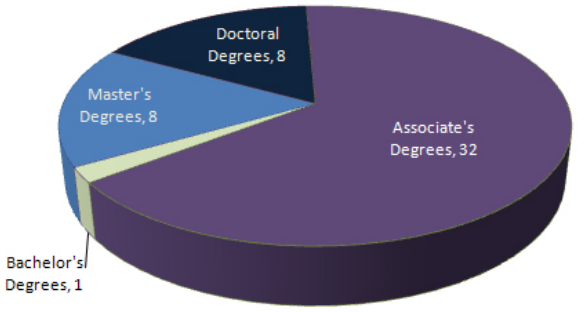
The Center for Nanotechnology in Society
ARIZONA STATE UNIVERSITY

A Snapshot Profile of Nanotechnology Degree Programs in the U.S.

One way post-secondary institutions respond to labor needs for emerging technologies is by creating new degree programs. CNS-ASU recently collaborated with the Heldrich Center for Workforce Development at Rutgers University to profile U.S. degree programs created in response to nanotechnology. The study defined nanotechnology degree programs as associate's, bachelor's, master's and doctoral programs that use the term "nano" in the formal degree title. This definition excluded certificates, minors, tracks, informal education and concentrations in nanotechnology. Sources used to identify nanotechnology degree programs included national databases, structured Web searches, a review of scholarly literature on nanotechnology education, and expert referrals.

Although there is no consensus yet on the best way to educate future nanotechnology workers, many scientists, employers and educators agree that the field requires interdisciplinary skills and knowledge across multiple science and engineering disciplines. The study therefore broadly examined how institutions approached the issue of *interdisciplinarity* within their degree programs.



Breakdown of Nanotechnology Degree Types in U.S.
(N=49)

The total number of formal nanotechnology degree programs is small, with 49 programs identified at 38 post-secondary institutions. These institutions are not concentrated in areas of high nanotechnology publication and patent activity, but rather are clustered in response to state and federal investments. For example, the NSF-supported *Nano-Link* involves a set of six associate's degree programs linked across five Midwestern states, and Pennsylvania's Nanofabrication Manufacturing Technology Network links 18 degrees across 16 institutions. Both programs require a capstone semester at a four-year college to complete an associate's degree program from a two-year school, thus partnering two- and four-year colleges.

The motivation behind degree program development varied by degree type. For associate's degrees, workforce and economic development were key motivators. Direct employer involvement in associate's programs was common, as nearly all were designed to train nanotechnology technicians. On the other hand, student attraction and faculty motivation to establish interdisciplinary education in nanotechnology were common themes in program development at the graduate level. Employer involvement at higher levels of education was less common, the major exception being the *College of Nanoscale Science and Engineering in New York*, where six graduate degree programs involve high levels of industry partnership.

Approaches to the interdisciplinary aspects of nanotechnology varied among programs. At all program levels, students are required to take courses from a variety of traditional core disciplines. Several institutions feature more intensive faculty collaboration across departments/schools, to create—and sometimes co-teach— nanotechnology-specific courses and lab work. Many faculty members stressed the importance of students maintaining a strong link to a core, traditional discipline. These faculty expressed concern about "diluting" the rigor of core disciplines. Not surprisingly, then, many degree requirements continue to be related to traditional disciplines.

College of Nanoscale Science & Engineering
University at Albany State University of New York

Nano-Link
Midwest Regional Center for Nanotechnology Education

Finally, at this time little is known about the employment outcomes of nanotechnology degree program graduates.

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