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FEATURE: AAC&U MEMBER INNOVATIONS

It's a Math World

At many colleges and universities, math departments operate as “filters,” sifting out all but the strongest students until only a small number remain as math majors. At St. Olaf College in Northfield, Minnesota, the opposite is true. There, the math department aims to work as a “pump,” infusing new students and new interest into the field of mathematics. The “pump, not a filter” analogy comes from Lynn Arthur Steen, St. Olaf’s special assistant to the provost and mathematics professor. “Mathematics is a foundation for a way of thinking that’s pervading all sorts of fields,” Steen says. “It’s as central as writing in all the disciplines.”

St. Olaf College tries to avoid teaching its students math in a vacuum—whether they major in it or not. That’s why the interdisciplinary nature of mathematics is so highly emphasized. “We teach students that if you learn a little bit of science and mathematics, you can do a lot of intelligent reading on many different topics,” explains David Van Wylen, associate dean for mathematics and natural sciences. Van Wylen says that quantitative literacy should be a standard outcome of a good liberal education. “Understanding [science and math] is a transferable skill,” he says. Steen says that while he doesn’t expect that most St. Olaf students will ultimately have careers in math-related fields, they *will* all need to understand an increasingly quantitative world. “In every field, people are doing research using data. There’s lots of counting things, measuring, making logical connections,” he says.

This outlook may help explain why nine to ten percent of St. Olaf’s three thousand students are math majors. There are about sixty-five majors per graduating class, and St. Olaf produces more students who go on to earn PhDs in mathematics than any other liberal arts college in the country. Those are impressive—and unusual—statistics for a small liberal arts institution. But when it comes to mathematics, St. Olaf’s goal is to be different.



The math department at St. Olaf produces more graduates who go on to earn PhDs in mathematics and statistics than any other liberal arts college

university community, as well.

This desire to attract a wider variety of students to mathematics catalyzed the development of what St. Olaf math faculty call their “Big Tent” philosophy. “Some institutions have an elitist attitude toward mathematics—‘If you’re not one of the best, we’d rather not have you in our major,’” explains associate professor of



St. Olaf’s inclusive “Big Tent” philosophy encourages all students—not just the math standouts—to take multiple mathematics courses.

Under the “Big Tent”

The college’s mathematical metamorphosis began in the 1970s, when a rigid mathematics curriculum requiring specific courses taken in sequence was the standard. Students who missed a course because of scheduling constraints, internships, or off-campus programs quickly fell behind. Steen and his colleagues decided to break up the sequences, allowing students more choice in what math courses to take and when to take them. As a result, mathematics majors could study abroad or explore courses in other departments, without losing progress toward their degree. The increased flexibility brought increased interest in math among students in related fields, like biology and chemistry. But the mathematics faculty wanted to draw students from the greater

mathematics Jill Dietz. "We think the opposite—we'd like everyone to be a math major! We want to open the doors to all students, not just the A students." St. Olaf math professors follow through on their belief that anyone can do math by providing intensive one-on-one and small-group support for students in the form of frequent open office hours, a daily Math Clinic, weekly colloquia on topics like the mathematics of baseball, and extracurricular math-based activities like problem-solving contests and game nights.

Faculty members are also careful not to proselytize too much to new students. "We don't try to convince first-year students in their first math class to major in math," Steen says. "That can be too big a hurdle." Instead, he explains, faculty encourage all students who do reasonably well in one class to consider taking another class. Many students take a second math class, then a third or a fourth, and eventually realize they could take a few more courses and be able to add a math major. "It's mostly a matter of allowing the subject to sell itself," Steen says.

The atmosphere of fun in the department helps sell mathematics, too. There's a math-centric activity almost every week, usually involving food. Tailgating parties tied to informal mathematics lectures are popular, as is an annual math department music recital. And nothing draws students to math like students already in math. "At any given time, there's a couple hundred math majors on campus," Dietz says. "Everyone knows a math major, or lives with a math major, or is in a group with a math major. There's a lot of good publicity—we're not a program that's hiding in the shadows."

Encouraging Mathematics Careers

While math is already visible and popular at St. Olaf, the department doesn't embody the diversity faculty would like to see. Women, for example, make up almost sixty percent of St. Olaf students, but only about forty percent of math majors. And attracting more Hispanic, African American, and other underrepresented students to St. Olaf is a college-wide goal. The math department recently got a recruiting boost with the award of a four-year, \$500,000 grant from the National Science Foundation to support "Encouraging Careers in the Mathematical Sciences (ECMS)," a new program that provides structural and financial support for traditionally underrepresented, first-generation, or low-income mathematics students.

Matt Richey, mathematics professor and codirector of ECMS, explains that the program allows students who might not traditionally choose math to explore the subject and its career implications in depth. The first cohort of thirteen ECMS students started the program this academic year, selected from a pool of applicants with math aptitude and financial need. "Many of these students don't fit the profile of the traditional St. Olaf student," Richey says. "We want them to understand that a math major is a door-opening career path, and we want them to be able to do this without financial worry." The college is in the process of creating similar grant-funded programs for biology and chemistry.

Ultimately, the math department at St. Olaf College has one overarching goal: to make mathematics and a liberal arts education synonymous for both math majors and non-majors. "We'd like to break the idea that if you're a strong math student, you don't go to a liberal arts college because you're giving something up," Richey says. "We believe you actually gain by having a liberal arts education, and we've got a strong, cohesive vision of making mathematics open for everyone."

For more information about math at St. Olaf College, visit the [department homepage](#). For information about the ECMS program, see the [ECMS Web page](#). To read more about mathematics and science as part of a liberal education, see the Peer Review [Summer 2004 issue on quantitative literacy](#). AAC&U's Network for Academic Renewal will host a meeting titled "Engaging Students with the Big Questions of Science" in November 2008; watch the [Network Web page](#) for updates.