

# **BUILDING THE PIPELINE: DEVELOPING A SYMPOSIUM TO PREPARE ENGINEERING STUDENTS FOR GRADUATE SCHOOL**

Margo Cousins<sup>1</sup>, Daniela Santiesteban<sup>1</sup>, Krystal Peralez<sup>1</sup>, Miguel Gonzalez<sup>2</sup>,  
H. Grady Rylander<sup>1</sup>, Mia K. Markey<sup>1</sup>

<sup>1</sup>Department of Biomedical Engineering, The University of Texas at Austin

<sup>2</sup>College of Engineering & Computer Science, The University of Texas-Pan American

[margocousins@utexas.edu](mailto:margocousins@utexas.edu)

## **Abstract**

With the support of an NIH Ruth L. Kirschstein National Research Service Award program grant (T32EB007507), we established a graduate training program in Imaging Sciences and Informatics in Biomedical Engineering (BME) at The University of Texas at Austin in 2009. As stated by the NIH, "The overall goal of the NIH Ruth L. Kirschstein National Research Service Award (NRSA) program is to help ensure that a diverse pool of highly trained scientists is available in appropriate scientific disciplines to address the Nation's biomedical, behavioral, and clinical research needs." To achieve this goal of developing a diverse pool of scientists, we have invested nearly five years into an ongoing endeavor to build a lasting relationship between the home institution of our graduate training program (UT Austin) and The University of Texas-Pan American (UTPA), which predominately serves the Hispanic population of South Texas and has high quality undergraduate engineering and science programs. A key challenge that we have identified through this partnership is preparing students from underrepresented groups for the admissions process and subsequent success in graduate school. To address this difficulty, we organized a pilot symposium in April 2013 through which a small group of undergraduates (mostly 2nd year students) and faculty members from UTPA engineering programs visited our department at UT Austin. This two-day symposium was financially supported by the UT Austin BME Department. A current trainee (Daniela Santiesteban) was instrumental in organizing the contributions of current graduate students to the event. The symposium included: presentations by UT Austin staff, faculty, and alumni about the graduate school experience and the application process; lab and campus tours; panel discussion with current graduate students; sample of research presentations from faculty; and opportunities for informal Q&A over meals. In this paper, we discuss the short-term outcomes of the symposium and discuss strategies for future expansion and improvement.

## **Introduction**

The young adult American population is approximately 15% African American [1] and 20% Hispanic [2]. Moreover, Texas is characterized by substantial and growing diversity, with approximately 12% African American and 38% Hispanic [3]. While neither undergraduate (15% African American, 14% Hispanic [4]) nor graduate (African American 12%, Hispanic 7% [4]) enrollments fully reflect the diversity of our nation, minority representation has steadily increased for all fields taken together. However, increasing minority enrollments in science and engineering has proven to be particularly difficult. Currently, the percentage of graduate students that identify as Hispanic, Black, and/or Native American is approximately 6% for The University of Texas at Austin (UT Austin) Department of Biomedical Engineering (BME) and 6% for the

entire Cockrell School of Engineering. More specifically, our graduate training program in Imaging Sciences and Informatics supported by an NIH Ruth L. Kirschstein National Research Service Award program grant (T32EB007507) has 3 students who are from traditionally underrepresented racial or ethnic groups out of a total of 20 trainees. Thus, our focus is on implementing aggressive strategies for recruitment and retention of graduate students of racial and ethnic minorities, as discussed in detail in this proceeding, since this is the greatest diversity challenge not only for our training program but for the UT Austin BME program overall.

The University of Texas-Pan American (UTPA) serves the higher education needs of a rapidly growing, international, multicultural population in the South Texas Region and has the one of the highest percentages Hispanic enrollment of any university in the United States. We have been building a relationship between UT Austin and UTPA over the past five years, and we are beginning to see indications that the partnership is impacting UTPA student's considerations about graduate studies in biomedical engineering at UT Austin. The UT Austin BME graduate program did not receive any applications from UTPA during the three years prior to the establishment of our imaging sciences training program and associated recruitment efforts (2006-2008). Since beginning our efforts in 2009, UT Austin BME has received 6 applications from students at UTPA. It is likely that several more years of deliberate effort will be needed before there will be a measurable impact on the enrolled student body at UT Austin, but enriching the applicant pool, as we are doing here, is a critical first step.

## **Symposium**

A key challenge that we have identified through this partnership is preparing students from underrepresented groups for the admissions processes and subsequent success in graduate school. To directly address this difficulty, we organized a symposium in April 2013 through which 6 undergraduates (mostly 2<sup>nd</sup> year students) and 2 faculty members from the UTPA engineering programs visited our department. The two-day symposium was financially supported by the department and 7 UT Austin BME faculty participated in it.

Key administrators and faculty at UT Austin, such as the director of the UT Austin Equal Opportunities and the UT Austin BME department chair, presented on:

- Graduate school preparation, e.g., participating in undergraduate research, grade point average, interactions with faculty that lay the groundwork for strong letters of recommendation
- Organizing a graduate school search
- Application process, e.g., taking the GRE test, writing compelling statements of purpose
- Financial and community support structures
- Post-graduate school employment experience and opportunities
- Research presentations by BME faculty

A current BME doctoral student and Imaging Science and Informatics training program trainee (Daniela Santiesteban) was instrumental in organizing the contributions of current graduate students to the event. UTPA visitors met with current UT Austin BME graduate students for informal Q&A over meals, participated in BME laboratory and UT Austin campus tours, and asked questions during a graduate student panel discussion on the experiences of graduate school.

## **Outcomes**

The number of participants was kept small to encourage open discussion and thus quantitative evaluation is limited; however, the qualitative feedback received was uniformly positive. The prospective students were very excited by the visit and reported that they learned a great deal about graduate school. There was considerable interest in identifying more opportunities for undergraduate research at UT Austin in which students from UTPA could be engaged. Feedback from UTPA faculty in December 2013 indicated that 100% (6/6) of the undergraduates who participated in the symposium subsequently found a research assistantship position at UTPA. Since undergraduate research experience is a critical factor for graduate school preparation and was discussed at the symposium, this result is very positive.

Another key finding from the symposium was that the prospective students expressed some very fundamental questions about graduate school and the application process (e.g., “What is the GRE?”) that could likely be efficiently addressed by other mechanisms. Our proposed next steps were devised with these issues in mind.

## **Future Improvements**

Through continued UT Austin BME departmental support, we will host another symposium for UTPA students and faculty about graduate school in April 2014 with improvements planned over our original symposium to address findings in 2013.

Firstly we will provide basic information about graduate school in advance of the visit by providing an informational packet to the students, and then holding a web-based informal Q&A discussion panel. Pre-symposium topics covered will be the application process, costs of an engineering graduate degree, and the post-graduate employment benefits. After the discussion panel the students will be electronically surveyed to gather their individual concerns. The purpose of this pre-symposium approach is to ensure that the visiting students have a foundational understanding of what graduate school is and why graduate school would be beneficial before participating in the symposium, and so we can focus on more impactful and individualized discussion during their visit.

Another improvement in 2014 will be more in-depth information on opportunities for funded summer research experience for undergraduates. One relevant program in Texas is The University of Texas System (UT System) Louis Stokes Alliances for Minority Participation (LSAMP) program supported by a NSF grant (HRD-1202008). The UT System LSAMP provides funding for students from under-represented minority groups studying science, technology, engineering, or mathematics at any UT System institution to do summer research at another UT System institution. This program was mentioned in 2013 and will be given more emphasis in the 2014 symposium in hopes that students can meet UT Austin BME faculty during the visit, be admitted to the LSAMP Summer Research Academy, and potentially come to work with specific faculty members of interest at UT Austin in summer 2015.

Through these two major developments we hope the 2014 symposium will provide students with a clearer understanding of a career path through graduate school, and specifically UT Austin BME.

**Bibliography**

1. U. S. Census Bureau, D. I. S. The Black Alone Population in the United States: 2011. (2013). at <<http://www.census.gov/population/race/data/ppl-ba11.html>>
2. U. S. Census Bureau, D. I. S. The Hispanic Population in the United States: 2011. (2013). at <<http://www.census.gov/population/hispanic/data/2011.html>>
3. Texas QuickFacts from the US Census Bureau. (2012). at <<http://quickfacts.census.gov/qfd/states/48000.html>>
4. The Condition of Education 2012. (2012). at <<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2012045>>