, there is a separate Healthcare Management minor at FSU enrolling an additional 45 students.
- 4. Potential for Unnecessary Duplication.** If this proposal is approved, there would be similarities among four of the five baccalaureate programs (ASU, ECU, UNC-CH, FSU) because of their

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meeting the national certification standards of AUPHA (Association of University Programs in Healthcare Administration) for disciplinary content. A distinguishing feature of FSU's accredited program would be its emphasis on educating ethnically diverse healthcare managers, and addressing the local needs of military students. Four campuses responded to the system-wide survey reviewing the proposal (ASU, ECU, NCA&T State, and NCSU); all supported establishment of the proposed program, and none raised the issue of unnecessary duplication.

- 5. Employment Opportunities for Graduates.** In North Carolina:
  - Employment of medical and health services managers is projected to grow 23 percent from 2012 to 2022, much faster than the average for all occupations
  - The median annual wage for medical and health services managers was \$88,580 in May 2012
  - In terms of jobs available, there were 499 job openings advertised online in North Carolina for Medical and Health Services Managers on February 08, 2014. There were also 14,892 job openings advertised online for the related occupation group of Management Occupations in North Carolina on February 08, 2014
  - Most medical and health services managers have at least a bachelor's degree before entering the field
- 6. Faculty Quality and Number.** Three full-time faculty members are currently supporting the existing Concentration in Healthcare Management. Three qualified adjunct faculty members provide additional resources as needed. The number and quality of faculty designated for the program is consistent with the related guidelines of AUPHA.
- 7. Availability of Campus Resources (library, space, etc.).** Existing resources are adequate; no new library resources, facilities, or information technology infrastructure and services are needed to implement the program.
- 8. Relevant Lower-level and Cognate Programs.** The core curriculum (general education) at Fayetteville State University has recently been revised and strengthened with a realignment of core learning outcomes with required and certified core courses, representing seven key categories. Implementation of the resulting changes began in 2012. Of note and perhaps particularly relevant to healthcare was the addition of an ethics and civic engagement requirement.
- 9. Impact on Access and Affordability.** The proposed program will provide access for both full- and part-time students, including military students. Geographically, the closest competing programs are at Methodist University and Campbell University, both private institutions with much higher tuition than FSU.
- 10. Expected Quality.** The curriculum, campus resources, and the number and quality of faculty designated for the program meet the related guidelines of the national certification agency AUPHA. In addition, FSU engaged two knowledgeable external reviewers as part of its program planning process; both reviewers rated the proposed program positively in written response.
- 11. Feasibility of Collaborative Program.** FSU states that all faculty members within the proposed program are keenly interested in the development or facilitation of shared courses with other AUPHA-certified UNC programs and understand that such endeavors have the potential to strengthen program offerings. Upon approval of this program, the Program Director will initiate

discussion to explore potential opportunities. Logical initial collaborative efforts might include areas for which FSU does not currently have specialized faculty (such as long term care administration).

- 12. Other Considerations.** An additional curriculum modification coupled with this proposed degree program is the addition at FSU of an interdisciplinary Health Information Technology Minor, which combines the healthcare administration and information technology disciplines. Health Information Technology is currently a popular area of study.

### III. Summary of Review Processes

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**Campus Review Process and Feedback.** The Request for Authorization to Establish a Bachelor of Science in Healthcare Administration was reviewed by the following campus entities: The Department of Management Curriculum Committee, The Chair of the Department of Management, The School of Business and Economics Curriculum Committee, The Dean of the School of Business and Economics, The Faculty Senate Academic Affairs Committee, The Chair of the Faculty Senate, The Provost/Vice Chancellor for Academic Affairs and the Chancellor. Other than minor editorial changes, all reviewers unanimously approved the Request for Authorization to Establish.

**UNC General Administration Review Process and Feedback.** After submitting the Request to Establish a Bachelor of Science in Healthcare Administration, Fayetteville State University responded to questions from UNC General Administration staff on student demand, evidence of societal demand and employability of graduates, and funding of the proposed program. Highlights of FSU's response are included in this summary.

Five individuals from four campuses (ASU, ECU, NCA&T State, and NCSU) responded to the system-wide survey reviewing the Request to Establish proposal. All were supportive of the new degree program; questions raised involved faculty teaching loads in the proposed program, request for additional information on collaboration opportunities with existing UNC degree programs, and expenses involved with pursuing AUPHA certification. FSU responded to these issues to UNC-GA, and highlights of FSU's response are included in this summary.

Current enrollment numbers demonstrate student demand at Fayetteville State University, and evidence exists for the employability of graduates of the proposed degree program. Quality is indicated by the fact that the curriculum follows guidelines of the Association of University Programs in Healthcare Administration (AUPHA) and American College of Healthcare Executives (ACHE); further, the program will pursue AUPHA certification upon BOG approval. Because this is currently a fully operating program as a Concentration (with 82 majors), there are no additional funding resources needed to implement the new degree. (The primary one-time expenses involved in creating the program, which FSU plans to address with Title III funds, will be related to achieving initial AUPHA certification.) FSU has committed in writing that if enrollment growth funding is not available, resources will be reallocated from low-producing programs to support growth in the new proposed program.

**IV. Recommendation**

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It is recommended that the Board of Governors approve Fayetteville State University's request to establish a Bachelor of Science in Healthcare Administration degree program (CIP 51.0701) effective April 2014.