

# GETTING INTO THE GAME

**Blame culture. Or genes. Or Dilbert. In engineering, it's a man's world—for now.**

**BY JULIEN RUSSELL BRUNET** • The Eurythmics had it only partly right. Back in 1985, the British pop duo of Annie Lennox and Dave Stewart recorded *Sisters Are Doin' It for Themselves* with the Queen of Soul, Aretha Franklin. A modern feminist anthem, the song makes this interesting observation: “*The inferior sex has got a new exterior. We got doctors, lawyers, politicians too.*” Indeed, much of that has come true. At several Canadian medical and law schools, women now outnumber men. But there's one traditionally male-dominated field where men are still a clear majority—and where women's representation has even declined in the past few years: engineering.

According to Engineers Canada, the number of women enrolled in engineering programs was on the rise for a full decade before plateauing in 2001, when 20.6 per cent of students were women. But since then, as more and more men have taken engineering, the number of women has remained flat. Since 2001, the proportion of female engineering students has dropped nearly every year, to just 17.3 per cent in 2007, and a mere 17.1 per cent in 2008. At the University of Toronto, for one, women comprised 26.6 per cent of engineering students in 2001, but just 21.4 per cent in 2008. And the phenomenon is not confined to Canadian universities: female enrolment in engineering has plateaued across North America.

The reasons are the subject of a heated debate in and outside of the academy. “Certainly, it is not due to a lack of effort to encourage women to go into engineering,” says Judy Myers, the past president of the Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWESTT). Indeed,

universities have embarked on a number of initiatives to attract women to the field, and the deans of some of the country's top engineering schools are female. Yet the male-female gap continues to grow, confounding professors and university administrators. And before they can address the phenomenon, they must first figure out why it exists.

One hypothesis, endorsed by CCWESTT, suggests that women aren't turning away from engineering so much as they're turning toward other sciences that seem to offer not only challenging career opportunities but also the chance to make a difference. As Elizabeth Cannon, dean of the Schulich School of Engineering at the University of Calgary, explains, there are now many science disciplines that fit the bill, and so women might enrol in health or environmental sciences instead of biomedical or environmental engineering. “With so many doors open,” says Cannon, “you get a little bit of a dilution across all of these areas where women can be successful.”

Others suggest the field may still have an image problem—engineers as out-of-touch geeks or nerds. As Tyseer Aboulnasr, the dean of the faculty of applied science at the University of British Columbia, says, “The perception of engineering as a pure-technology field that doesn't really connect with society is certainly an issue.” A recent study supported by Engineers Canada found that young women tend to “equate engineering and technology... with construction work, outdoor work, working in a cubicle, and relating primarily to computers and machines, rather than people.” Says Kathleen Sendall, an engineer and the first woman to chair the Canadian Association of Petroleum Producers, “Dilbert has contributed to a number of stereotypes about engineers.”

It's hardly fair: engineering solutions are behind everything from iPods and laptops to roads and bridges, and they will be crucial to addressing worldwide issues like energy, clean water and climate change. But “engineering



**UBC engineering students; U of T's Amon (right): can engineering change its image?**

has not been successful in communicating the fact that engineering careers are, indeed, people-oriented and provide great benefit to society,” says Elizabeth Croft, the associate head of the department of mechanical engineering at the University of British Columbia.

Or maybe it's just that engineering doesn't have much of an image at all. As Chantal Guay, the chief executive officer of Engineers Canada, says, “We are the silent or invisible profession.”

Clearly, cultural factors also play a role in how women perceive engineering. It might be seen as a male domain in North America, but that's not true in much of the rest of the world. UBC's Aboulnasr and Adel Sedra, dean of the faculty of engineering at the University of Waterloo, are both from Egypt, where Aboulnasr says engineering isn't considered more appropriate for one gender over the other; it's simply seen as a prestigious field, along with medicine, dentistry and pharmaceutical science. (By contrast, law is “at the absolute bottom,” she adds.) In Egypt, adds Sedra, engineering is perceived as “desirable because it leads to high-paying jobs and is



**After peaking in 2001, the proportion of women in engineering programs has declined almost every year**



important for the country and society.” It’s much the same in Southeast Asia, eastern Europe and South America, says Cristina Amon, the dean of the faculty of applied science and engineering at U of T, who’s from

Uruguay. “In South America, engineering gives you prestige that you can contribute in a meaningful way to society.”

Some observers suggest—controversially—that men are simply better at engineering

#### HOW HARD WILL IT BE TO GET IN?

Here are the average final-year high school grades—or the R score in the case of Quebec’s CEGEP system—of first-year undergrads starting engineering school in fall 2008.

	Average Entering Grade
Acadia	84.2%
Alberta	87.4%
UBC	86.4%
Carleton	83.8%
Concordia	79% / R score 25.563
Guelph	80.4%*
Lakehead	80%
Laurentian	80.7%*
Manitoba	90.6**
McGill	89.2% / R score 30.84
McMaster	84.9%*
Memorial	87.9%
Moncton	81.2%
École Polytechnique de Montréal	R score 29.231
New Brunswick	85%
UNBC	87.3%
University of Ontario Institute of Technology	77%
Ottawa	81.9%*
UPEI	N/A
Québec à Chicoutimi	R score 25.22
Québec à Montréal	R score 24.03
Québec en Outaouais	Not applicable
École de technologie supérieure	Not applicable
Queen’s	86.7%*
Regina	83.6%
Royal Military College	84%
Ryerson	79.8%
St. Francis Xavier	86.4%
Saskatchewan	90%
Simon Fraser	80%
Toronto	88.9%
Victoria	87%
Waterloo	88.7%
Western	85.5%
Windsor	81.6%
York	85%*

Ten universities with engineering programs are not listed here. These institutions did not release their average entering grades to *Maclean’s*.

\* Grade average for fall 2007 incoming class. Source: Common University Data Ontario

\*\* Majority of students enter engineering after first year (University One)

and science because of differences in the way men and women think. Perhaps most famously, in 2005, Harvard University president Lawrence Summers—now President Barack Obama’s special economic adviser—made some provocative comments about “intrinsic aptitude” in science and engineering, the career pressures women face and discrimination within universities. Speaking at the National Bureau of Economic Research’s Conference on Diversifying the Science and Engineering Workforce, Summers wondered aloud whether innate differences between

the sexes may help explain why fewer women succeed in science and why men dominate the top ranks of research. Steven Pinker, a psychology professor at Harvard, subsequently provided support for Summers's remarks, citing evidence that biological sex differences—male superiority in mental object rotation and problem solving, for example—play a role in establishing and maintaining cognitive sex differences.

The backlash to Summers's remarks speaks for itself: many in the science and engineering community simply don't buy that argument. Elizabeth Spelke, a psychology professor at Harvard, remarked shortly after his speech that "there is not a shred of evidence for the biological factor." Says UBC's Croft: "There may be some evidence that men and women may approach engineering and science problems from different perspectives, as do people from various cultural and social backgrounds, but I have not seen any evidence that indicates, in general, that men are better suited to science or engineering careers than women."

So how are universities trying to encourage women to go into engineering? Part of the effort has been to address the image problem. In particular, schools have attempted to redefine engineering as a helping profession. "At UBC," says Aboulnasr, "we are taking engineering back to what it was supposed to be about, which is service to society and making people's lives better."

Schools have sought to recruit more women faculty—a move that might well help to attract more female students, research suggests. In a recent study, researchers at the University of California-Davis and the United States Air Force Academy, for example, found that while professor gender has little impact on male students, "it has a powerful effect on female students' performance in math and science classes, their likelihood of taking future math and science courses, and their likelihood of graduating with a science, technology, engineering, or math degree." As CAPP's Sendall explains, "All of us have an easier time imagining ourselves in careers where there are other people like us." Ania Kroman, a civil engineering student at the Schulich school currently on her internship year, agrees, noting that "it is encouraging to see women who are leading a field that has a low percentage of women."

Several Canadian universities have also embarked on a number of initiatives to attract female students to the field at a young age—"when they form views and interests," says U of W's Sedra—and to better support women in their university. The Skule Sisters program at U of T, for example, pairs second-year female engineering students with Grade 10 students in Toronto for a three-year mentor-

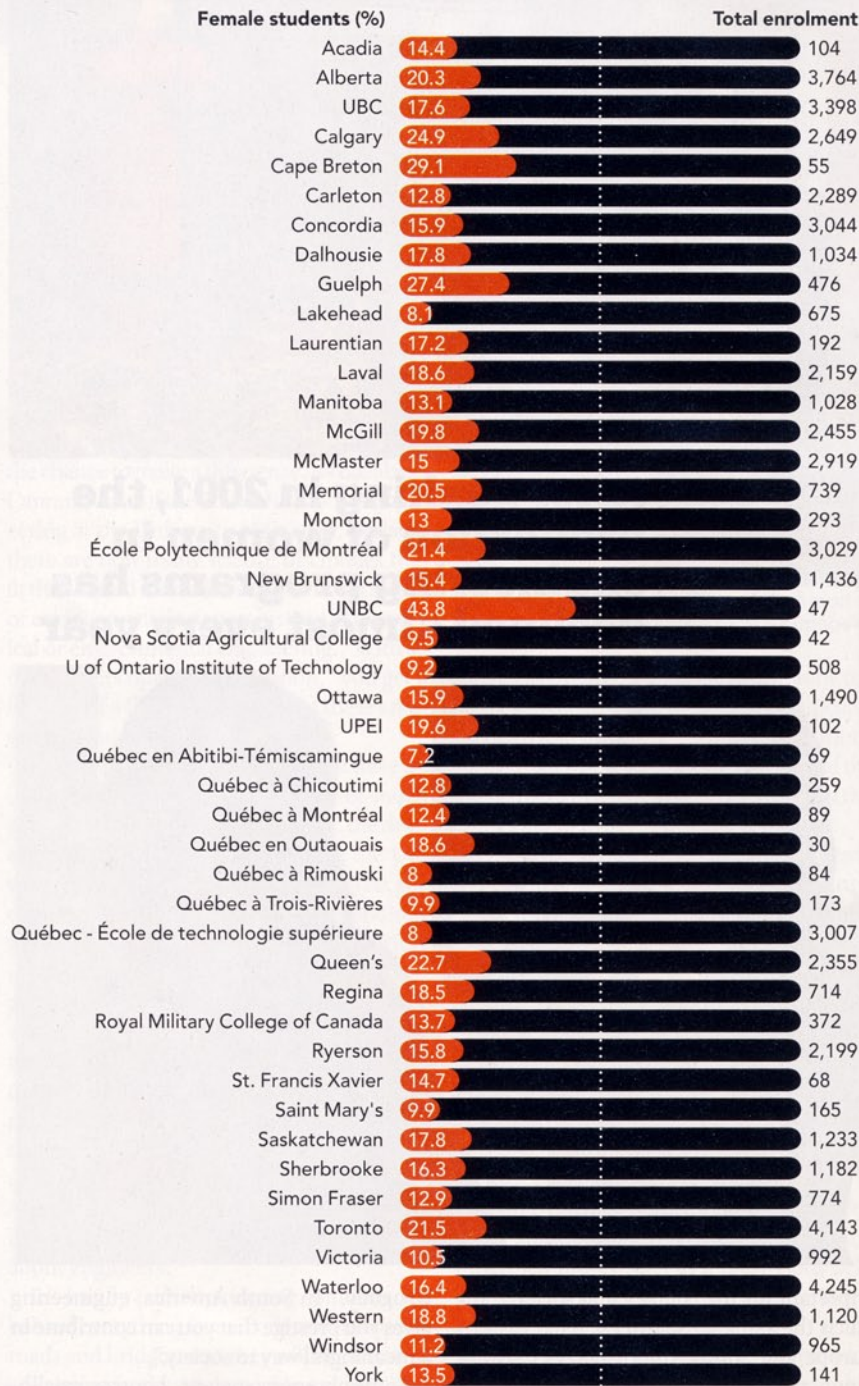
ship; since its inception in 2007, enrolment in the program has more than doubled, to 63, during the 2008-'09 academic year. At the University of Calgary, the student organization Women in Science and Engineering offers educational tutorials, guest lecturers, field trips and scholarships; WISE has grown from 125 members in 1990 to more than 1,000 members in 2004.

While such initiatives might have results

in the short term, it's clear that changing the social and cultural perceptions that might be discouraging women from becoming engineers will require a long and concerted effort. But there's good reason to believe the profession will figure out a solution. "This is a complex and challenging problem, and one that requires a multidisciplinary, team-based approach," says Croft. "Perfect for engineers." M

**ENGINEERING ENROLMENT, SCHOOL BY SCHOOL**

Undergraduate enrolment at Canadian engineering schools ranges from a few dozen students to a few thousand, but as these 2008 figures show, the number of female students is less than 25 per cent at all but a handful of institutions.



Source: Engineers Canada

50%