

PCC's STEM Programs and Job Training Flourish

By Christina Holmes

The college plays a critical part in the national movement to encourage more students into Science, Technology, Engineering and Math careers as local industries look for workers in those high-demand fields



When it comes to STEM programs and careers, PCC is both digging deep roots and sprouting.

Across the country, educators, business leaders, economists, politicians and labor groups are focused squarely on filling Science, Technology, Engineering and Math-related jobs and careers. The demand for qualified workers in STEM (the commonly used acronym) fields is high with the current generation of workers about to retire and new, well-paid jobs developing at a quick pace.

Employers in the specific industries are turning to educators to fill the ever-growing gap.

"America is throwing everything we have at STEM," said Todd Sanders, a mechanical engineering faculty member who last year was appointed by Gov. John Kitzhaber to Oregon's Joint Interim Task Force on STEM Access and Success.

The depletion of STEM workers dates back to 9/11 when the United States stiffened requirements on foreign workers coming into the country with visas, Sanders said. The result was too few high-tech workers to fill in-demand jobs. Ever since, there has been a realization of this "drain of brain power" as well as a groundswell of momentum to train and educate future STEM students and excite them about the multitude of career possibilities.

Oregon's list of STEM careers is broad and encompasses a diversity of occupations — everything from doctors,

geologists and mathematicians to computer programmers, multimedia technologists and machinists — and just about anything in between.

In 2010, about 95,000 Oregonians worked in STEM occupations, representing 5.8 percent of all workers, according to the state's STEM Task Force. Employment in STEM occupations is expected to grow about 18 percent between 2010 and 2020.

"A lot of first-generation college students don't pick STEM even though the pay is better," said Dieterich Steinmetz, science and engineering division dean at the Sylvania Campus. "But for those who are driven, we can get them to a good paying job quickly."

PCC is proving to be a community college leader in the STEM arena, securing nearly \$2 million in grants from the National Science Foundation for STEM-related projects and another \$50,000 in grants from within Oregon. Sanders is the principal investigator on the grants that fund faculty development and award scholarships for engineering and technology students, among other things. So far about 200 students have received funding.

"We're hoping to make a huge impact with the scholarships. We want our graduates so technically skilled that they will get hired immediately," said Sanders, who for the past three years has run a Summer Sustainability Institute that brings together about 30 college faculty members from the western United States to update their knowledge about current industry trends and methodology.

"Considering the number of students a faculty member teaches each term (about 120) we believe this is a good use of the dollar," Sanders said.

Still, there are challenges. Only 40 percent of students who enter a STEM program complete a STEM degree, which suggests the need for strategies to keep students in the STEM pipeline, according to the state task force.

While PCC is reaching out farther and wider to students, it's also up to students and their parents — who have the most influence over a student's career choice — to recognize the potential benefits of pursuing a STEM career. If a student sticks with a STEM major and advances to a master's program, many colleges and universities offer grants that pay for tuition.

"If you do the hard work in the sciences and get through calculus, then grad school could be paid for," said faculty member Eriks Puris, who teaches geology and general science courses at the Southeast Center.

The statewide task force recommended lawmakers adopt an ambitious agenda for STEM education, including goals for K-12 and post-secondary education systems. The task force concluded that colleges and universities need to increase their capacity to enroll students, especially those in underrepresented populations, in STEM programs.

Getting more women into STEM careers is another challenge, said Charmagne Ehrenhaus, business and computer technology division dean at Sylvania. "Although I think it's improving because of the web and Facebook. Girls see that the career fields are not just hard coding and high-level programming."

"We want our graduates so technically skilled that they will get hired immediately."

*-Todd Sanders
PCC engineering faculty*

PCC's commitment to increase the number of STEM graduates who finish a degree or certificate program is unwavering. Many agree that STEM education will

help Oregon's capacity to create and build a healthy economy.

"It will take a lot to keep up with the rest of the world," said Sanders. "But we will catch up. Because technology, innovation and invention drive the nation's economy." ■

PCC's STEM Industry Partners

- Aerotek
- Axiom Electronics
- Biotronik
- ClearEdge Power
- Commissioning Agents, Inc.
- FEL
- Genentech
- Heitzman Auto Body & Paint
- HemCon
- HP
- HydraDx
- Intel
- Kaiser Permanente
- Legacy Health System
- Madden Industrial Craftsmen
- OHSU
- Oligos Etc.
- PeaceHealth
- Portland VA Medical Center
- Precision Wire Components
- Providence Health & Services
- SolarWorld
- Tektronix
- Tuality Healthcare
- Vanguard-EMS
- ViaSystems
- Vigor Industrial
- Welch Allyn



Rock Creek's New Research Bug

By Janis J. Nichols

A student walks through the woods with a collection jar and carefully plucks bugs off tree moss. It's a scene repeated often by science majors at universities. At PCC's Rock Creek Campus, it will happen for the first time this spring.

Thanks to the steady global conversation about STEM and what educators interpret as a lack of investment on a national scale, policymakers understand that community colleges need to be fully engaged in teaching science and not just with overhead projectors.

The Community College Undergraduate Research Initiative replaces the lecture approach to teaching science with hands-on laboratory and field work. Twenty students will get their hands dirty and exit the experience with a new approach to critical thinking. These students are future technicians who will work in areas ranging from health care to climate change.

"At traditional four-year schools where faculty engage in funded research, for example, science majors are welcomed into the labs as research assistants and are encouraged to do independent research," said biology instructor Josephine Pino. "Until now, faculty at community colleges have engaged in research on a voluntary, ad-hoc basis. That will change. We know that one of the keys to attracting students to science is early engagement — engagement that challenges them in new ways."

The small class size guarantees interaction between faculty and students, and the location of the field work — 44 acres of woodland, 11 acres of wetlands and 44 acres of grassland — makes the research personal and relevant.

Now students will tramp the wooded acres to study how humans influence organisms in the forest. Through lab and field work, students will design research studies and present their findings.

"We know that one of the keys to attracting students to science is early engagement."

*-Josephine Pino
PCC biology faculty*

The Rock Creek undergraduate research project aims to collect, identify and use DNA bar coding

to compare species of bark beetles from the campus forest. This work will help PCC build partnerships with local environmental agencies and university researchers.

"We know that we are not alone in our desire to study human impacts on our forests," said Pino. "The opportunities for student researchers to partner with public and private investigations are plentiful." ■

STEM Grows at Southeast Center

By Christina Holmes

With all the national attention and talk aimed at STEM classes and programs, PCC is reserving one area of a new building at the Southeast Center for science, technology, engineering and math students.

The STEM Center at Southeast, part of the new learning commons building scheduled to open in late 2014, will house general classrooms, science labs and faculty offices. It will be anchored by a glass exhibit space where student and faculty research will be displayed to educate and inspire visitors and other students.

"We're dedicated to bringing more robust and well-rounded science classes to the Southeast Center," said Susanne Christopher, a PCC veteran faculty member who recently relocated to the Southeast Center to chair the science programs.

Longtime instructors from other PCC campuses are joining the effort to develop and launch the center.

"We're here at the beginning of fostering student involvement in STEM activity and we have a chance to develop something new," said Alexie McNerthney, a biology instructor at Sylvania for 14 years who moved to the Southeast Center last year. "This could be the district's flagship store."

McNerthney hopes to prove students wrong who think they're not cut out for math or science which offer lucrative careers.

"I'd like to foster an understanding that we all can be science minded," she said. "I would love to encourage confidence among students that they can pursue science if they want to." ■

Robots Rock PCC's Sylvania Campus

By Kate Chester

It wasn't a typical soccer match, nor were the teams or players well known, but the competition generated an unusually spirited audience of faculty, staff and students at the Sylvania Campus last fall.

"Today's game was a hoot," said Charmagne Ehrenhaus, dean of Sylvania's business and computer technologies division, referring to the campus' first remotely-controlled robotic soccer challenge.

"The team spirit was definitely here, because it celebrated the collective, interdisciplinary effort of faculty, staff and students — along with support from outside PCC," she said.

The "World Cup" of robot soccer showcased the efforts of three Sylvania-based departments: Computer Science, Engineering and Machine Manufacturing Technology. A month prior to the competition, students and faculty teamed up to participate in a non-credit, "build-a-bot" workshop that enabled students to build and program remotely-controlled robots that would compete in the culminating soccer championship.

Google Nexus 7 tablets served as the "heads" of the soccer competitors; since their bottom halves were fused, robots dribbled the soccer ball with their "arms," or in their case, paddles. Game day uniforms — variations of University of Oregon, Oregon State University, and a referee outfit — were custom-designed by a PCC engineering student who had a bachelor's degree in art.

"The month-long experience leading up to the soccer match emphasizes cross-technical learning in what we hope is a fun and engaging environment for students," said Gregg Meyer, civil and mechanical engineering instructor and lead organizer of the workshop. "We hope they'll want to learn more, that perhaps the experience will open their eyes to STEM disciplines, in terms of majors and possibly, careers."

The idea for Sylvania's workshop and soccer match sprang

from a national STEM-oriented conference for community colleges that Ehrenhaus and Dieterich Steinmetz, dean of Sylvania's science and engineering division, attended in October 2011. The two returned from the conference, mapped out the resources necessary to make the workshop a reality, integrated the math and industrial technology division into the equation, and gave Meyer the green light to coordinate logistics.

Over three consecutive Fridays, students were taught to build robots through themed lessons that offered engineering-focused learning, a fabrication day, and a computer programming-specific lesson.

The first class session highlighted engineering concepts and included a rocket club guest speaker from Portland State University, followed by a demonstration hosted by the Tactical Robot team of the Washington County Sheriff's Office. Students accessed Sylvania's machine shop during the second class and learned how to build robots using new rapid prototyping equipment — 3D printing, computer-controlled routers, laser cutters, 3D scanners, and a new vinyl cutter — in addition to conventional shop equipment. The how-to's of computer programming made up the third class prior to the soccer competition.

"We witnessed excitement from the students as they connected the dots between the three disciplines over the course of the workshop," said Dan Findley, division dean of math and industrial technology. "They began to understand how each field is connected to the other."

Ehrenhaus, Steinmetz and Findley hope to create additional STEM workshops down the road, ones that are for-credit — and

perhaps women-only, in an effort to encourage female students to consider STEM majors and careers (women are significantly underrepresented in STEM fields). In the meantime, they join Meyer in savoring the results of their first STEM soccer competition.

"We hope ... the experience will open their eyes to STEM disciplines, in terms of majors and possibly, careers."

*-Gregg Meyer
PCC engineering faculty*

"It was a big day for all of us, especially those on Team Duck, which pulled off a win of 4-2 over the orange-clad Beavers," said Meyer. "And while I'm not

suggesting robots are reliable point spread predictors, isn't it curious that our teams matched the 2012 Civil War 2:1 score ratio just a few days later?" ■

