

## Science and Engineering Professions and Underrepresented Minority Women: We're Not Remotely There Yet

African-American, Hispanic, and Native-American women are pursuing higher education in science and engineering more than ever before. Given this significant growth in interest and participation, what has the impact been on the professional outcomes for underrepresented minority (URM) women?

Unfortunately, data show that they have made little progress in the percentage of doctorates received or in representation among faculty at top research institutions.

### Minority Women at the Undergraduate and Master's Levels

Evidence of growing interest in science and engineering among URM women can be found in data from the National Science Foundation<sup>1</sup>:

- Over 60% of the URM students in undergraduate science and engineering courses are women.
- Between 1998 and 2006, while there was a 121% baseline increase in the general population for undergraduate enrollment in science and engineering courses, the increases for African-American, Hispanic, and Native-American populations were higher: 135%, 149%, and 124%, respectively.
- URM women's interest in majoring in science and engineering was nearly 10% higher than that of their non-URM peers.

At the undergraduate level, URM females received 20% of the degrees in science and engineering compared with 17% awarded to URM in general. This rate has continued a trend from the last decade in which the URM rate of completion of bachelor degrees in science and engineering was 15%, while that for URM women reached 17%. In 2006 in the biological sciences, URM women represented 17% of the degree recipients, up from 15% in 1997.



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Although these increases in the percentage of degrees awarded to URM may seem marginal, they represent significant progress since 1989, when individuals from URM groups received only 10% of the degrees in science and engineering. The relatively strong representation and interest by URM women is seen not only in enrollment and degrees awarded, but also in participation at summer Research Experiences for Undergraduates programs at many R1 doctoral institutions and at meetings of professional societies such as the ASCB.

At the master's level, URM continue to increase their share of degrees in the sciences and engineering. In 2006, among U.S. citizens and permanent residents, URM received 16% of the M.S. degrees in science and engineering (up from 12% in 1997), while non-URMs received 64% of the degrees (down from 75% in 1997). The same trend is seen within the biological sciences: URM received 11% of the master's degrees in 2006 (up from just over 8% in 1997), while non-URMs received 71% (down from 78% in 1997). URM women received 12% of the master's degrees in the biological sciences awarded to female U.S. citizens and permanent residents in 2006.

### Minority Women at the Doctoral and Professional Levels

By contrast, at the doctoral level, URM women have seen very modest progress that has not nearly reflected the progress experienced by women in general. Of almost 17,000 Ph.D.-level degrees awarded in 2006 in science and engineering to U.S. citizens and permanent residents, 45% were awarded to women. Within the biological sciences, women represented 50% of the U.S. citizen and permanent resident doctoral degree recipients in 2006, up from



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45% in 1999. However, there was not nearly as much parity related to race and ethnicity. Of the female U.S. citizens and permanent residents who received doctoral degrees, 75% were non-URMs. Only 9% (or 201) of doctoral degrees in the biological sciences were awarded to URM women. This 9% rate was essentially equivalent to the 8% rate at which female URM women were awarded doctoral degrees in the biological sciences in 1999.

At the professional levels, the trend for URM women is discouraging. Data from the 2007 Nelson Diversity Survey that looked at the top 100 departments in science and engineering, based on research expenditures, showed only 4.1% of the tenured and tenure-track faculty are from URM groups, and 1% are URM females.<sup>2</sup> The tenured and tenure-track faculty at these institutions are 75% male and 85% white. This is striking considering that the URM demographic is projected to constitute a third of the U.S. population by 2020. This disparity does not appear to be on track for remediation anytime soon because within the biological sciences at these top 100 institutions, URM women comprised only 6.2% of the assistant professors. That rate lags behind the relative rate at which doctorates were awarded to URM women from 1996–2005 (7.8%).

### Where We Stand

Traditionally, the life sciences have been seen as an area where women have experienced tremendous progress toward parity. They now receive half of the doctoral degrees in the field, and growing numbers are in the professional sphere. However, the

growth in the number of URM women in the life sciences, although vibrant at the undergraduate entry level, is negligible at the level of the faculty at the top research institutions in the U.S.<sup>3</sup>

The critical mass that is necessary for

systemic change appears to be nonexistent as URM women have been largely left behind in the advancements made by women in representation and leadership in science and engineering in recent years. The true integration of the training and leadership community in the sciences and engineering is critical if it is to reflect what will be a majority population later this century. Continued action is needed to increase the opportunities for URM women in the science and engineering community as we look to address the current disparities in economic empowerment, health, education, and training for a future workforce that will support the domestic expansion of the research infrastructure. ■

—Anthony DePass, Long Island University, for the Women in Cell Biology Committee

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### References

<sup>1</sup>National Science Foundation, Division of Science Resources Statistics. Survey of Earned Doctorates. [www.nsf.gov/statistics/srvydoctorates](http://www.nsf.gov/statistics/srvydoctorates).

<sup>2</sup>Nelson DJ, Brammer C, and Rhoads H. (2007). A National Analysis of Minorities in Science and Engineering Faculties at Research Universities. Norman, OK: Diversity in Science Association and University of Oklahoma.

<sup>3</sup>National Science Foundation, Division of Science Resources Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Fall Enrollment Survey, 1998–2006.