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Women graduates increase in science

UA will conduct two ceremonies for grads today

By Valarie Potell

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More than 420 University of Arizona students from the College of Science will be able to don a navy blue cap and gown this morning at the university's commencement ceremony. Fewer than half will be women. But that long-standing trend may be changing.

The proportion of women earning undergraduate degrees in science, technology, engineering and mathematics increased by almost 4 percentage points nationally from 1995 to 2004, and by almost 10 points at UA from 1995 to 2006, an Arizona Daily Star analysis shows.

In 1995, there were nearly 193,000 bachelor's degrees awarded in science and related fields to students across the country and 34.7 percent of those went to women, according to a December 2006 report from the National Science Foundation. In 2004, the most recent available year for national figures, those numbers increased to more than 233,000 total degrees, 38.4 percent of which went to women.

UA reported an increase as well, with women accounting for 30 percent of science degrees awarded in 1995 and 39.4 percent in 2006.

The shift is "huge," said Anne Padias, a chemistry professor and director of academic services for the department. That's especially true, she said, because percentage shifts work both ways. "If you see a 5 percent increase, that means men went 5 percent down, too," she said.

In addition to the obvious benefits for women, the increase is a benefit for science, those involved say, because it means a wider range of people working on the world's problems. But some say the statistics also show women still have more ground to gain.

Progress being made

Ekaterina Spriggs is graduating from UA today with a double major in computer science and mathematics, with minors in computer engineering and physics.

"My mother is a mechanical engineer," Spriggs said. "She had so many math books that she joked that I was reading linear algebra when I was 2."

Spriggs attended a high school in Bulgaria that focused on math and science. Her generation has seen increased support and encouragement for women interested in science, technology, engineering and math, one possible reason for the statistical increase.

"I never thought, 'I am in a classroom with all males.' When I walk into a class or meeting, I see students," Spriggs said. "I don't see that this is an all-male field, and I shouldn't be here."

Padias said she's noticed more women in organic chemistry classes in the last 15 years and that women account for at least half of the students in those classes now. Several biological-science majors, including physiology, biochemistry and molecular and cellular biology, require organic chemistry.

"There seems to be much less of a barrier," she said. "When I went to school around 1970, in my undergraduate chemistry class, it was around 10 percent women."

The increase is a result of institutional and cultural changes, said Lisa Frehill, executive director of the Commission on Professionals in Science and Technology, a New York-based nonprofit.

Title IX of the Education Amendments of 1972 allowed women the opportunity to enter these fields, Frehill said, adding that before that, engineering schools could ban women and some medical schools had percentage caps on the number of the women they'd admit.

Culturally,, "ideas about what's appropriate for men and women to do have changed," she said. "Women expect they need to have a career or job and pursue areas where they can have gainful employment."

All of it means there's less bias against women now, said Gail Burd, associate dean in the UA College of Science.

"Students can see they can be anything they want to be and we make it a welcoming environment," she said.

But with women accounting for 52.5 percent of all UA undergraduates in fall 2006, some students and faculty members say the statistics show there's still a ways to go. They're trying to improve the support for women studying science, technology, engineering and math and attract more women to the majors.

It's an important goal, said Jeff Goldberg, associate dean of academic affairs in the UA college of engineering.

"If you only have white, middle-age guys solving problems, you only get their solutions," he said. "We have to have people of color and women at the table."

Lack of role models

One frequently cited reason for the lower number of women earning undergraduate degrees in these fields is the smaller number of female professors, which means fewer role models.

"You see a lot of men, but not many women," Burd said. In 2006, women accounted for 17 percent of tenure-track faculty in the College of Science and 12 percent in the College of Engineering and Mines, figures from UA's Office of Institutional Research and Evaluation show.

"To attract more women into engineering, you need more mentors and role models and that really translates into more faculty," Goldberg said. "To get more women faculty, we need more women

graduate students in engineering. To get more graduate students, we need more women undergraduate students and that's a problem because that's what I'm trying to solve in the first place."

Beth Mitchneck, associate dean of academic affairs in the UA College of Social and Behavior Sciences, said there's an unconscious bias that affects many choices people make. She said this leads to hiring fewer women and having a department or university "that is less conducive to women in these areas and less conducive to promoting women as leaders."

The university received a \$3.3 million grant in fall 2006 from the National Science Foundation Advance program, which funds "programs at universities aimed toward change that will advance careers of women and minorities in academia," said Mitchneck, who also is the lead co-principal investigator for the Advance grant.

The funds will be used to promote the recruitment, retention and advancement of female and minority tenure-track faculty in science, technology, engineering, math and related areas.

Gender roles

Another issue being addressed is the tendency of female students to drop out of majors such as engineering at a faster rate than male students, even though they usually enter college with higher grades and SAT scores than their male counterparts, Goldberg said.

"Something in our process is anti-woman," he said.

The track for careers in science, technology and similar fields starts in sixth or seventh grade. Girls are told that "it's OK, you don't have to solve that problem" while boys are told they need to work harder to figure out the same problem, Goldberg said, adding that when students stop taking math or science classes, sometimes as early as ninth grade, they're making career choices and are inevitably done with engineering.

Women usually have preconceived notions about computer scientists, too, said Suzanne Westbrook, senior lecturer and associate head in the department of computer science.

"They have this vision of a geeky, nerdy guy drinking Mountain Dew and living out of a vending machine, which is not appealing to most women," Westbrook said.

Each year, UA recruits students by sending out brochures, letters and invitations to events, and presenting talks to younger students. Burd said the College of Science also is careful with recruiting materials, to show diversity in scientific fields.

Clubs on campus

Students and faculty also have formed clubs aimed at supporting women in science.

Wendy Ingram, a UA senior studying biochemistry and molecular biophysics, is co-president of Women in Biological Sciences and a member of the Women in Science and Engineering leadership council.

"What we're trying to do is encourage freshmen and sophomores to stick with these majors," said Ingram, who is double-majoring in psychology.

She said the biological-sciences club tries to create student and faculty interaction.

Westbrook, who is also the faculty adviser for Women in Computer Science, said the organization sponsors an annual university wide coding competition, sponsorships for national conferences and other events designed to welcome women.

"This is where you make your career decisions, at the undergraduate level, based on whether you think it's possible," she said. "If you're discouraged from that at this level, you won't continue."

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