Request for Authorization to Establish a Bachelor of Science in Bioengineering at NC A&T State University

NC A&T State University requests authorization to establish a Bachelor of Science in Bioengineering degree (CIP 14.0501).

Program Description

NCA&T, in partnership with the University of Pittsburg and the University of Cincinnati, has been awarded a National Science Foundation (NSF) Engineering Research Center (ERC) on metallic biomaterials. Undergraduate bioengineering students will have the opportunity to work in the laboratories of faculty associated with the ERC at the three institutions. The electives and concentration areas will be developed based on the knowledge required to perform state-of-the-art research in areas such as biomaterials and biocompatibility, tissue engineering and regenerative medicine, and nanoscience and nanofabrication. The capstone senior design course will focus on one of the four areas of biodegradable materials, biofunctional surface modifications, active biosensors, and controlled release.

UNC Tomorrow Relevance

This degree program addresses several recommendations in the UNC Tomorrow Final Report including 4.1 Our Global Readiness, 4.4 Our Communities and Their Economic Transformation, 4.5 Our Health, and 4.7 Our University's Outreach and Engagement.

Highlights from UNC-GA Data Template

Job growth in this field will be much faster than the national average for occupations. NCSU has a BS in Biomedical Engineering degree. In the last three years, NCA&T has added one baccalaureate, one master's, and one doctoral program and has discontinued four baccalaureate and three master's programs.

Outcome of Consultation with Disciplinary Panel

Faculty from ECU, NCSU, and UNC-Chapel Hill participated in the panel discussion with NCA&T and UNC-GA representatives. Topics discussed included relationship of the proposed program to related graduate programs that NCA&T is implementing, coordination with the other campuses involved with the ERC grant, and sharing courses with NCSU and UNC-Chapel Hill. Panel participants were supportive of the proposed degree.

Student Demand

Over the last ten years, bioengineering has been the fastest growing discipline in engineering, and there are generally substantial enrollments in NCA&T's other

baccalaureate engineering programs. The program projects full enrollment of the program in its fourth year will be 150 students. Assuming that 70 percent of the enrollments would be students already enrolled at NCA&TSU and 30 percent would be new students coming specifically for this major, this would mean 45 new students at NCA&TSU.

Opportunities for Graduates of the Program

Bioengineers are expected to have 21 percent employment growth over the decade. The aging of the population and the focus on health issues will drive demand for better medical devices and equipment designed by bioengineers. Along with the demand for more sophisticated medical equipment and procedures, an increased concern for cost-effectiveness will boost demand for bioengineers, particularly in the pharmaceutical manufacturing and related industries.

Resource Implications

Resource needs: Over a period of several years, ten new faculty positions will be needed to support growth in the baccalaureate, master's, and doctoral programs.

Resources allocated: Funds for the above positions have been allocated by the University. The Engineering Research Center grant will bring direct federal funding of about $40 million over 10 years. NCA&T has established a variety of state-of-the-art facilities including high performance computing systems, a scientific visualization laboratory, the Center for Advanced Materials and Smart Structures, and a number of other laboratories and facilities.

Estimated cost to the State: Based on the University funding formula, when the program reaches full enrollment, NCA&TSU would receive additional State appropriations of approximately $835,530 if fully funded by the General Assembly.

Recommendation

It is recommended that the Board of Governors approve NCA&TSU's request to establish a Bachelor of Science in Bioengineering degree (CIP 14.0501) subject to the availability of funding.

General Information Template for Academic Program Review

Degree Area and Level:

Bachelor of Science in Bioengineering at North Carolina A&T State University (CIP 14.0501)

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 Communities and Their Economic Transformation (Recommendation 4.4), Our Health (Recommendation 4.5), Our University's Outreach and Engagement (Recommendation 4.7).

Role of Program in Relation to State and Regional Needs:

According to the proposal this degree program, "responds to the need for biomedical engineering graduates. Over the last ten years, biomedical engineering has been the fastest growing discipline in engineering. Enrollment data from the American Association of Engineering Societies clearly shows that the undergraduate and graduate enrollment in biomedical engineering program in the United States has tripled in the last ten years, compared to a relatively negligible growth in cumulative enrollment in other engineering disciplines."

US Labor Department Analysis:

- *Summary* –Additional national information available: Biomedical engineers are expected to have 21 percent employment growth over the projections decade, much faster than the average for all occupations. The aging of the population and the focus on health issues will drive demand for better medical devices and equipment designed by biomedical engineers. Along with the demand for more sophisticated medical equipment and procedures, an increased concern for cost-effectiveness will boost demand for biomedical engineers, particularly in pharmaceutical manufacturing and related industries. However, because of the growing interest in this field, the number of degrees granted in biomedical engineering has increased greatly. Biomedical engineers, particularly those with only a bachelor's degree, may face competition for jobs. Unlike many other engineering specialties, a graduate degree is recommended or required for many entry-level jobs. http://www.occsupplydemand.org/OSD_Main.aspx?ST=NC

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

- *Public universities*

Enrollment			**Academic Year**						
			Fall 06	Spr 07	Fall 07	Spr 08	Fall 08	Spr 09	Fall 09
NCSU	Biomedical/Medical Engineering	BS	100	126	117	128	102	118	90

Number of Degrees Awarded			**Academic Year**		
			2005-2006	2006-2007	2007-2008
NCSU	Biomedical/Medical Engineering	BS	36	44	44

- *Private universities* – Source: Occupational Supply Demand System

Number of Degrees Awarded	**Academic Year**		
	2005-2006	2006-2007	2007-2008
Duke University	114	118	110

Available in Online or Distance Format from UNC institutions:

Not Available.

Available or not from Academic Common Market:

North Carolina does not participate in the ACM at the undergraduate level.

NC A&T State University Campus enrollment and degrees awarded in similar programs at the Bachelors level:

(*Based on two CIP digits – 14 CIP is the summary group for Engineering under which Biomedical Engineering is a program)*

Enrollment			**Academic Year**						
			Fall 06	Spr 07	Fall 07	Spr 08	Fall 08	Spr 09	Fall 09
NCA&T	Agricultural/Biological Engineering and Bioengineering	BS	11	9	12	17	17	22	26
	Architectural Engineering	BS	61	67	75	89	81	87	79
	Chemical Engineering	BS	26	28	37	40	44	52	52
	Civil Engineering, General	BS	24	27	45	50	51	55	54
	Computer Engineering, General	BS	18	19	28	42	40	50	51
	Electrical, Electronics and Communications Engineering	BS	122	122	114	118	134	130	122
	Engineering Physics	BS	4	5	5	3	0	0	1
	Mechanical Engineering	BS	86	88	112	118	116	116	122
	Industrial Engineering (NEW)	BS	82	80	68	71	62	61	70
	Surveying Engineering (NEW)	BS	N/A	N/A	3	8	13	16	13

Number of Degrees Awarded			**Academic Year**		
			2006-2007	2007-2008	2008-2009
NCA&T	Agricultural/Biological Engineering and Bioengineering	BS	4	5	4
	Architectural Engineering	BS	22	22	27
	Chemical Engineering	BS	16	10	14
	Civil Engineering, General	BS	9	9	14
	Computer Engineering, General	BS	5	3	7
	Electrical, Electronics and Communications Engineering	BS	52	23	41
	Engineering Physics	BS	0	0	2
	Mechanical Engineering	BS	30	22	39
	Industrial Engineering (NEW)	BS	21	24	23
	Surveying Engineering (NEW)	BS	N/A	2	2

Campus Average of enrollment and degrees awarded in this degree area at the Bachelors level:

(*Based on two CIP digits – 14 CIP is the summary group for Engineering under which Biomedical Engineering is a program - over the last 3 Academic Years, Fall 2006-Fall 2009)*

Campus Average			
	Number of Active Programs	Enrollment per Semester	Degrees Awarded per Year
ECU	1	57	21
NCA&T	10	53	15
NCSU	15	203	69
UNCA	1	12	3* in 2008-2009
UNCC	4	148	68
WCU	1	18	7
Campus Average:		82	30.5

NCA&T Campus Degree Programs added in the past three years:

- *Bachelor*
  - BS Atmospheric Sciences and Meteorology (11/09/2007)
- *Master*
  - MS Information Technology (09/07/2007)
- *Doctoral*
  - Ph.D. Computational Science and Engineering (01/08/2010)

NCA&T Degree Programs discontinued in past three years:

- *Bachelor*
  - BS Visual Arts, Art Education (03/20/2009)
  - BS Music Education (03/20/2009)
  - BS Romance Languages and Literatures, French Secondary Education (03/20/2009)
  - BS Romance Languages and Literatures, Spanish Secondary Education (03/20/2009)
- *Master*
  - MS English Education (03/20/2009)
  - MS Mathematics Education (03/20/2009)
  - MS History Education (03/20/2009)
- *Doctoral*
  - N/A