

## **Increasing Access and Diversity in Technology Programs**

### **A. Results from Prior NSF Support**

Portland Community College (PCC) currently has three active and one recently completed National Science Foundation funded projects: (1) Framing Student Success: Increasing Math and Science Achievement through Construction Technology (ATE – Award #0302945). PCC is developing and implementing a model of instruction and articulation focusing on construction technology creating linkages for students from high school to community college to four-year university to career; (2) Planning Grant for an ATE for Sustainable Development Education and Training Project (ATE – Award #0603466). PCC is planning the development of an ATE Regional Center for Sustainable Development Education and Training. PCC technology programs are active participants in this process; and (3) Increasing Access and Diversity in Engineering and Microelectronics Careers (CSEM – Award #0220875) is described in detail below. (4) Creating Avenues, Support and Equity for Women and Minorities in Advanced Technologies (ATE – Award #0101736) is a completed project. This project illustrates PCC's success in recruiting underrepresented students into technology programs. Despite a dramatic decrease in Computer Information Systems enrollment, due to the 2001-03 recession, the project was able to demonstrate increases in the percentage of women and minorities considering IT careers and enrolling in these courses. Specifically, the percentage of female students increased from 50.2% to 52.3% on PCC's Cascade Campus and from 42.1% to 43.6% at PCC's Sylvania Campus. Similarly, the percentage of Hispanic, African-American and Native American/Alaska native students also increased from 18.2% to 19.3% at Cascade and from 7.8% to 8% at Sylvania. The increases in female and minority enrollment, while slight, are remarkable given the economic environment.

The purpose of PCC's CSEMS project, "Increasing Access and Diversity in Engineering and Microelectronic Careers," has been to provide scholarships and support services to underrepresented students in engineering technology programs. This project has been very successful in meeting its goals. While the number of full-time students in the target technology programs fell by 39% during project implementation, primarily due to an economic recession, the CSEMS project met or exceeded four of five of its stated objectives described below:

1. Increase the number of underrepresented minority students in participating departments by 50%. *Between 2002 and 2005, the number of underrepresented students increased 50% from 12 to 18.*
2. Increase the number of female students in targeted departments by 25%. *Over the life of the CSEMS project the number of full-time female students increased 85% from 14 to 26 students.*
3. Increase by 20% the number of students in targeted departments who enter PCC within 12 months of graduating high school. *High school students entering the target departments decreased by 33% from 19 in 2002-03 to 11 in 2005-06. Anecdotal evidence suggests that students' decisions were affected by the economic climate during this period.*
4. 80% of CSEMS scholars will complete the two-year program in which they enroll. *88% of the CSEMS scholars completed a two-year program. 22 of 25 of students graduated with an Applied Associate of Science Degree.*
5. 95% of graduating CSEMS scholars will be employed or enrolled in a four-year program related to their discipline within 12 months of graduation. *100% of graduating CSEMS scholars were employed (16 of 22) or enrolled in a four-year program (6 of 22) within 12 months of graduation.*

During the 2001-03 economic recession, PCC's CSEMS scholarship project was instrumental in providing opportunities for students to pursue a degree. The Pacific Northwest was hit harder by the recession than any other region in the country with Oregon having the highest unemployment rate in the country and the Portland Metro area having the highest unemployment in the state.<sup>1</sup> Due to the high unemployment rates and a weak job market, enrollment fell at all community colleges involved

in the CSEMS project. Grant partners, Tillamook Bay Community College and Columbia Gorge Community College, closed their engineering technology programs, in part, because of the recession. Because of the CSEMS project, PCC's Civil and Mechanical Engineering Technology (CMET), Electronic Engineering Technology (EET), and Microelectronics Technology (MT) programs were able to provide scholarships to students affected by the changing economic climate. Faculty consider the CSEMS program to be one of the most important factors in drawing students to their programs during the recession.

### **B. Project Objectives and Plan**

The overarching purpose of the proposed "Increasing Access and Diversity in Technology Programs" S-STEM project is to enhance the numbers of educated and skilled technology workers in the Portland Metro area, with a particular focus on populations underrepresented in these fields. For this project those underrepresented populations are women, African Americans, Hispanics, and Native Americans/Native Alaskans (see Section D for Program Demographics). This project will exclusively serve students who are academically talented and have demonstrated financial needs. An additional requirement will be that these students are (1) seeking two-year degrees in the following PCC programs: Civil/Mechanical Engineering Technology (CMET), Electronic Engineering Technology (EET), Machine Manufacturing Technology (MMT), and Microelectronics Technology (MT); or (2) are S-STEM scholars who have completed or are completing one of the above technology program and who chose to transfer into one of Oregon Institute of Technology's (OIT) four-year technology programs to seek a Bachelor of Science (B.S.) degree located on its Portland Campus. These students will receive scholarships for the third year of the B.S. program. In the fourth year of the OIT program, students enter the "Industry Sponsored Independent Senior Project" for which industry partners reimburse tuition costs.

The technology programs at PCC and OIT have been targeted for two reasons. First, there is high demand for technicians trained in these areas at both regional and statewide levels, as described in Section C. Second, targeting specific programs will allow PCC to promote cohesion among students with shared interests and needs. In accordance with NSF's stated goals for the S-STEM projects, "Increasing Access and Diversity in Technology Programs" will achieve these eight goals:

- Goal #1:** Increase numbers of well-educated and skilled employees in engineering technology and microelectronics technology.
- Goal #2:** Improve educational opportunities in STEM disciplines for academically talented students with the greatest financial need.
- Goal #3:** Improve educational opportunities for academically talented students from populations underrepresented in STEM disciplines with the greatest financial need.
- Goal #4:** Increase retention of students to degree completion.
- Goal #5:** Improve student support and recruitment programs.
- Goal #6:** Strengthen partnerships between PCC, OIT, and local engineering and technology employers in industry and government.
- Goal #7:** Increase numbers of engineering technology and microelectronics technology students entering PCC directly from high school.
- Goal #8:** Increase numbers of graduates continuing on to four-year electronic engineering programs.

To accomplish these goals, PCC will build on its current CSEMS project, offering a comprehensive package of student outreach and support, career exploration, college transfer and job placement services. PCC will also leverage its network of local and regional industry partnerships to aid in recruiting and retaining its S-STEM scholars and placing them into jobs or four-year degree programs upon graduation. Specifically, a total of sixty-six (67) S-STEM scholarships will be

awarded as follows: fifty-five (55) two-year scholarships valued at \$4,250 per year for a total of \$8,500 for the full two-year scholarship, and twelve (12) one-year scholarships valued at \$4,250 per year will be awarded to S-STEM scholars who have completed their two-year program and enter OIT Technology programs seeking a B.S. degree. The amount available for each scholarship year has been selected because it will cover costs for tuition, books, and supplies at each institution. **Along with targeting women and underrepresented minorities in technology programs, the project will also increase access to these programs by providing scholarship funds to those students with the greatest financial need.** Specific objectives and implementation strategies are described below:

**Objective #1: Increase the number of underrepresented minority students in participating technology programs by 50%. Increase from 21 to 32 full-time, underrepresented minority students. Goals Addressed: #1, #2, #3 and #7**

1. Develop engaging recruitment materials announcing S-STEM scholarships and support services and distribute widely at targeted high school, college, and community locations. Materials will be available in Spanish and depictions of underrepresented minority students will be used to provide positive role models.
2. Implement Math Visits Recruiting Program to provide information to current PCC students on S-STEM technology programs, potential technology career pathways, and financial resources available through the S-STEM scholarship program.
3. Conduct outreach activities and presentations designed to inform potential participants about careers in technology and S-STEM scholarships and services:
  - a. To PCC college preparation programs, specifically *Gateway to College*, *Upward Bound*, and *Talent Search*, which serve large numbers of high school students from underrepresented populations and from economically disadvantaged families.
  - b. At area high schools with significant African American, Hispanic, and/or Native American populations.
  - c. At community centers that serve a large number of African Americans, Hispanics, or Native Americans.

**Objective #2: Increase the number of female students in the targeted departments by 25%. Increase from 29 full-time women students to 36 full-time women students in technology programs. Goals Addressed: #1, #2, #3, and #7**

1. Work with the Gender Equity Team of the Portland Area Vocational Technical Educational Consortium (PAVTEC) to raise awareness in area high schools and communities about technology careers for women.
2. Implement Math Visits Recruiting Program to provide information on S-STEM technology programs, potential career pathways, and financial resources available through the S-STEM scholarship program.
3. Provide S-STEM scholarship information to the Women's Resource Centers located on each of PCC's three campuses: Sylvania, Rock Creek, and Cascade.
4. Develop engaging recruitment materials announcing S-STEM scholarships and support services and distribute widely at targeted high school, college, and community locations. Materials will be available in Spanish and images of women will be used to provide positive role models.

**Objective #3: Increase by 20% the number of students in targeted departments who enter PCC within 12 months of graduating from high school. Increase from 14 full-time to 17 students entering target programs within 12 months of graduating from high school. Goals Addressed: #1, #2, #3, and #7**

1. Provide opportunities for high school students who are interested in robotic construction to take two tuition-free, introductory PCC Machine Manufacturing Technology courses, while earning college credit.
2. Provide scholarship information to existing PCC programs including *Gateway to College*, *Upward Bound*, and *Talent Search* which provide assistance to high school students from underrepresented populations and economically disadvantaged families.
3. Work with PAVTEC to present S-STEM information through their programs, such as high school counselors' workshops, high school transition fairs, and PCC–High School Connections teams.
4. Increase high school counselors' awareness of opportunities afforded by the S-STEM project when they attend annual information sessions at PCC and by creating a contact e-mail list to provide updated information on scholarship availability.

**Objective #4: 80% of S-STEM scholars will complete the two-year program in which they enroll. 44 S-STEM scholars will receive an associates degree or certification and/or OIT four-year degree. Goals Addressed: #1, #2, #3, #4, #5, and #6**

1. Host S-STEM scholars' orientation events at which they will meet peers, faculty, and industry mentors; get an overview of their respective programs; and learn what is expected of them as S-STEM scholars.
2. Increase hours for drop-in tutoring sessions, with special weekly sessions devoted specifically to S-STEM scholars.
3. Engage students in monthly activities designed to promote peer connections among scholars, such as workshops with industry representatives about technology careers.
4. Initiate one-on-one meetings between each S-STEM scholar and the co-PI from the relevant department to discuss student progress and troubleshoot potential barriers to academic success.
5. Introduce S-STEM scholars to available student services (detailed in Section D below) and assist them in accessing services applicable to their individual needs.
6. Host graduation celebrations to honor the accomplishments of S-STEM scholars and motivate scholars working toward a degree.

**Objective #5: 95% of graduating S-STEM scholars will be employed or enrolled in a four-year program related to their discipline within 12 months of graduation. Fifty (50) students will be employed or enrolled in four-year programs. Goals Addressed: #1, #3, #5, #6, and #8**

1. Provide scholarship funds to PCC student completing a two-year program in EET who chose to transfer to OIT's four-year technology programs.
2. Organize campus tours for S-STEM scholars to Oregon Institute of Technology to introduce them to OIT faculty and technology programs.
3. Organize workshops with representatives from local industries to discuss career opportunities and benefits of a four-year degree.
4. Provide optional internship and cooperative work experience opportunities.
5. Meet with a dedicated student support specialist to prepare résumés, draft cover letters, and go through mock interviews.
6. Plan appointments for each S-STEM scholar with the appropriate college's Job Placement Office.

### **C. Significance of Project and Rationale**

Portland Community College is the largest institution of higher learning in Oregon, serving more than 1,336,667 college-age residents in a five-county, 1,500-square mile area. The district includes the state's largest city, Portland, and the most rapidly growing population areas in Oregon. In 2005-06, PCC enrolled more than 88,200 students at three campuses and multiple education and training

service centers located throughout the Portland Metro area. PCC students receiving scholarship funds through this project will attend classes at PCC’s Sylvania and Rock Creek campuses. Minority students make up 24% of the PCC student body (compared to 21.7% of the population of the Portland Metro area<sup>2</sup>). Women comprise 56.3% of PCC students and the average student age is 29. 65% are employed full or part-time and 73% of all full-time credit students received some form of scholarship, work-study employment, loans or grants to help pay their tuition in 2005–06. Approximately, 31% of all students receive financial aid.<sup>3</sup>

The “Increasing Access and Diversity in Technology Programs” project will meet a critical need in providing scholarships funds to technology students. Additionally, the PCC Board of Directors has established the following goal related to institutional diversity: “Goal #3 - We will enrich the educational experience by committing to the development of diversity in our student body, faculty and staff.”<sup>4</sup> This project will play an important role in increasing the diversity in technology programs on campus diversity as a whole. The table below provides an overview of current demographics in the targeted technology programs and will provide a baseline for data collected through the course of the project:

<b>Current S-STEM Technology Program Demographics - Full-Time Students, Winter 2006 <sup>5</sup></b>				
Programs	Total Students	Female	Under-represented*	Under Age 19
Civil/Mechanical Engineering Technology	59	11 (18.6%)	9 (15.3%)	5 (8.5%)
Electronics Engineering Technology	18	2 (11.1%)	4 (22.2%)	3 (16.7%)
Microelectronics Engineering	48	13 (27.1 %)	5 (10.4%)	5 (10.4%)
Machine Manufacturing Technology	22	3 (13.6%)	3 (13.6%)	1 (4.5%)
<b>Total</b>	<b>147</b>	<b>29 (19.7%)</b>	<b>21 (14.3%)</b>	<b>14 (9.5%)</b>

\*Underrepresented minorities include African Americans, Hispanics, and Native American/ Native Alaskans.

This project will also meet the critical, nation-wide need by increasing underrepresented minority populations in the high tech work place. By increasing student populations in PCC’s technology programs, we also increase the diversity of our future technology workforce. Additionally, there is a need to provide for more well-trained technology workers in Oregon and, more specifically, in the Portland Metro area where most of the state’s high tech industries are located. The Oregon Employment Department, as shown in the table below, anticipates high demand for employees in STEM technology related industries located in regions served by PCC and OIT:

<b>Employment Projections by S-STEM Technology Occupations 2004-2014 <sup>6</sup></b>								
S-STEM Technology Occupations	Oregon Statewide				Multnomah / Washington Counties (Portland Metro Area)			
	Employment		# Jobs	% Change	Employment		# Jobs	% Change
	2004	2014			2004	2014		
Mechanical Engineering Technicians	625	720	95	15.20%	408	488	80	19.60%
Civil Engineering Technicians	1271	1460	189	14.90%	619	734	115	18.60%
Electrical/Electronic Engineering Technicians	2832	3359	527	18.60%	1574	1798	224	14.20%
Semiconductor Processors	4550	4906	356	7.80%	1567	1754	187	11.90%
Machinists	3273	3626	353	10.80%	1275	1400	125	9.80%

The technology occupations above, for the most part, are also technical areas of national need. As the largest institution of higher education in Oregon, PCC has an exceptional opportunity to expand Oregon's tech workforce and its diversity to meet growing industry need through implementation of this important project.

#### **D. Activities on Which the Current Project Builds**

S-STEM scholars at both PCC and OIT-Portland will have access to three levels of support designed to help them achieve academic success: College-wide services, Department-specific services, and S-STEM-targeted services developed or enhanced through this proposal (these services are discussed in Section G). As a part of their orientation and ongoing advising, S-STEM scholars will be made aware of all support services programs available to them and assisted in accessing appropriate resources. Student support will make it easier to identify and assist students in need, increasing the likelihood that they will complete their degree in a timely fashion.

#### **PCC College-Wide Student Support Services:**

TRiO Student Support Services (SSS)—PCC's TRiO SSS program offers services to increase student retention, graduation, and transfer rates of low-income and first-generation students. Each student in the program works with an advisor to create an individualized Contract for Success. This contract is based upon comprehensive skills, interest, and needs assessments, which address each participant's academic, social, and economic situations.

Tutoring—Tutoring is available in English, mathematics, and science through the Student Success Center. In addition, the Multicultural Center provides peer tutors in technology disciplines for minority students.

Women's Resource Centers—Centers are located on each of PCC's three campus and provide college advising and information on educational programs, child care resources and subsidy information, community resource referrals, and crisis intervention and problem solving assistance.

Campus Career Centers—Professional counselors are available to advise students on career decisions, job research, and interview preparation.

#### **PCC Department-Specific Support Services:**

Orientation Sessions—These sessions provide an overview not just of individual programs, but of support services and social activities available to make student life successful and enjoyable. Deans, faculty, and industry representatives participate in sessions. Professionals will include women and those from minority populations to provide positive role models for S-STEM scholars.

Student Success Seminars— Weekly sessions are offered by each department to help students with study skills, problem solving, critical thinking, conflict resolution, understanding diversity, test taking, social skills, and job search skills.

Partnerships with Industry— Each department involved in this project has an industry advisory board. Industry representatives (many of whom are PCC alumni) also discuss career paths and facilitate student career placement in the STEM workforce. Letter of commitment to assist with the project have been received from Intel, FSI International, Manufacturing 21 Coalition and others.

Academic and Career Advising—A dedicated student support specialist acts as a safety net for technology students, assisting them with financial aid applications, language and cultural difficulties, courses of study, career research, and financial crises.

Job Search Workshops—Job search workshops are offered year-round. These sessions provide information on drafting résumés, writing cover letters, researching industries, locating and culling job listings, and preparing for job interviews.

Internships—Local industry partners, such as Intel, Cascade Microtech, and others, offer internships to PCC students and assist with career placement. After graduation, many of these students are hired by the company that provided the internship.

**OIT-Portland College-Wide and Department-Specific Student Support Services:**

Tech Opportunity Program (TOP): TOP is a federally funded (TRiO: Student support services) academic program designed to assist highly-motivated students who are also low-income, first generation or have disabilities. TOP offers services to increase student retention and graduation.

Tutoring—Tutoring is available in English, mathematics, and science through the Center for Learning and Teaching.

Communication Skills—Special help is available to students for whom English is a non-native language. This assistance includes intensive work on communicating more effectively, writing research papers, and preparing presentations.

Campus Career Centers—Professional counselors are available to advise students on career decisions, job research, and interview preparation.

Assistance Services—Childcare, note-taking services, and assistance to students with disabilities and special needs students are all available.

**E. Management Plan**

The “Increasing Access and Diversity in Technology Programs” project includes five programs on three different campuses. Targeted PCC technology programs are located on the Sylvania and Rock Creek Campuses and OIT’s technology programs are located on Portland Campus. One lead PI and four co-PIs will be needed to ensure successful project implementation and consistency. The following lead PI and four co-PIs are all instructors in the programs whose students would be supported by S-STEM scholarships:

**1. Principal Investigator & Co-Principal Investigators:** The project will be lead by the following high quality, diverse team that understands the needs of their students, including the targeted underrepresented populations and can serve as role models for these students.

**Todd Sanders**, Ph.D., PCC Sylvania, General Engineering and Civil and Mechanical Engineering Technology Instructor. As lead Principal Investigator (PI), Dr. Sanders will provide overall project leadership and management. He will oversee and coordinate the activities of the co-PIs, the Advisory Committee, and the Scholarship Selection Committee. He will also coordinate activities related to recruiting students and will implement the evaluation plan, including tracking S-STEM scholars following graduation. Dr. Sanders is currently the PI on PCC’s CSEMS project. Dr. Sanders has a MS and Ph.D. in Physical Oceanography from University of Delaware and a BS in Civil Engineering from Michigan State University. The four co-PIs who will work with Professor Sanders are:

**Dorina Cornea-Hasegan**, Co-Chair of Microelectronics Technology, PCC Rock Creek. Ms. Cornea-Hasegan was a co-PI in the NSF-CSEMS project. Ms. Cornea-Hasegan earned MS degrees from Polytechnic Institute of Cluj, Romania in Electrical Engineering and from Purdue University in Industrial Technology.

**Sanda Nedelcu**, Chair of Electronic Engineering Technology Department, PCC Sylvania. Ms. Nedelcu has both a Bachelor and MS degree from Craiova University, Romania, in Electrotechnical Sciences and a MBA from Marylhurst University in Oregon.

**Pat Kraft**, Chair of Machine Manufacturing Technology Department, PCC Sylvania. Mr. Kraft holds a BS in Manufacturing Engineering Technology from the Oregon Institute of Technology.

**Mateo Aboy**, Ph.D., Program Director, Oregon Institute of Technology Electronic Engineering Technology Program–Portland Campus. Dr. Aboy holds MS degrees in Electrical & Computer Engineering from Portland State University and Telecommunications Engineering, University of Vigo, Spain, and a Ph.D. in Electrical Engineering/Biomedical from the University of Vigo, Spain.

The co-PIs will be responsible for coordinating and personally directing the recruitment efforts in local high schools and community groups. They will act as primary liaisons between local industries and the participating departments. The co-PIs will be in charge of organizing and scheduling monthly S-STEM activities and meetings. They will also advise and support S-STEM scholars monthly to ensure they are getting the help they need, track student progress, and make sure that project objectives are being met. The PI and co-PIs will also act as the scholarship selection committee.

**Other Management Personnel:** The Math Visit Recruitment Program will be delivered by a part-time faculty member from the technology programs who will develop and implement the program. NSF funds will also provide the assistance of a PCC Accountant who will assist the PI with issues related to managing funds and contract.

**2. Advisory Committee:** Project oversight and guidance will be provided by an Advisory Committee. This committee will be composed of division deans for the programs represented, a **financial aid coordinator**, a **student services specialist**, and the lead PI and co-PIs. Before recruitment activities begin, the Advisory Committee will meet to discuss the design and delivery of materials to publicize the scholarship project. The Committee will convene at least twice each year to ensure that student services designed for S-STEM scholars are delivered and will also be charged with assessing the progress of the project toward its stated goals and providing feedback if changes or improvements in the project become necessary. The student services specialist and financial aid coordinator will work together to ensure that S-STEM activities dovetail with existing recruitment efforts, student support services (e.g., TRiO), and retention efforts (e.g., tutoring, mentoring, peer involvement), and will collaboratively administer the scholarship monies.

**3. S-STEM Scholarship Selection Committee:** Finally, there will be a Scholarship Selection Committee with each program area represented. Membership will consist of the PI and co-PIs. The committee will meet in December and March during the scholarships cycles to evaluate the S-STEM applications and to see that scholarships are distributed equally among all programs involved. (See Section F below for more detailed timeline and eligibility criteria.)

**4. Implementation Timeline:**

Project Implementation Timeline	
Schedule	Implementation Elements
Fall 2007	<ul style="list-style-type: none"> <li>• Advisory Committee reviews project work plan and revises recruitment materials and work with Media Services to develop press releases, etc.</li> <li>• Recruitment brochures and posters printed and sent to appropriate schools, agencies, and organizations. Press release sent to media outlets (ongoing).</li> <li>• Scholarship applications for first-year technology students are made available by Nov. 1; due Dec. 1. Scholarship Selection Committee convenes and awards</li> </ul>

	<p>scholarships. S-STEM scholars notified by beginning of Winter term.</p> <ul style="list-style-type: none"> <li>• Math Visit Recruitment Program begins and will continue Fall, Spring, and Summer quarters for the each of the four years of the project.</li> </ul>
Winter 2008	<ul style="list-style-type: none"> <li>• S-STEM scholars receive awards and attend orientation event.</li> <li>• Applications for S-STEM scholarships available on Feb. 1 and due March 1. Scholarship Selection Committee convenes and chooses scholars; S-STEM scholars notified by start of Spring term.</li> <li>• Recruitment event for interested high school students.</li> <li>• First Field Trip. Additional field trips will be held each Winter quarter of the project.</li> <li>• Student tutors are hired and S-STEM tutoring program begins and is available for the four years of the project.</li> <li>• Introductory Machine Manufacturing courses for high school students begin and continue for the four years of the project.</li> <li>• First orientation event for new S-STEM Scholars</li> </ul>
Spring 2008	<ul style="list-style-type: none"> <li>• Applications for NSF-CSEMS scholars interested in an OIT BS degree in Technology available May 1. Scholarship Selection Committee convenes and awards OIT scholarships; S-STEM OIT scholars notified by early June.</li> <li>• Applications for high school students with PAVTEC articulation credits are made available May 1. Scholarship Selection Committee convenes and chooses scholars; S-STEM scholars notified by graduation date, early June.</li> <li>• Orientation event for new S-STEM scholars.</li> <li>• Advisory Committee meets to reviews results and make project adjustments.</li> <li>• Review S-STEM scholar progress and eligibility. This will occur each quarter for the remainder of the project.</li> <li>• First monthly S-STEM Roundtable held and will continue each month of the project.</li> </ul>
Fall 2008	<ul style="list-style-type: none"> <li>• Advisory Committee meets for review project.</li> <li>• Orientation event for new scholars (recent HS graduates).</li> </ul>
Winter 2009	<ul style="list-style-type: none"> <li>• Recruitment event for high school students.</li> </ul>
Spring 2009	<ul style="list-style-type: none"> <li>• Applications for S-STEM scholars interested in articulating to OIT made available May 1. Scholarship Selection Committee convenes and chose scholars; S-STEM OIT scholars notified by early June.</li> <li>• Applications for high school students are made available May 1. Scholarship Selection Committee convenes and chooses scholars; S-STEM scholars notified by early June.</li> <li>• Recruitment begins for second cycle of scholarships to be offered to first-year technology students.</li> <li>• First graduation event. Future graduation events will be held each Spring quarter.</li> <li>• Advisory Committee meets to reviews results and make project adjustments.</li> </ul>
Fall 2009	<ul style="list-style-type: none"> <li>• Advisory Committee meets for project review.</li> <li>• Scholarship applications for first-year technology students are made available by Nov. 1; due Dec. 1; Scholarship Selection Committee convenes and selects S-STEM scholars; S-STEM scholars notified by beginning of Winter term.</li> <li>• Orientation event for new scholars (recent HS graduates).</li> </ul>
Winter 2010	<ul style="list-style-type: none"> <li>• S-STEM scholars receive award and attend orientation event.</li> <li>• Applications for remaining S-STEM scholarships available Feb. 1; due Mar. 1</li> <li>• Scholarship Selection Committee convenes and chooses scholars; S-STEM scholars notified by start of Spring term.</li> </ul>
Spring 2010	<ul style="list-style-type: none"> <li>• Orientation for new scholars.</li> </ul>

	<ul style="list-style-type: none"> <li>• Advisory Committee meets to review results and make project adjustments.</li> </ul>
Fall 2010	<ul style="list-style-type: none"> <li>• Advisory Committee meets for project review.</li> </ul>
Spring 2011	<ul style="list-style-type: none"> <li>• Advisory Committee meets. Project completion activities.</li> <li>• Final report submitted to NSF.</li> </ul>

## **F. Student Selection Process and Criteria**

### **1. Scholarship Eligibility Requirements –**

#### **a. General Scholarship Requirements for All Applicants:**

At the time of application each S-STEM applicant must:

- Be a US Citizen, permanent resident, national, or refugee (as defined in the NSF solicitation)
- Meet academic requirements for one of the S-STEM programs.
- Demonstrate financial need, based on the cost of attending PCC or OIT, minus family contribution. This information will be obtained from the Free Application for Federal Student Aid (FAFSA) application and verified by PCC’s Financial Aid Office
- Demonstrate academic talent (e.g., GPA of 2.5 in coursework in high school or PCC and academic promise shown in personal statement)
- Offer assurance that he/she will register for at least 12 credits per term (i.e., full time) at PCC or OIT while a S-STEM scholar
- Commit to meeting regularly with co-PI/advisor and participating in S-STEM activities
- Agree to respond to surveys to determine employment or student status following graduation

#### **Additional Scholarship Requirements:**

**Requirements for 1<sup>st</sup> Year PCC Technology Students:** Students must enroll in a target technology program for one (1) quarter, taking at least six credits prior to receiving scholarship funds. This buffer ensures that students are committed to the program before they are awarded scholarships.

**Requirements for High School Students:** Students must receive advising from one of the target PCC technology programs, must meet program entry requirement, and will be required to have completed at least three (3) PAVTEC-PCC dual credits.

**Requirements for PCC S-STEM Scholars Articulating to OIT Four-year Programs:** Students must receive advising from one of the target OIT technology programs. Only PCC CSEMS & S-STEM scholars will be allowed to apply for these scholarship funds.

**2. Selection Process:** Students will apply for S-STEM scholarships by first completing a FAFSA and then PCC’s standard scholarship application which is used for all scholarships distributed through PCC’s Financial Aid Office. These forms will be made available at financial aid and student support services offices on all campuses and in area high schools and targeted community organizations. The application that students will use to apply for S-STEM scholarships consists of four sections: personal and educational information, financial information, a one-page personal statement that addresses educational and career goals, and three letters of recommendation.

**3. Scholarship Renewal:** Scholarships will be renewed each term, provided that students continue to meet all eligibility requirements and demonstrate progress towards graduation. Scholarship award are available for a maximum period of two years for PCC students and an additional year for students continuing their education at OIT.

**4. Reallocation Procedure:** Regular monthly meetings between co-PIs and each S-STEM scholar will make it possible to identify and avoid any difficulties by ensuring that students receive the support they need. Student hardship will also be considered as a part of this decision and a deferral of scholarship funds may be offered, if justified. If at the end of any term, a student does not meet the

criteria listed above, the remainder of the scholarship will be forfeited. The remaining money will then go to the next-ranked applicant who did not receive a scholarship.

### **G. S-STEM Student Support Services and Programs**

In addition to the campus-wide and department-specific support detailed in Section D, PCC will put in place recruitment activities and retention services designed specifically for S-STEM scholars. These measures will help the colleges meet their stated objectives, building on lessons learned from PCC's CSEMS project.

#### **1. Recruitment Activities**

**High School Recruitment Activities:** One of the challenges of PCC's previous CSEMS project was effectively recruiting high school students, particularly those from underrepresented populations and those with the greatest economic need. To more effectively recruit high school students, PCC will implement the following:

***Tuition for High School Students:*** This program will expose high school students involved in the international "FIRST" robotics competitions to PCC and the Machine Manufacturing Technology program. With this free tuition program, students will be enrolled in two courses within the Machine Manufacturing Technology Department. The first class is Manufacturing Processes I (4 credits), which provides a broad overview of manufacturing processes. The second course is Shop Project Machine Technology II (3 credits). This class allows students to work on self-defined projects, with approval of the instructor. Both of these courses are transcribed college courses and would go towards degree and certificate completion requirements from the MMT department. The classes are self-paced and are open until 8:30 pm Monday through Thursday allowing for the flexibility high school students require to attend. Pat Kraft, co-PI, assists high schools throughout the region with mechanical manufacturing programs and will directly recruit interested students for this programs.

***PAVTEC:*** The PI will work with PAVTEC to promote the S-STEM scholarships and distribute S-STEM information at PAVTEC events and meetings, such as the PAVTEC Council, the Gender Equity Team, high school counselors' workshops, high school transition fairs, and PCC-High School Connections teams. The purpose of PAVTEC is to enhance the access of high school and PCC students to quality professional technical education. This encompasses a broad scope ranging from career development to technical skill development instructional programs.

***PCC College Preparation Programs:*** PIs will also work closely with existing PCC programs such as Gateway to College, Upward Bound, and Talent Search. Each of these programs provides support to populations that would benefit from access to S-STEM scholarships. Gateway to College provides high school students who have dropped out but demonstrate strong academic potential with opportunities to earn both high school and college credit while providing participants with intensive academic and personal support. Upward Bound and Talent Search prepare low-income and first-generation high school students for college during their high school years by providing tutoring, advising and mentoring services, as well as opportunities to explore various careers.

***Organization Contacts:*** Co-PIs will work with Portland area high schools that have significant African American and Hispanic populations (e.g., Jefferson and Forest Grove High Schools) to conduct engaging presentations that explain the S-STEM scholarships and career opportunities. Recruitment materials will be provided in Spanish to reach Spanish-speaking parents of Hispanic youth. Co-PIs will also work with local organizations that promote educational and career opportunities for underrepresented minority youth (e.g., Centro Cultural, Self-Enhancement, Inc.) and with MESA, the Oregon Math, Engineering, and Science Achievement Program.

PCC Recruitment:

***PCC Math Visits Recruitment Program:*** The goal of the PCC Math Visits is to reach out to an audience that is extremely diverse in gender, ethnicity, socio-economic status, and age and already in an area of study pertinent to all S-STEM careers – math. The PCC Math Visits will consist of a highly engaging presentation on a diverse range of S-STEM career opportunities and the different S-STEM programs and classes available at PCC. The S-STEM Scholarship project will be described and outreach materials will be made available to interested students. The presentations will be delivered to all PCC Math 60 (Introductory Algebra) to Math 111 (College Algebra) courses prior to each application cycle, providing interested students with time needed to apply for scholarships.

***Media Outreach:*** PCC's Media Relations Department will develop press releases and promote articles about the S-STEM scholarships and technology careers in community papers that serve underrepresented minority populations. Efforts will also be made to highlight underrepresented populations in outreach materials such as using photographs of these populations in brochures and on websites. S-STEM scholars will also be highlighted on the PCC Homepage.

OIT Recruitment: PCC S-STEM scholars in the EET discipline will receive information directly from faculty concerning the OIT-Portland program so that they will be aware of the opportunity to receive financial support if they chose to seek a four-year degree. PCC students will also have the opportunity to visit the OIT campus and meet directly with OIT faculty through annual field trips.

**2. Retention Activities:** S-STEM scholars will be required to meet with the PI or co-PI from their department on a regular basis and will be encouraged to participate in the additional activities described. There will be a mix of day, evening and weekend activities to accommodate student schedules.

One-On-One Meetings: Each scholar will meet one-on-one with the PI or co-PI from his/her department monthly. This will afford the scholar a chance to get any necessary help needed for academic success and will provide valuable feedback to the co-PI about student progress and the status of the program.

Tutoring Services: After financial resources, technology students described tutoring as their greatest need. All technology programs currently offer tutoring, but the S-STEM project hours that tutoring is available will be increased and special sessions, tailored to meet the needs of S-STEM scholars, will be added. Four tutors will be hired providing 70 hours of service each year.

Financial Aid Services: A financial aid coordinator will be directly involved in the project, assisting S-STEM Scholars with their financial aid and scholarship applications and mitigating any problems with their financial aid package once it is awarded.

Student Recognition Events: Orientation dinners will be held at the beginning of Winter and Spring terms so that students can get to know their S-STEM peers, faculty, and administrators, become familiar with their program of study, and be recognized for being awarded an S-STEM scholarship. Graduation celebrations will allow students to celebrate their accomplishments among their academic peers and instructors and motivate scholars who are still working toward a degree.

Monthly S-STEM Roundtables: There will be monthly meetings of S-STEM scholars at PCC and OIT. First and foremost, these sessions will build a group identity and support network among the scholars themselves. Speakers from area industries, including women and underrepresented minority professionals, will be brought in to discuss high-tech careers; representatives of area universities will discuss the benefits of the B.S., M.S., and Ph.D. in technology fields. The agenda for each meeting will differ, but will always include a roundtable discussion where students can raise any difficulties they are experiencing.

Field Trips: Once per year, S-STEM scholars will be offered the opportunity to take a field trip to a local business or government facility that employs PCC and OIT graduates, to include Intel, ESI, the Army Corps of Engineers, and others. The field trip will focus on career exploration and address the benefits of continued education in the field. Efforts will be made to introduce students to women and underrepresented minority professionals during site visits.

Annual S-STEM Meeting: Once per year, all the S-STEM scholars, along with faculty from all departments involved, will gather for a half-day meeting. This meeting will help build and maintain peer connections among scholars. It will also be an opportunity for the lead PI, co-PIs, and Advisory Committee members to convene and discuss the progress of the project.

### **3. Job or Four-Year College Placement Activities**

Field Trips: Once per year, S-STEM scholars will take a field trip to the Oregon Institute of Technology Portland Campus. While there, S-STEM scholars will tour the campus, observe classes, meet faculty, visit with student organizations, and learn about available student services and financial assistance.

Industry Presentations: Industry representatives will attend S-STEM student roundtables to discuss the benefits of a four-year degree in engineering and internship opportunities. Industry partners who have committed to assisting with the project include Intel, FSI International, Microchip, and MWH to name a few.

Internships & Job Placement Services: Through their individual departments, S-STEM scholars will be apprised of internship and cooperative work opportunities at local businesses. Each scholar will have an appointment with the Job Placement Office to discuss how to research technology careers, conduct a successful job search, write résumés and cover letters, prepare for an interview, and follow up after the interview.

### **H. Quality of Educational Programs**

Portland Community College: PCC's mission is to provide quality educational programs and services that are affordable and accessible. PCC is the largest institution of higher learning in the state, enrolling over 88,000 students annually. The college has three comprehensive campuses that provide lower-division college transfer courses, two-year associate degree programs, and professional and technical career training.

Civil and Mechanical Engineering Technology (CMET): By focusing on outcomes rather than entry requirements, the CMET program makes it possible for many students, who might otherwise have been turned away, to enter the engineering field. Recognizing that many entering students have not studied calculus, physics, or chemistry, the CMET program requires only basic algebra skills for admission. Students are introduced to applied mechanics on their very first day. By the end of their first year, they have mastered statics, strength of materials, and integral calculus. During the second year they have studied physics, chemistry, computer-aided drafting, and project management. Graduating students work for engineering consulting firms, government agencies, in construction, and manufacturing. Many graduates also transfer to four-year engineering technology programs.

Microelectronics Technology (MT): The MT program was developed in partnership with Intel Corporation with a truly multidisciplinary curriculum. The curriculum includes a foundation in math and science, followed by technical courses in semiconductor manufacturing processes, electronics, and vacuum and plasma technology. The course of study emphasizes the oral and written communication skills needed to work in a team-oriented environment. Through individual and group laboratory projects, MT graduates acquire problem-solving and analytical skills. Students have the

option to attend classes while pursuing internships at Intel and enter the workforce as semiconductor technicians.

**Machine Manufacturing Technology (MMT):** The Machine Manufacturing Technology Program trains students for entry level positions in the machinist trade. Machinists trained through this program operate material removal equipment such as lathes, milling machines, and grinders, many of which are computer numerically controlled. Much of the work in today's manufacturing companies requires machinists to use computers to model and program the parts for these automated machines. PCC's MMT program is unique in that it is a self-paced, open entry/open exit format. Classes are modular by design, allowing students to attend and complete work on a schedule that meets their needs.

**Electronic Engineering Technology (EET):** The Electronic Engineering Technology program at PCC is concerned with the theory and practice of applied electronics engineering. Emphasis is placed on the practical application of engineering knowledge. To apply electronics engineering knowledge requires a thorough background in mathematics and science which PCC's program provides. The EET program includes a combination of electronic technology courses and college transfer mathematics, physics, English, and elective courses. The two-year EET program is designed to train the best possible Electronic Engineering technicians in terms of overall technical competency. The program educates and trains people to work in many areas including research and development laboratories, electronic equipment manufacturing, public utilities, government agencies, medical laboratories and hospitals, electronic equipment distributing, and semiconductor manufacturing.

**Oregon Institute of Technology - Portland:** OIT's Portland Campus offers eight Bachelor of Science degree completion programs and one Master of Science program to students in the Portland Metro area. Graduates obtain jobs as part of teams that create, design and test devices and systems that permeate modern life in the workplace including computers, robots, medical diagnostic equipment, test equipment, communications devices, and aerospace components. By partnering with industry, OIT keeps its curriculum, theoretical and applied, current and relevant to future industry needs. OIT Portland programs provide special value for transferring students with an associate's degree. At OIT there is an emphasis on the application of engineering knowledge. S-STEM scholarship funds will be available for students entering the following four-year programs OIT technology programs: Electrical Engineering Technology, Machine Engineering Technology, and Mechanical Engineering Technology.

### **I. Assessment and Evaluation**

Program objectives will be evaluated rigorously on an ongoing basis, for the purposes of continuously improving the program and meeting program goals. PCC and OIT will collaborate in both formative and summative evaluations of the S-STEM project. The formative evaluation will include review of student recruitment statistics and of scholars' academic progress and retention. It will also include review of information from monthly meetings between co-PIs and S-STEM scholars to identify student barriers and recommend appropriate student services. Current S-STEM scholars and recent graduates will be surveyed on their S-STEM experiences including effectiveness of recruitment activities and student services provided. Qualitative and quantitative evaluation of the Math Visit Recruitment Program and the targeted efforts with high school students who have shown an interest in robotics will also take place to determine the effectiveness of these recruitment strategies. Advisory Committee meetings will review progress toward achieving project objectives and will provide feedback for consistent project improvement. The summative evaluation will consist of annual reports that will evaluate the project's effectiveness, provide a detailed picture of the project's achievements, and help determine the project's success in achieving the objectives laid out in Section B. These reports will be shared with NSF and appropriate executives, deans, and faculty.

As a result of PCC’s current CSEMS project, a database to track S-STEM scholars is already in place. This database will be adapted to include information from OIT. The information that will be tracked through the S-STEM database is: name, age, gender, and race/ethnicity of each S-STEM scholar; date high school or GED was completed; date enrolled in chosen technology program; courses taken and credits completed; grades; GPA; date of degree completion; and placement in technology job or four-year technology program. PCC routinely collects most of this data. Data that are not already being collected, such as rates of job placement and matriculation to four-year colleges, will be obtained from S-STEM scholars as part of their agreement to participate in the scholarship project. Co-PIs will be responsible for following up with S-STEM graduates to obtain this information. Co-PIs will forward all student data to the project administrative assistant, who will enter it into the database.

As explained in the table below, demographic data will be used to establish baselines against which percentage and numerical increases can be measured for the project’s five stated objectives. The baseline data for this project will S-STEM technology program attendance for full-time students as of Winter 2006 (See “Current S-STEM Technology Program Demographics - Full-Time Students, Winter 2006” in Section C). As part of the ongoing evaluation, the co-PIs will receive a report, produced by the PI at the beginning of each term and at the end of each academic year, detailing the academic status of each S-STEM scholar. This report will include courses taken, credits earned, grades achieved, and progress toward degree. In addition, the faculty and co-PIs will devote part of their scheduled S-STEM meetings to discussing the progress and the needs of current S-STEM scholars. The PI and co-PIs will keep a file on each S-STEM scholar that will contain that student’s college application, scholarship application, transcripts, and notes on the progress of each student. The PI will be responsible for writing the annual and final reports to NSF, with the input and assistance of the co-PIs. The table below provides specific objectives, methods, and the evaluator.

<b>Assessment &amp; Evaluation Plan</b>		
<b>Objective</b>	<b>Methods</b>	<b>Evaluator</b>
<b>#1:</b> 50% increase in under-represented minority students in targeted departments.	Use Winter 2006 data as baseline. Each year of project, data collected, entered into database, and compared to baseline.	Lead PI & co-PIs
<b>#2:</b> 25% increase in female students in targeted departments.	Use Winter 2006 data as baseline. Each year of project, data collected, entered into database, and compared to baseline.	Lead PI & co-PIs
<b>#3:</b> 20% increase in students in targeted departments coming directly from high school.	Use Winter 2006 data as baseline. Obtain high school graduation dates from S-STEM application; enter in database and compare to baseline.	Lead PI & Co-PIs
<b>#4:</b> 80% of S-STEM scholars will complete program in which they enroll.	Baseline will be total scholarships awarded compared with student program completion data. Graduation date will be entered in database and compared to baseline.	Lead PI & Co-PIs
<b>#5:</b> 95% of S-STEM scholars who complete program will be employed or enrolled in four-year college within 12 months of graduation.	Track outcomes by e-mail and regular mail surveys sent to graduates.	Lead PI & Co-PIs