

## Formation of a Joint Biomedical Engineering Program between UNC-CH and NC State

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**Abstract:** Biomedical engineering (BME) was a natural outgrowth of the technology revolution in medicine in the 1960's<sup>1,2</sup>. At that time a BME graduate program was founded within the UNC-CH Medical School. Since 1968, this BME program has enjoyed an intimate and interactive relation with the clinical departments in the School, both in research and in training students. While reaping the benefits of this close association with clinical medicine, the program has been lacking many of the advantages of traditional engineering culture. The formation of an inter-institutional bridge between the School of Medicine at UNC-CH and the College of Engineering at NC State, as a natural foundation for education and research in biomedical engineering, has clear and compelling advantages for both intuitions, their faculty, their students and the public they serve. With the formal formation of a Joint Graduate Program in August 2003, and the establishment of a joint department in December 2003, we have begun the process of building a program in which the value of the whole far exceeds the sum of its parts.

**Introduction:** Over the previous two decades there has been a modest yet increasing interaction between faculty in the Department of Biomedical Engineering at UNC-CH with faculty in the various engineering and science departments at NC State. In 1998 a committee composed of faculty leadership from both universities began work on forming a joint biomedical engineering program. The process of forming a joint program was significantly encouraged following the recent formation of inter-institutional biomedical engineering programs between Georgia Tech and Emory<sup>3</sup>. Subsequently, the Dean of the Medicine proposed a bi-institutional department to the UNC-CH Provost. That proposal was enthusiastically embraced at both institutions, and included significant commitment of institutional resources for the realization of that vision.

Differences in faculty promotion, tenure, salary, and responsibilities between the intuitions are being addressed with the view of effecting an academically cohesive department that is part of two university cultures. Also, logistical problems including parking, facilitation of joint faculty meetings, seminars, the curricula and common courses, recruitment, review, and admission of students, degree requirements and the diploma have presented challenges. Administrative concerns, such as grant F&A apportionment, sharing of resources, and research and teaching space are being addressed. However, the two faculties are committed to work together as one faculty on all academic issues, and differences between institutions are being viewed as opportunities to improve the program. In this discourse we present a prospective view

of the motivation, mutual advantages, and difficulties in such an undertaking - largely originating from differences in the administrative policies and culture at our two Research-1 institutions.

**History:** In 1968, a BME graduate program was established at UNC-CH<sup>4</sup>. During the late 1990s, a proposal to create a joint graduate program and a joint BME department was prepared by faculty from both campuses. The administrations in Raleigh and Chapel Hill, as well as the UNC Office of the President, enthusiastically supported the concept. In January 2003, a Department of Biomedical Engineering was created at NC State<sup>5</sup> in anticipation of its merger with its sister department at UNC-CH<sup>6</sup>. In August 2003, the joint graduate program began operation. The new joint graduate program was established by generally adopting the curriculum, structure, and procedures of the UNC-CH academic program. Students admitted into the joint graduate program for the fall semester of 2003 were the first to be recognized as graduate students of both institutions. During the first eleven months of 2003, the two departments held separate departmental faculty meetings, with occasional joint planning and committee meetings primarily focused on organizational issues. In December 2003, the two departments were formally merged as the Joint Department of Biomedical Engineering and a founding chair was appointed for a three-year term of office. The department will begin a national search for a permanent chair of the joint department in two years.

**Faculty:** With the formation of the Joint Department of Biomedical Engineering between the College of Engineering at NC State and the School of Medicine at UNC-CH, the faculty appointed to biomedical engineering at the two institutions is considered operationally one faculty, although they continue to be appointed and administratively supported through their respective institutions. All faculty meetings are held jointly, either at a common location or using teleconferencing facilities.

Tenure is governed at the institution level and promotion is established by policies of the College of Engineering for the faculty appointed at NC State and the School of Medicine for the faculty appointed at UNC-CH. While tenure and promotion procedures differ between the institutions, the provosts of the two universities and deans of the College of Engineering and School of Medicine have agreed in principal to form uniform policies for tenure and promotion for the joint faculty of the Joint Department of Biomedical Engineering. Similarly, while salary levels for engineering faculty at NC State are different from those of the engineering faculty in the Medical School at UNC-CH, the two institutions are committed to work to achieve parity. A further distinction is that most biomedical engineering faculty at NC State are paid on a nine-month academic calendar, while the biomedical engineering faculty at UNC-CH are paid on a 12-month fiscal calendar. The former arrangement is more typical for engineering faculty and permits focused professional consultation, research, and faculty development commitments. While past attempts in the school of medicine to change to a nine-month academic schedule for biomedical engineering faculty were unsuccessful, now there is reason to revisit this issue.

**Students:** Students admitted to the Joint Department of Biomedical Engineering are admitted as students at both UNC-CH and NC State. These students may fulfill their course requirements by taking courses at either or both institutions, as their needs and interests direct them. Upon graduation the diploma will be granted by the institution of the student's choice: generally determined by the institution where their faculty advisor, financial support, and research are

based. The diploma, however, will have the university seals and signatories of both institutions, thereby acknowledging the concurrence of the sister institution.

The graduate program structure has been adopted from the longstanding graduate program at UNC-CH<sup>7</sup>. In the coming months, it is expected that there will be changes in some of the details governing the program as it is reviewed and revised by the joint faculty, including course offerings, required hours, and examinations. Dialog on the nature of the qualifying exam, required for both M.S. and Ph.D. students, is currently underway.

**Program Structure:** The Joint Department of Biomedical Engineering is a bi-institutional organization in both the College of Engineering at NC State and the School of Medical at UNC-CH. It has a single faculty, with each member appointed at one of the two institutions. Although students may apply for admission to the Joint Department through the graduate schools at either institution and are eligible for scholarships through the normal graduate school mechanisms at each institution, there is a single Admissions Committee that reviews all applications and selects a mutual pool of candidates. Courses may be taken at either institution, as determined by a single Curriculum Committee, and there is a single Qualifying (in fact, this committee only administers the qualifying exam - the comprehensive Ph.D. exam is administered by the student's Ph.D. committee) Examination Committee which offers a single exam bi-annually to determine competency to proceed to completion of the Master's degrees or further pursue doctoral degrees. A single departmental Promotion and Tenure Committee recommends promotion of all faculty and reappointment of non-tenured faculty and a single Faculty Search Committee solicits applications and evaluates candidates. There is a monthly seminar series during the academic year attended by the students and faculty of the Joint Department. The faculty, as a whole, determine the details of the structure of the Joint Department as well as the duties and procedures of its committees.

**Administration:** The Joint Department Chair is appointed by both the School of Medicine at UNC-CH and the College of Engineering at NC State. The Chair has an office at each institution, reports to both Deans, and spends approximately equal time at each institution. The chair's salary is the joint and equal responsibility of both the College of Engineering at NC State and the School of Medicine at UNC-CH.

The joint faculty has full library and computer network access at each institution. It is not surprising to note that one issue of paramount importance is parking, since it is often necessary for the joint faculty to have a physical presence at the cohort institution. A reciprocal arrangement has been made such that faculty of the Joint Department who have secured parking arrangements at one institution will receive comparable parking privileges at the other. This agreement will facilitate and broaden teaching, collaborative research, and general academic pursuits of the faculty, and will help the Joint Department flourish as a single academic unit.

**Resources:** Concurrent with the formation of the joint department, significant additional resources have been allocated by both universities, thereby enabling the department to grow from its current level of 16 FTE faculty to approximately 30 FTE faculty in five to seven years. Some new space on each campus will become available over the next three years, largely due to significant investments by the State of North Carolina to develop and expand the 16-campus UNC system infrastructure. In the meantime, the model for space utilization in the department

will be to build shared core facilities and acquire shared equipment in order to maximize the use of resources for research initiatives, funding opportunities and student training.

**Conclusion:** The merging of the new Department of Biomedical Engineering at NC State and with the existing Department of Biomedical Engineering at UNC-CH has substantial advantages for both programs. The commencement of the Joint Program, and the subsequently established Joint Department, have enabled the program at NC State to bypass the early program building process, acquire an instantaneous student body and benefit from an established academic unit with tested structural and procedural mechanisms. Rather than becoming a biomedical engineering program within an engineering college, the NC State program has access to, and in fact is a part of, the School of Medicine at UNC-CH. This link to the medical school research environment is of great advantage in the development of medically related biomedical engineering innovations. Likewise, the biomedical engineering program at UNC-CH, which was created and developed within a medical school, will benefit from the depth and breadth of resources and expertise afforded by an engineering school, has and will now have full access to, and is, in fact, part of the College Engineering at NC State. Additionally, the engineering faculty at UNC-CH has a direct link to the engineering culture of the engineering college, with shared supervision of an engineering dean who fully understands the perspectives and requirements of an engineering faculty. The engineering faculty at NC State gains these same advantages from interactions with a medical dean. This joint department, as a partnership between two universities, is the first bi-institutional department within the UNC System.

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