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OSATC has reaffirmed Oregon Administrative Rule (OAR) 839-011-0084, which requires each committee to adopt certified curriculum for all new standards. In addition, OSATC directives and federal apprenticeship revisions [29 CFR 29], make the .0084 criteria mandatory benchmarks for all existing committee curricula. This essentially requires each JATC committee to maintain and provide documentation to show that its related training curriculum meets independent accreditation benchmarks. As such, we are developing a growing client base for which we are contracting to provide related training for their apprentices ............................................................................................................................................................................53

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Apprenticeship Introduction

Apprenticeships are careers that offer college level education for men and women wanting to earn living wages while they learn a skilled craft. For centuries, the apprenticeship structure has produced highly skilled craftspeople for construction and building trades across our great nation. These apprenticeship programs have shaped the dreams and built the realities of our homes, roads, bridges and system infrastructures that bind humanity throughout time. The construction and building trade careers afford tremendous advancement and educational opportunities, prevailing wages, healthcare and true pensions.

Apprenticeship is born on the premise that a solid background of knowledge, skill, pride and tradition learned through thousands of hours of on-the-job training and related classroom education will produce skilled workers who produce quality work.

The function of PCC in apprenticeship training is to provide related training classes for apprentices (at least 144 hours per year). Classes are technical in nature and are intended to supplement the training apprentices receive on the job. Apprenticeship programs are not intended to prepare for jobs, which can be learned in a relatively short period of time, rather their focus is to develop a master craftsman. The average training period is four years (some less, some more, but most train for four years). Apprenticeship is often called “The Other 4 Year Degree” since most apprenticeship programs are four years in length and provide the opportunity to work toward college level statewide degrees and certificates.

Apprenticeship has had a long history with Portland Public Schools and Portland Community College. Adult evening classes in Portland public schools started November 11, 1889. By 1921, evening classes were conducted in nine schools of the city of which trades preparation was one. During the 1930’s, Portland Public Schools through their adult education program, later Portland Community College, became involved with industry in the training of apprentices.

In 1966, PCC enrolled 1100 apprentices representing 25 different trades. In the 2003 recession, the college cut funding and the union program had lower enrollment of approximately 750 apprentices. In 1967, PCC purchased the old Multnomah College building (later renamed Stadium Center) for MDTA (Manpower Development and Training Act) programs. In 1974 PCC designated the building for apprenticeship programs. Sheet-Metal Local 16 contributed $35,000 from their trust fund toward the new facility. Apprentice (student) painters, floor covers, sheet metal workers, ironworkers, drywall finishers, sign and pictorial artists practiced their skills to improve the building. By 1985 plans were under way to sell the Stadium Center and relocate apprenticeship programs throughout the district. Due to the fragmentation of program
locations; many JATC's looked elsewhere for related training facilities. Non-union electricians and carpenters went to Clackamas Community College (CCC) where they were given land while the trust put up money for construction of a new Trades building on the CCC Campus. In 2003 PGE and PP&L partnered with CCC to establish an Electrical Training Center in Wilsonville. PCC was no longer the only hub of apprenticeship in the state.

As more JATC's began building or purchasing their own training facilities, the role of the community college also changed. PCC was no longer providing facilities, but rather we began to provide services in the form of instructional support. This was a win-win for everybody; it allowed PCC the opportunity to still support apprenticeship programs while freeing up on campus facilities for traditional programs.

Apprenticeship FTE looked good to the community colleges since most did not provide facilities. This FTE was often referred to as a "cash-cow", so schools became competitive in their drive to serve apprenticeship. In turn, "college boundaries" no longer meant much since local JATC's could include several community college districts within their boundaries. As things became more competitive, some colleges (not PCC) started ‘revenue sharing’ of FTE with JATC's. Most apprenticeship programs in the state had partnered with Mt. Hood Community College Apprenticeship Division. Eventually, as apprenticeship FTE grew many people were alarmed that this "revenue-sharing" practice would de-value the entire state FTE pool. An apprenticeship task force was developed to establish standards, which were released February 2002. With the drive for FTE, came a FTE freeze by the state.

Schools that had been collecting ‘revenue sharing’ FTE froze at a much higher level than those who did not, thus some schools were financially able to continue apprenticeships support at a higher level than others. The FTE freeze, along with the State financial cuts, pushed PCC to look at all possible avenues for reduction, one of which became apprenticeship.

In FY 03, the department supported 530.6 journeyman upgrade and apprenticeship FTE with an allocated budget of $618,482. In FY 04, as budgets were being cut across the district, apprenticeship contract instruction was reduced to $478,482 for 494.5 FTE. The Apprenticeship Standards were released and non-tuition based classes were no longer an option for apprenticeship Related Training. Therefore, PCC was forced to withdraw instructional and related service dollars after a very long-standing affiliation due to the FTE freeze and downturn of the economy. We had to turn away 209 FTE which relocated to Mt Hood Community College. Students enrolled in apprenticeship courses are committed to their JATC's affiliated school for the duration of their apprenticeship program-most being four years. This is a captive
and stable audience so enrollment numbers remain consistent therefore the majority of the programs who left remain at MHCC today.

In the ever changing and complicated world of apprenticeship, PCC found another way to participate in Oregon apprenticeships. In 2006, the department was awarded the bid to be the program administrator for the Limited Maintenance Electrician, Stationary Engineer, and Limited Manufacturing Plant Electrician apprenticeship programs. The apprenticeship programs serve Clackamas, Columbia, Multnomah, Washington and Yamhill counties in the State of Oregon. The department is responsible to create, collect, record and maintain apprentice records including; re-rates, monthly progress reports and classroom attendance rosters as required by the Oregon Revised Statute and Administrative Rule 839.

**Program/Discipline Overview**

**What are the educational goals or objectives of this program/discipline, and how do they compare with national or professional program/discipline trends or guidelines? Have they changed since the last review, or are they expected to change in the next five years?**

The educational goals of the Trades & Industry Department are to advance the region’s long-term vitality by delivering accessible, quality education to support the academic, professional, and personal development of the diverse students and communities we serve. These goals follow the Mission of Portland Community College. The course offerings of the Department reflect the dedication to filling the needs of our community in Northwestern Oregon and Southwestern Washington. The community consists of large international industries and organizations such as; Intel, Gunderson, Boeing, Solar World, and Leatherman. The community we serve also is made up of many small industries; heating, ventilation, and air conditioning, installation and repair companies, electrical companies doing large and small projects, and local manufacturing companies, service organizations such as school districts, hospitals, universities, colleges, and federal, state, county, and city governments. The employment base we support consists of new technicians entering the trades as well as employed technicians who wish to upgrade their skill levels. Of those technicians, especially Apprentices, many complete sections of the programs and receive their license or journey card in the Trade. We also provide Continuing Education courses for Oregon Electrical Licensing Renewal.

Our goals and course objectives are reviewed by our subject Area Committee (SAC) and by our Industry Advisory Committee to assure that all of our training is current with industry developments. All of our part time faculty members are also members of our SAC, most of whom are still working full time in their specific trade while instructing for our department. As
a result these goals and objectives are given supervision by both part-time and full time faculty as well as representative members from the local industries employing our students. We have extensively revised the majority of the Apprenticeship Courses to better align with accepted industry standards and practices. We have re-emphasized and added more “green” and “sustainable” content to a number of courses.

Our goals focus in three primary areas; Facilities Maintenance Technology/HVAC-R, Electrical Trades, and Apprenticeship. Our Department also administers the functions of the Joint Apprenticeship Training Committees (JATC) for Oregon LME & MPE Electricians. This involves tracking on-the-job-training hours and facilitating regular JATC meetings to assure our training is consistent with industry standards, and that Apprentices in these Programs are meeting all the benchmarks outlined by the Oregon Bureau of Labor and Industry.

Facilities Maintenance Technology/ HVAC-R (FMT) program students can earn the following degrees and certificates; an Associate of Applied Science Degree in Facilities Maintenance Technology (FMT), a Less-Than-One-Year 44-Credit Certificate in Facilities Maintenance Technology, a Career Pathway Certificate as a HVAC-R Installer of Residential and Light Commercial Equipment, and/or a Certificate for Oregon State Bureau of Labor and Industries approved Pre-Apprenticeship Training.

Apprenticeship students can earn the following degrees: an Associate of Applied Science in Construction Trades, General Apprenticeship, an Associate of Applied Science in Electrician Apprenticeship Technologies, and an Associate of Applied Science in Industrial Mechanics and Maintenance Technology Apprenticeship. Apprenticeship students can earn the following Certificates of Completion; Limited Electrician Apprenticeship Technologies, Electrician Apprenticeship Technologies, Manual Trades Apprenticeship, Construction Trades, General Apprenticeship, Mechanical Maintenance Apprenticeship, and Industrial Mechanics & Maintenance Technology Apprenticeship.

Students can earn a PCC Certification in Fiber Optics Technology and, as a service to industry, we offer Industry Certification for Amp/Tyco Fiber Optic Connectors.

**What changes have been made as a result of the last program review?**

As a result of our last program review, and in conjunction with the Department’s move from the original Southeast Center to Cascade Campus, our Department has upgraded and increased our real-world training equipment and Lab facilities. We have enhanced our course and instructor evaluation process. We have cooperatively worked with the college Education Department in developing one day courses in teaching methods and related subjects for technology instructors. The instructors in our department have taken these courses to sharpen their instructional skills in the classroom with good results. We have established
Statewide Apprenticeship Degrees and Certificates in cooperation with a consortium of 17 other Oregon Community Colleges. Our department has also purchased a unique software package which provides accuracy and flexibility in tracking apprenticeship records. This feature has enhanced our ability to create precise reports and documentation for the apprentice, employer, unions and the College when needed. We have established new courses such as Building Commissioning, Exploring Trades & Apprenticeship, Introduction to Facilities Maintenance, National Electrical Code Review and Examination Preparation, Fiber Optics Inside/Outside Plant, Basic Installation of HVAC-R equipment, Basic Human Interface for Industrial Controls, OSHA Safety Training, and Trades Preparation so that the Department has kept abreast with the needs of industry. We have extensively revised the majority of the Apprenticeship Courses to better align with accepted industry standards and practices. We have re-emphasized the “green” and “sustainable” content in a number of courses. We also have added, or are in the process of adding, several “green” and “sustainable” courses. We have made some minor changes to the Facilities Maintenance Technology Degree, adding PSY 101: Psychology and Human Relations, and PHY 101 – Fundamentals of Physics, to our Core Classes, and we have revised our List of Recommended Electives for that Degree.

Curriculum: reflect on learning outcomes and assessment, teaching methodologies, and content in order to improve the quality of teaching, learning and student success.

Addressing Course-Level Outcomes: Identify and give examples of assessment-driven changes made to improve attainment of course-level student learning outcomes. Where sequences exist, also include assessment-driven changes to those sequences. (CTE programs may address this in section 6).

Addressing the Six College Core Outcomes:
There are six Portland Community College Core Outcomes that The Department of Trades and Industry shares with all other Departments and Coursework at PCC. They are:
Communication, Community and Environmental Responsibility, Critical Thinking and Problem Solving, Cultural Awareness, Professional Competence, and Self Reflection.

Of these six Core Outcomes, the Department of Trades and Industry, including both the Facilities Maintenance Technology/HVAC-R Program and the Apprenticeship Program, and their individual courses, address and support two Core Outcomes to a very high degree. Those are “Critical Thinking and Problem Solving” and “Professional Competence.” We address and support two other Core Outcomes, “Communication”, and “Community and Environmental Responsibility”, to a moderately lesser degree. We do address and support the remaining two outcomes, “Cultural Awareness” and “Self Reflection”, but to a much lesser degree.
Overall, we, the Department of Trades and Industry, do address and support all six of the College Core Outcomes but not to the same quantifiable standard for each.

### Addressing College Core Outcomes

**Describe how the College Core Outcomes are addressed in courses, and/or aligned with program and/or course outcomes.**

For **“Critical Thinking and Problem Solving”:**

In both the Facilities Maintenance Technology/HVAC-R and Apprenticeship Programs, and in the accompanying backbone courses for both Programs, systematic troubleshooting and the control logic of mechanical and electrical facilities systems are what we teach and emphasize. The Refrigeration Mechanical Courses, FMT 101, 102, 103; the Refrigeration Electrical Courses, FMT 111, FMT 112, FMT 113; and most of the APR courses, especially APR 124, APR 125, APR 201, incorporate a systemic understanding of the sequences of operation of different types of equipment and the logical, step-by-step, correct, diagnosis of why a piece of equipment is not functioning. The logical troubleshooting skills obtained in these classes carry over into our more advanced controls courses. For example, courses such as FMT 202-Direct Digital Control and ELT 204-Adjustable Speed Drives instruct in problem solving using terms such as “Ladder Logic, Sequence of Operation, Programmable Logical Control, logical component elimination”. A Technician must be able to apply these specific, critical thinking, problem solving techniques to equipment malfunctions on a daily basis. In addition to the hard skills of critical thinking applied to equipment repair, all of our courses FMT, APR, ELT are infused with the soft skills of Customer Service and Customer Relations. Technicians must be able to problem solve, directly, with a diverse group of external customers, supervisors, fellow workers, and suppliers. Usually this is a different type of problem solving that is not as readily quantifiable, but many of our courses address this type of problem solving.

Our Degree and Certificate Outcomes, “Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers and supervisors”, “Perform corrective maintenance in facilities systems”, and “Recognize interrelationships of facilities systems to avoid negative impact,” Apply theory to electrical wiring”, definitely address and support this College Core outcome for “Critical Thinking and Problem Solving”.

For **“Community and Environmental Responsibility”:**

Both the Facilities Maintenance Technology/HVAC-R and the Apprenticeship Programs, since the 1980’s, have conscientiously supported Environmental Responsibility mostly by instruction
in meeting Federal Environmental Protection Agency’s mandates for the safe handling of refrigerants, especially Ozone Depleting refrigerants. We prepare all Facilities Maintenance Students to take and pass the Environmental Protection Agency’s 608 Certification Examination for the correct recovery, reclamation, and/or recycling of refrigerants of all types. We teach reduction in carbon dioxide emissions by advocating for proper and efficient combustion analysis of Fossil Fuels such as Natural Gas and Number Two Fuel Oil. Especially through courses such as Programmable Logical Controllers, Direct Digital Control, and Adjustable Speed Drives, we advocate for, and teach, the fine tuning of HVAC-R and Energy Management Control systems to achieve whole building efficiency. We have added FMT 265 – Building Commissioning as an Elective in the Facilities Maintenance Technology Degree Program. We teach proper air duct sealing in our FMT 210 – Basic HVAC-R class. We are in the process of adding two Solar Photo Voltaic courses as electives for the proper commissioning and maintenance of Photo Voltaic Arrays and their accompanying inverter systems. Our FMT 204 – Heat Pumps Class now includes the principles of ground source and ground water heat pump systems as well as high efficiency air to refrigerant systems. Many of our Apprenticeship Courses center on efficient lighting and high efficiency electrical motor operation. Load Study, including studies for both heat gain and heat loss of buildings, for proper sizing of both heating and air conditioning equipment, is taught in both our FMT 122 –Introduction to Boilers and FMT 210 – Basic HVAC-R Installation Courses. These are all examples of the environmentally responsible content woven throughout our Facilities Maintenance Technology/HVAC-R and Apprenticeship course content.

Under the guidance of the Oregon Bureau of Labor and Industry, the Department of Trades and Industry also serves as the administrator for three Apprenticeship Programs: Limited Maintenance Electricians, Manufacturing Plant Electricians and Stationary Engineers. As an Administrator, we provide a vital community service to the Companies who employ our Apprentices as well as to the Apprentice themselves. The Apprenticeship Administrator is charged with ensuring that each Apprentice is meeting the benchmarks for coursework, classroom hours, on-the-job training hours, and accurate record keeping as outlined in the State of Oregon Administrative Rules and as enforced by the Oregon Bureau of Labor and Industry. The ability of an individual Apprentice to progress through their two to five year program, to obtain rerates for pay increases, to accumulate their correct OJT hours, and to eventually obtain their Oregon License or Journey Card, depends on the accuracy and the skill of an Apprenticeship Administrator.

Our Degree and Certificate Outcomes, “Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors”, “Perform preventative maintenance in facilities systems”, and “Recognize interrelationships of facilities systems to
avoid negative impact”, “Apply theory to Electrical Wiring address and support this Core Outcome of Community and Environmental Responsibility.

For “Professional Competence”:

One unique feature of the Department of Trades and Industry is the professional background of its Faculty and Staff. There are three Full Time Faculty members, forty three Part Time Faculty members, one Academic Professional, one Administrative Assistant, and one Lab Technician.

Of the Full time Faculty members, all three have had a full, successful, career in the Facilities Maintenance Technology/HVAC-R or Electrical Industries before starting a new career as an Instructor in the Department. Of the Part Time Faculty, all forty three members have had successful careers, and are now either retired or still working industry jobs as well as instructing in the HVAC/R or Electrical profession. Their careers have been successful because of the professional competence they have brought, or continue to bring, to their job. The reason that we look for people from real world industry to teach in the Trades and Industry Department is that they bring & infuse that professional competence to the classroom. A few examples are the following: Steve Saylors is an electrical engineer who teaches our ELT 204 – Adjustable Speed Drives Course. Steve is a world-wide project engineer for Vestas, a wind turbine generation company. Steve specializes in power transmission lines analysis for Vestas. Tim Hodgson is the owner, operator, and manager of Larry and Chuck’s Heating, a long time, local HVAC-R service and installation company. He teaches our FMT 122 and FMT 222 Boilers Courses. Tim has professionally and successfully filled many roles within his company for over 25 years. Robert Freuler, who teaches our FMT 202- Pneumatic Controls Course, is a nationwide designer and sales person for Siemans Industries which is an industry leader in electrical and electronic controls. Robert specifies, designs, and supplies control systems for buildings of all sizes. These are just a few examples of our Faculty versatility who possess the level of professional competence necessary to teach & succeed in today’s Facilities Maintenance/HVAC-R and Apprenticeship job markets.

Our Department Academic Professional holds a Masters Degree in Education and our Administrative Assistant has been involved with Apprenticeship and the Electrical Industry for many years.

Another unique feature of the Department of Trades and Industry is that we train our technician/students on real-world facilities equipment and electrical equipment, using real-world instrumentation and tools. It was with intention that, when our department moved from the original PCC Southeast Center to the North Portland Cascade Campus in 2004, and right after the completion of our last Program Review, we set out to acquire and to upgrade
our Facilities, HVAC-R, and Electrical Labs’ and Classroom training equipment. We accomplished this through PCC purchase, mostly as part of the 2002 Bond build out, or through an extensive donation campaign soliciting our Industry Partners. This campaign was very successful netting over $250,000.00 in new and used equipment and tools so that we have been able to provide extremely important hands-on training to our students using the exact types of equipment that they will encounter in today’s facilities, residences, commercial buildings and industrial plants. The result is that our professional Faculty is able to provide professional training on professional equipment so that our technician/students are brought up to the professional standard expected by our Industry Partners who will employ them. With the help of continued donations and some purchasing, so far, we have been able to maintain and update most of the training equipment.

Our Degree and Certificate outcomes, “Practice Safety in all areas to prevent occupational incidents”, “Determine problems in facilities systems”, “Perform corrective maintenance in facilities systems”, “Perform preventative maintenance in facilities systems,” “Properly install equipment and systems to specifications”, “Recognize interrelationships of facilities systems to avoid negative impact”, “Actively search for continuous improvement by analyzing the workplace for effectiveness and efficiencies”, “Complete 4000, 6000, or 8000 hours of Oregon-approved, on-the-job-training hours, “Repair and/or install electrical wire devises according to licensure regulations...”, address and support this Core College Outcome of “Professional Competence”.

For “Communication”:

Infused throughout the backbone courses for our Facilities Maintenance Technology /HVAC-R Degree and Certificates and throughout all of our Apprenticeship Degrees and Certificates is the constant theme that students leaving our programs will be prepared for the real world career and work environments while delivering the quality customer service expect of them. The Refrigeration Mechanical Series: FMT 101, FMT 102, FMT 103; the Refrigeration Electrical Series: FMT 111, FMT 112, FMT 113; all the Advanced Control Courses: FMT 202 – Direct Digital Control, ELT 126 – Intermediate PLCs, ELT 225 – Advanced PLCs, FMT 222 – Intermediate Boilers, ELT 204 – Adjustable Speed Drives along with many other courses emphasize communication with customers, whether it be the internal customers of the company, or the external paying customers. Customer Service is one of the keys to opening the door of success in the workplace. In order to deliver that quality customer service, students must be able to communicate effectively using most every type of media. Whenever examples of HVAC-R service calls are presented in Labs or in the classroom for our Refrigeration Electrical series, they begin with statements like “The service person consults with the homeowner or building owner” or “The serviceperson listens attentively to the
owner’s concerns and questions”. In almost all of the FMT, ELT, and APR courses that have a lab section, most of the lab work is done by teams of two to four students. Students work in a communicative, team environment that mirrors the workplace. They are asked to work fairly with each other, and to interact productively in order to complete the Lab projects.

One of our Degree and Certificate Outcomes simply says, “Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors”. This outcome definitely addresses and supports the College Core Outcome of “Communication.” One of the Outcomes of the Apprenticeship Degrees and Certificates is “Complete 4000, 6000, or 8000 hours of State of Oregon- approved, on-the-job training hours”. This task would be impossible without productive communication among the Apprentice, the Apprentice’s Journey Person, the company owner, and the companies’ external and internal customers. These Degree and Certificate outcomes also definitely support the College Core Outcome of “Communication”.

For “Cultural Awareness”:

As discussed above, the Department of Trades and Industry, in both the Facilities Maintenance Technology and Apprenticeship Programs, instruct to provide employees for service industries. We intentionally instruct that students must be willing and able to, not just provide service, but to provide quality customer service. Quality customer service is blind to gender, sexual orientation, age, race, ethnic background, and economic status; and that concept is blended throughout our FMT, APR, ELT Curriculum. In those courses that have a Lab component, students almost always work in teams and those team members are selected randomly even without regard to even technical skill level. We currently collaborate and partner with the Evening Trades and Apprenticeship Preparation Program (ETAP) in our eight-credit, term long, APR 200 – Pre-Apprenticeship Training Program, at Cascade Campus. ETAP’s students take the APR 200 course as a part their pre-apprenticeship training. ETAP’s stated mission is to provide help for disenfranchised minority students to successfully enter into Oregon State Apprenticeship Programs especially in the heavy construction trades. In the recent past we have also collaborated with the Margaret Carter Skill Center and the Portland Urban League to provide training in our short term, Career Pathway, Oregon Certificate of Completion Program in HVAC-R residential and light-commercial equipment installation. We support the mission of Oregon Tradeswomen by hosting field trips to our FMT Program and by presenting our Programs at their Tradeshows.

Our Degree and Certificate outcome, “Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors” as well as our
involvement helping provide training which targets minority populations. The Department
definitely address and support this College Core Outcome for “Cultural Awareness”.

For “Self-Reflection”:

None of our Degree and Certificate outcomes directly address and support this College Core
Outcome. However, every new challenge to repair, maintain or install a new and unknown
piece of HVAC-R or electrical equipment, especially when it introduces a new or advanced
technology, leads our students to “self-reflect” on their professional competence and skill
level and possible need for improvement.

Please revisit the Core Outcomes Mapping Matrix for your SAC and update as appropriate.

Assessment of College Core Outcomes

As discussed in the previous section of this report for the Department of Trades and Industry
Program Review for 2012, most of our Degree and Certificate outcomes directly address and
support the PCC College Core Outcomes and many, many of our course level outcomes,
therefore, support the College Core outcomes as well. In Curriculum language, our outcomes
mostly map very well to the College Core Outcomes.

Accordingly, if our student assessments show that we are delivering outcomes at the Degree,
Certificate, and Course level, we can translate those results to hopefully show that the
Department is effectively and directly helping to deliver the College Core Outcomes to
students.

We assess our students in several ways but, most importantly, we employ assessment tools
that demonstrate student skill while actually working in the real world of Facilities/HVAC-R
and Apprenticeship. For example, we use test results from approved Industry exams such as in
our ELT 220-Federal Occupational and Safety and Health Administration Course. Another
example is that we use the final exam results from our National Electrical Code APR Courses
such as APR 226-Electrical Code Level III or APR 204-Limited Maintenance Electrician Electrical
Code Level III as assessment tools. We use active, skilled, demonstrative results where
students must perform logical, trouble-shooting on working HVAC-R and/or electrical
equipment directly under the supervision of the instructor using a sign-off, skills completion
checklist. In our FMT 213-Commercial Refrigeration Shop Class students must create and
complete a “Work Order”, also directly under a supervising instructor, using a step-by-step,
written checklist for signoff. Our most valuable assessment tool is an evaluation by a working
industry technician, supervisor, or manager in a real world facility or HVAC-R company while a
student is completing 240 hours of required Co-op Work Experience. Co-Op Work Experience
technicians, supervisors, or managers use an evaluation checklist, which also has space for a narrative, to assess our students.

The results of our student assessments, in general, have been, somewhat unexpectedly, very high. For classes where we look at exam pass rates, or student skill demonstration, those rate have mostly been above 90%, or in the letter grade of “A” area, with no complete failures. For the assessments done by employers, of 23 employer evaluations there were only two marks indicating a need for improvement. Nineteen out of 23 Co-op work evaluators answered yes to the question, “Would you recommend this student for employment in your firm or another firm?” The other four abstained. In general, most of these assessment results were higher than our Department expected.

The Peer evaluation of our assessment processes and tools, conducted during Summer Term, 2011, stated that there was no need to redo our assessments or assessment reporting and that our process could serve as a model for other departments.

Since our last Program Review in 2002, when the Department of Trades and Industry was still located at the original Southeast Center, and before the College introduced and began the more formal student assessment initiatives that all departments at PCC are currently doing, we were already conducting informal student assessments partially as a result of continuous student evaluations of our courses/training. We heard from students what they wanted. And what they wanted was more hands-on-training to help them meet the demands of the workplace, which, for our SAC, led to an informal but absolutely vital assessment of our students’ skills in meeting those demands of Industry. We hope that we heard what students were saying because, as indicated earlier and also later in this report, our department created vital, working Laboratories here in the Technology Education Building at Cascade Campus, and we stocked them, by Industry donation and purchases using Bond funds, with the best in operating, real-world equipment that we could find. It was with intention that the department, in the time just before the move to Cascade Campus, ensured that the Classrooms, Labs, and training equipment in the new Technology Education Building at Cascade Campus would be current and extensive. During many meetings and phone calls, we worked with the Architects to plan the needed infrastructure for all our Classrooms and Labs. They were planned to house working HVAC-R and Electrical Systems. For example, our FMT Lab, Room 114, of the Technology Education Building houses an 800,000 BTU dual fuel boiler, a 15,000 cubic-feet-per-minute air handler, a forty ton water chiller, and an outside condensing water cooling tower, a complete piping system with five three-phase pump motors, and a state of the art electrical controls for the whole system. This Lab replicates a working Commercial HVAC-R system. It was also with intention that, while the Technology Education Building was under construction, we started an Industry donation campaign and
asked our Industry partners: HVAC-R equipment distributors, HVAC-R service companies, hydronic supply companies, hydronic contractors, electrical supply companies, electrical contractors, water treatment companies, and other facilities, or facilities contractors to donate new and used equipment to our classrooms and Labs at the Technology Education Building. That has been the most assessment driven change to our training that has helped students attain our Degree and Certificate outcomes and, concurrently, the College Core Outcomes.

Another major change in our Department that has been, and continues to be driven by student assessment, is that we have established Statewide Apprenticeship Degrees and Certificates for students who have previously completed an Apprenticeship Program and have attained a State License or Journey Card. Five years ago our Academic Professional/Apprenticeship Specialist joined a consortium of Apprenticeship Representatives from seventeen Oregon Community Colleges, and worked with the Consortium for a period of three years to write and establish these Apprenticeship Degrees and Certificates. The Consortium continues their work even today. The Apprenticeship Degrees and Certificates are State Wide and can be portable from one Community College to another. Previous to the approval of these Degrees and Certificates, there were a significant number of students at PCC who were not completely included in the College Core outcomes process because there was no Degree or Certificate pathway available to them. Currently there are 150 students in our Apprenticeship Courses who, only two years ago, would have fallen into this category. Our assessment led to the remedy, which was the statewide collaboration and establishment of the Apprenticeship Degrees and Certificates. We are now regularly granting these Degrees and Certificates. A more detailed look at Apprenticeship follows in another upcoming section of this Report.

A third assessment driven change to our curriculum centers on “sustainability” and “green” initiatives, partially brought about by our Department’s involvement in a PCC Grant from the National Science Foundation (NSF). We have re-emphasized, in many FMT, ELT or APR Courses, the sustainability and green content already in those courses. The reduction of carbon dioxide, or greenhouse gases, in the atmosphere using proper combustion analysis of fossil fuels, or the proper handling of HFC and CFC Refrigerants, or the use of ultra high efficiency natural gas furnaces and heat pumps, are all examples. We are currently writing course curriculum, and securing training equipment for, two new courses in Solar Photo-Voltaic electrical energy generation as electives in the Facilities Maintenance Technology Program. Facilities Technicians will be charged with the task of maintaining and commissioning the hundreds of Photo-Voltaic Arrays that are now being installed on buildings.
across the country. The College Core Outcome, “Community and Environmental Responsibility”, is the Outcome most positively impacted by this change.

Assessment of College Core Outcomes (Note: for Career and Technical Education (CTE) programs, assessment of Core Outcomes that have been mapped into the Degree and Certificate outcomes may be addressed in that section 6B instead). This section may refer to, include or summarize the results of annual Core Outcomes assessments carried out over the last 5 years.

Career and Technical Education (CTE) programs address these questions in section 6B.

Describe the strategies that are used to determine how well students are meeting the College Core outcomes

Summarize the results of assessments of these outcomes (SACs may refer and/or link to the Annual Reports, but work should be summarized here.)

Identify and give examples of assessment-driven changes that have been made to improve students’ attainment of the Core Outcomes.

To what degree are courses offered in a Distance modality? Have any significant revelations, concerns or questions arisen in the area of DL delivery?

Distance Modality Courses

Because of the large hands-on lab components in our FMT and ELT Courses, almost all of those courses cannot be offered in an online format.

Apprenticeship Training Committees, for whom the Department of Trades and Industry is the Administrator, does not approve online or distance learning courses for our Apprenticeship students. The Joint Apprenticeship Training Committees are accountable to the Oregon Bureau of Labor and Industry.

Has the SAC made any curricular changes as a result of exploring/adopting educational initiatives (e.g., Service Learning, Internationalization of the Curriculum, Inquiry-Based Learning, Honors, etc)? If so, please describe.

Curricular Changes Based on Educational Initiatives

The Trades and Industry Department SAC made several curricular changes as a result of exploring/adopting educational initiatives.

Here are two examples: First, there have been changes to several FMT and ELT Courses because of the Department involvement with the PCC National Science Foundation Grant for sustainability. This grant established the Sustainability Practices for Academics and Resources Committee (SPARC) here at PCC. In addition to the re-emphasizing of green content in many
of our courses as outlined in the section above, we have added a new course, FMT 265 – Building Commissioning, as an elective in the Facilities Maintenance Technology Program. This course covers analysis of whole buildings in order to maximize building efficiency, reduce carbon dioxide emissions, and recommend to building owners and managers steps to reduce heat losses and gains, and to further fine tune a building to its highest efficiency in order to conserve energy. Second, we have collaborated with the PCC Education Department at Cascade Campus, specifically with Gabe Hunter – Bernstein, to offer Continuing Education “Adult Learning Teaching Effectiveness” Classes to all our Faculty, both Full and Part Time. Originally these Teach-the-Teacher Courses came as an educational directive from the Oregon State Apprenticeship and Training Council for instructor training for our Apprenticeship Instructors. However, they are now being offered to, and taken by, any Faculty at PCC. The initial run of the first adult learning course during Fall Term, 2011, was very successful and they will continue.

**Identify and explain any other significant changes that have been made to course content and/or course outcomes since the last review.**

**Other Significant Changes to Course Content/Outcomes**

The most significant change to Outcomes was the rewriting of all the Apprenticeship Course Outcomes and the writing of all the Apprenticeship Degree and Certificate Outcomes prior to navigating through the Degrees/Certificates and Curriculum Committees. Another Significant change was getting all of our course level Outcomes and our Degree/Certificate Outcomes into the correct format to meet the standards for Outcome-based-learning, a standard that PCC has been striving towards for several years.

**Needs of Students and the Community: are they changing?**

**What is the effect of student demographics on instruction, and have there been any notable changes since the last review?**

There are two dominant forces at work which impact the student demographics, unfortunately they are diametrically opposed and have significantly impacted the workforce. The first issue is the aging workforce. The construction and services workforce is being overwhelmed by the “Baby Boom” generation which is rapidly reaching retirement age. Without significant increases in a new trained workforce, the industry will not be able to support the demand of services.
Figure 1

*From the Congressional Research Service report dated January 2008 summary:

Figure 1 shows the change in age demographics over the past 40 years which clearly demonstrates the significant increase in “55+ years” workforce impact. Note the 2007 statistics are before the major downturn in the economy which has now impacted the retirement age of the working class due to the uncertainty of the economy and the resulting impact on retirement financial resources.

**Describe current and projected demand and enrollment pattern. Include discussion of any impact this will have on the program/discipline.**

“The unemployment rate in 2007 averaged just 4.6%, which is low by historic standards and suggests the presence of tight labor market conditions that are related to long-running demographic trends. The oldest members of the baby-boom generation turned age 60 at the end of 2006, and every year thereafter, more of this large birth-cohort will move into the ages when workers traditionally have retired. Consequently, the business community in particular
has asserted that the future supply of labor will fall short of employer demand and that U.S. economic growth and competitiveness would be put in jeopardy.

Based upon a CRS analysis of the current employment patterns of baby-boomers across industries and occupations and of occupational employment projections within industries, many industries throughout the economy (e.g., insurance, manufacturing, mining, public administration, real estate, transportation, wholesale trade, utilities) appear to be highly dependent on baby-boom workers and to face the prospect of tightening labor market conditions as more of them move into the traditional retirement ages. Baby-boom dependent industries that seek both to replace all boomers who retire from occupations critical to their operations and to increase employment in those fields could face the most intense competition for workers in the near term”.

The impact of the baby boomers has been on the mind of the construction/ apprenticeship programs for several years. Not only is there an issue of replacing the aging workforce but also the process that must take place to prepare the new work force: apprenticeship. Most of the construction trades rely on formal apprenticeship programs to train and certify new workers. Apprenticeships can require as much as 5 years to complete, of which 90% of the training will be On-the-Job training (OJT) working under the direct supervision of a qualified journeyman, of which a significant portion of that resource falls under the “Baby-Boomer” generation. Several of the programs have indicated that at their current pace of replacements, they will not have enough trained/certified workers in the future, this determination was made before the recession hit in 2008.

What strategies are used within the program/discipline to facilitate access and diversity?

The department works closely with several internal PCC departments and also widely markets the programs to facilitate access and diversity in the programs. For example, the Apprenticeship & Training Specialist conducts several presentations throughout the year at local high schools, career fairs, job fairs and general public information forums. The department participates annually in the Women in the Trade Fair, the PCC Cascade Campus Job Fair, the NW Youth Career Expo, and PCC Cascade Campus High School Preview Day. We also participate bi-annually in the NW Facilities Expo and High School Career Day scheduled at the Rock Creek Campus. We encourage women and minorities to enter the program. We promote the program quarterly to approximately 2400 Portland Metro Businesses and Residents and we market journey level classes to approximately 3400 electricians across the state. Additional demographic information is referenced in the appendix.
Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes (not been addressed elsewhere in this document)? If so, describe.

The Game Changer – The Recession –

The statistics for the state of Oregon employment for the years 2008 - 2011 are shown in figure 2 which clearly show the effects of the recession on overall employment in Oregon.

Figure 2

20 Year Construction Market – Projects (3a)

The figure 3a shows the 20 year trend of the construction market activity. This indicates the number of construction projects in progress for each year broken down into types of construction.

Figure 3a
Table 3b indicates the number and type of contractors registered with the state of Oregon

**Figure 3b**

- Building Construction
- Residential Construction
- Non-Residential Construction
- Heavy & Civil Construction

**Figure 3c**

**20 Year Construction vs. Contractors Trend (Figure 3C)**
The construction trades were in planning stages of adding significant numbers of new apprentices to deal with both the increase in construction work and to deal with the impending shortage of skilled labor before the economic downturn in 2008.

Summary

The net result of all of the recent factors is a significant increase in the number of students caused by job displacement not by a career choice as was the main driving factor before. For some, a career change has been considered in the past but was never a practical option for them. Recent unemployment has given them the “new motivation” and the means to pursue their career options. For others, this was never considered an option but they are now looking for another career. Services and construction work have unique characteristics that make them possible career choice:

a.) It is difficult to impossible to outsource these jobs. Manufacturing jobs have been hit hard by not only the recession but also the ability to outsource their work.

b.) The down side of these careers is that they are particularly susceptible to the status of the economy: Construction work is directly related to the investments and markets therefore has cycles of good and poor economies. Service work is usually the first area that is considered for cuts in a down economy.

A recent 2011 article in the **Oregon Associated General Contractors Magazine (AGC)** discusses the impact of the recession on construction in Oregon:

Impact of the Recession: 2007 to 2009: - In the construction industry, more than 30,000 jobs were eliminated—a loss of 29 percent. No other Oregon industry had employment losses anywhere near the percentage of jobs lost in construction.

Outlook: While it appears for the moment that construction employment hit bottom in the first half of 2010 along with the economy in general, the industry is not expected to ramp up rapidly. Oregon’s Office of Economic Analysis projects that by the end of 2017, construction employment will once again reach 80,000—far below the 2007 peak of 110,000 jobs.

Economic Impact of the Construction Industry - In 2009 more than $4.9 billion of construction activity took place in Oregon, a 21 percent decrease from 2008. Commercial construction accounted for over $3.4 billion of the total, a decrease of more than $476 million over 2008. Within the commercial sector, over $1.9 billion was spent on nonresidential building construction, and over $1.5 billion on non-building/heavy construction.

The feedback from our local contractors, HVAC-R service and installation companies, Apprenticeship training agents, and facilities managers indicates that a very slow recovery is
taking place. Even though the stock market has improved dramatically, businesses are still operating in a “cautiously optimistic” mode right now.

The market for new people in trade and service industries has slowed significantly since the start of the recession but it has not stopped. One thing is certain: the job market in trade and service industries is tight and competitive. Portland Community College, hopefully with fair input from the Department of Trades and Industry, including both Facilities Maintenance Technology and Apprenticeship, will continue to make sure that our graduates are well skilled and well prepared to be considered in such a highly competitive job market.

We have worked closely with the Skills Center and the ETAP program within the PCC family to increase diversity and prepare students for trades careers. This partnership has allowed us to evaluate and provide the necessary fundamental skills to meet our target audience expectations (local employers), and also prepare students to meet the minimum skills levels required to be considered for many of the trades apprenticeships. The geological location of the Trades and Industry group is central to one of the most depressed employment markets in the Portland Metro area and also the most diversified source of students.

The Trade Act and NAFTA funds have provided needed funding for displaced workers in our area. The ODOT grant received by PCC’s ETAP program provides resources for non-traditional (women and minorities) to enter into Heavy Highway related construction trades.

An ongoing formal dialog between the trades staff, target audiences, and students have permitted us to adjust our programs to best meet the current needs of our students and industries. Several forms of written feedback (evaluations) from our students at the end of each term permit us to make the necessary changes before the next term begins. Employers have also been crucial part of our program composition. One of the key areas where we have made changes based on feedback is the addition of significant resources for hands on training and lab facilities added with our move to the new Cascade facility.

**Faculty: reflect on the composition, qualifications and development of the faculty**

**Provide information on**

**Quantity and quality of the faculty needed to meet the needs of the program/discipline.**

The Trades & Industry Department has an exceptional staff. We currently have three full-time faculty, one academic professional and 41 part-time faculty. Of our 41 part-time faculty, 24 part-time instructors are employed on a regular, term by term basis and 17 part-time
instructors are working industry professionals who we use on an as needed basis for substitutes and specialty courses. All part-time faculty keep themselves current with industry trends, demands, and skills. Having a large diverse part-time faculty pool allows the department the ability to select the best individual for any given situation. Our instructor base is impressive. Collectively, our instructors have over 270 years of teaching experience which ranges individually from 2 to over 30 years. Combined, our instructors have over 800 years of industry experience. Some of our instructors have electrical licenses which provide teaching opportunities while others are working professionals with extensive industry training.

Our full and part-time faculty provide students with an exceptional learning environment. In addition to classroom hours, our full-time faculty provide student advising and mentoring while our part-time instructors are available for tutoring. (The department also utilizes the JATC Apprenticeship Committees and the Advisory Committees to supplement the tutoring and mentoring options for struggling students.)

Apprenticeship instructors are required to possess and maintain an active Oregon Electrical License in excess of the target audience. License holders are required to take 8 to 16 hours of code related and code change classes per renewal cycle to retain an active license. This license renewal cycles affords our instructors an awareness of current technology, codes, and industry trends.

The Oregon Apprenticeship & Training Council (OSATC) now outlines the basic credentials instructors are expected to attain. OSATC requires each apprenticeship instructor meet the Oregon State Department of Education certification requirements for a Career and Technical Education Instructor; or be a subject matter expert (such as a journey worker) who is recognized within an industry as having expertise in a specific occupation; and have training in teaching techniques and adult learning styles, which may occur before or after the instructor has started to provide related technical instruction. Guidelines on how to satisfy the required instructor training are in place. As such, all apprenticeship instructors are required to complete an annual adult education training course. The department provided its first required training and all apprenticeship instructors attended. In addition, the FMT instructors were invited of which some attended.

In summary, we have a highly trained faculty pool and without expansion, the number of both full and part-time faculty adequately meets the demand of courses currently offered through the Trades and Industry Department.

Extent of faculty turnover and changes anticipated for the future.
Due to a continued climb in enrollment, possibilities could exist for additional adjunct daytime instructors for the Facilities Maintenance HVAC/R Installer Certificate of Completion Program. History shows stability and consistency throughout our part-time faculty pool resulting in few expected changes.

An example of our rising enrollment is reflected in these term numbers: Fall 2009 (613 students), Winter 2010 (713 students), Spring 2010 (727 students), Summer 2010 (140 students), Fall 2010 (662 students), Winter 2011 (732 students), Spring 2011 (676 students), Summer 2011 (184 students), and Fall 2011 (689 students).

As this review is being generated, Winter registration is on-going. Enrollment reports reflect many classes are close to, or full while several other sections including those with waitlists are showing near capacity. When circumstances allow the development of additional sections, we are happy to provide our students with split or alternative sections.

The Facilities Maintenance program is known to be “green” through the alignment with industry standards and placing emphasizes on green content in several of our courses. Our current faculty pool includes instructors who are certified and qualified to teach many green classes. As we bring on additional classes in energy management, renewable energy and green technology, the department will evaluate the need for additional qualified faculty at that time.

Our part-time instructors teach because they love to share their knowledge with others. Since monetary motivation is not their primary reason for teaching, we have a fairly low turnover rate.

**Extent of the reliance upon adjunct faculty and how they compare with full-time faculty in terms of educational and experiential backgrounds.**

Both full and part-time faculty have several years experience working in the industry. Many have gone through the same PCC class sequences; supporting classes or through other Industry vendors thus expanding their teaching versatility. Years of experience, previous jobs and training have provided our instructors with the necessary knowledge to present a superior learning environment for our students. Most part-time instructors work during the day thus maintaining a skill level that is real and applicable in today’s technology.

**How the faculty composition reflects the diversity and cultural competency goals of the institution.**

Currently the Department has 6 female instructors in addition to 1 Asian male.

**Report any changes the SAC has made to instructor qualifications and the reason for the changes.**
No changes; as pointed out in other parts of this document, we screen and hire only professionals in their field therefore there have been no changes in any qualifications.

In addition as noted previously, Apprenticeship instructors are required to possess and maintain an active Oregon Electrical License in excess of the target audience. These teaching perimeters have been in place since PCC first endorsed Apprenticeship classes thus providing stability and continuity in our teaching staff.

**How have professional development activities of the faculty contributed to the strength of the program? If such activities have resulted in instructional or curricular changes, please describe.**

We are in the process of reviewing, aligning and updating our Manufacturing Plant Electrician core course curriculum. This process will enhance the flow within the four year structure.

As previously mentioned, our instructors now have the opportunity to participate in professional development activities which focus on teaching effectiveness, adult learning styles, and instructional technologies. This newly developed educational track has been well received and continued development of additional tracks is expected to provide even more opportunities in assisting instructors incorporate today’s technology into today’s classroom.

The Trades & Industry Department has received a portion of the National Science Foundation (NSF) grant to assist with the development and addition of new course in our department. Our Department Chair and one of our full-time faculty attended the Summer Sustainability Institute. The funds for this training opportunity were provided by the NSF grant. Another full time faculty actually taught one section for the Summer Sustainability Institute on High Efficiency Heat Pumps. This is one example of how professional development activities strengthen our emphasis on the sustainable practices in our courses. The instructors used this knowledge to develop a short series of green energy management courses. The department is following the NSF guidelines for the rollout of these courses. In addition, we have many part-time instructors that consistently take professional development courses in order to maintain their licenses, competitive business edge and the knowledge of industry advancements. Professional development strengthens our emphasis on the sustainable practices in our courses.

**Facilities and Support**

**Describe how classroom space, computers/technology and library/media, laboratory space and equipment impact student success.**
**Describe how students are using the library or other outside-the-classroom information resources.**

**Provide information on clerical, technical, administrative and/or tutoring support.**

**Provide information on how Advising, the Office for Students with Disabilities and other student services impact students.**

**Describe current patterns of scheduling (such as class size, duration, times, location, or other) address the pedagogy of the program/discipline and the needs of students.**

**Specialty Laboratory Equipment and Technology**

We have specialty labs in our department which include an Installation Lab, a Commercial Refrigeration Lab, an Electrical Motor Control Lab, a Refrigeration/Electrical Lab, a Programmable Logic Control (PLC) Lab and a Direct Digital Control (DDC) Lab.

**Installation Lab** - Our Installation Lab allows students to build ductwork and install equipment such as furnaces, heat pumps and air conditioners just like they would in a house or commercial building. These hands-on laboratories are an excellent training opportunity for our students to become familiar with real world experiences which can immediately be tested in a real work environment.

**Commercial Refrigeration Lab** - Our Commercial Refrigeration Lab allows students the opportunity for practice on real refrigeration equipment. For example, they can trouble shoot issues that they may face on a job site. Troubleshooting is a skill students can develop & practice with the classroom specialty workstations. Lab exercises are a favorite among students in addition to the many benefits derived from such a superior training environment.

**Electrical Motor Control Lab** - Our Motor Control Lab teaches students how to wire magnetic motor starters. This lab makes it possible for students to learn in a real and authentic way. One activity that students complete in this lab is creating issues/problems with motors and motor starters for other students to solve. This helps students to really prepare themselves for real work situations.

**Refrigeration/Electrical Lab** - Our Refrigeration/Electrical Lab allows students to work on training boards investigating how refrigeration electrical systems work before practicing on individual equipment. It helps them synthesize textbook electrical wiring methods with hands-on practice.
Programmable Logic Control (PLC) Lab - Our PLC Lab is a computer lab that allows students to learn how to use PLC’s to monitor and maintain machinery in large facilities. Specialized training boards have been built so students can visualize how the programming works. Students learn to write computer programming software for use in commercial, manufacturing and industrial applications. This is a specialty field that can earn students upwards of $10,000 in their annual wages.

Direct Digital Control (DDC) Lab - Our DDC lab is a place where students can practice this computer program. More and more companies are using DDC to maintain operation of their entire facilities. These specialty computer environments result in skill which greatly enhances a student’s resume.

As already indicated in previous sections of this report, the largest impact on our students’ success, since our last program review in 2002, has been the change and improvement in our classroom space, laboratory space, and Industry equivalent training equipment brought about by the Department’s move from the original PCC Southeast Center to our current home in the Margaret Carter Technology Education Building at Cascade Campus. Not only have we been able to provide students training on real-world equipment thereby raising their technical skill levels, but we have been able to develop valuable student assessment tools using this equipment. Thus our students are realistically prepared for entry into the Facilities Maintenance Technology/HVAC-R, Electrical, and General Construction Industries. As an example, it is invaluable for students to learn fork lift operation in moving a 150,000 BTU Heating/5 Ton Cooling, Package, Roof Top, Unit within Lab space that can accommodate both the students and the equipment. In addition students make connections into a 480 Volt, 3-Phase Buss Plug System and a Natural Gas supply system, run the unit for several hours, after which they prepare a different unit for a different class, move it into the Lab and repeat the process again and again.

Today, manufacturers and distributors of HVAC-R, Electrical, and General Construction equipment, make online replacement parts, tools, and instrumentation available. An enormous amount of information which includes equipment specifications, service flow charts, control and power supply schematics, installation instructions, service bulletins and updates, sizing information, training for specified pieces of equipment, and safety warnings is a click away. Having Classroom plus Computer Lab access to the internet, or the ability to download power-point presentations, has opened up a new instructional toolbox for both our Faculty and their students. For example, an instructor in Refrigeration Electrical II, is able to display, using the
Classroom/Lab projector, the entire electrical schematic for a piece of equipment on which the class is working by simply inputting a model number at the manufacture’s website.

A Programmable Logical Controller online software package has been installed in the Computer Lab in the TEB at Cascade Campus. Students, who are required to take up to three PLC Courses in the Degree Program or as Electives in the Apprenticeship Programs, are able to practice and work outside the regular class periods. Information Technology employees at Cascade Campus have always gone out of their way to help us maintain our specialized PLC Computer Labs.

Students may access reserved copies of mechanical and electrical code books as well as a number of Industry Periodicals, which support several of our classes, from the library.

 Administrative Assistant duties encompass a quantity of detail required for both the Facilities Maintenance Technology and Apprenticeship Programs. Successful Completion of an Apprenticeship and the ability to obtain pay increases is all dependent upon correct records. Some of our APR courses and ELT courses are approved for Continuing Education for Oregon Electrical Licensing. The State Electrical Division demands accurate and timely reporting in order that a Licensed Electrician is able to renew their license. Electricians are prohibited from working without holding an active Electrical License.

Because accurate and timely record keeping is critical to be in compliance with the Apprenticeship JATC and Oregon Bureau of Labor and Industries Administrative Rules, our Department has recently purchased and implemented a specialized software program to track all our Apprentices. This program has greatly benefited the department with apprentice management and accuracy tasks.

Administrative support and advising from our Division Dean, our Dean of Instruction, and also from Office of the Dean of Student Development, has always been timely and supportive to our Programs. Our Division Dean has been supportive in locating additional funding to keep our training equipment updated and operational.

Math skills have always been vital to the success of students in our Programs. All apprenticeship programs set math placement standards for applicants. Students must demonstrate their mathematical skill level through Compass testing. In addition to the normal Math tutoring through the Campus Learning Centers, we have developed a close working relationship with James Dawson, Math Faculty and Specialist at the Cascade Campus Learning Center. He goes to extended lengths in assisting our Trades students improve their Math skills.
Historically, our department has offered classes in the evening beginning at 6:00 PM. We cater to adult students who work during the day. The evening schedule has always served our demographic well, especially our Apprenticeship Students. Since our last Program review, however, we have added a daytime, Certificate of Completion Program, approved by the State of Oregon as a Career Pathway. This Certificate is presented in a one short-term-training format. The target audience is students seeking entry level positions in the HVAC-R Industry for installation of Residential and Light Commercial Equipment. Students who have access to retraining funds such as NAFTA or Trade Act have helped to populate this daytime program. Many of those students have continued on into our AAS Degree program.

We continue to limit the size of specific classes because of safety issues, size of lab space, or limited training equipment.

For Career and Technical Education (CTE) Programs only: to ensure that the curriculum keeps pace with changing employer needs and continues to successfully prepare students to enter a career field.

Statewide Apprenticeship Degree Keeps Pace with Employer Needs and Career Field Demands

Community colleges partner with industry in providing a great deal of apprenticeship training in Oregon. Eleven out of 17 Oregon community colleges have approved Associate of Applied Science degrees while 15 colleges provide related training courses for apprenticeship trades. Of these colleges, several had an “umbrella type” AAS degree, grouping together several BOLI trades in one degree. They varied from institution to institution becoming out of focus over the years, and out of compliance with Oregon Administrative Rule.

In 2003, the State Board of Education revised Oregon Administrative Rules (OAR) 589-007-0100 through 0190 pertaining to apprenticeship programs. Among other things, these revisions ensure apprenticeship programs are consistent with other community college [Professional Technical Education] instructional programs. To meet the revision requirements, Oregon’s apprenticeship coordinators and professional technical education deans, in consultation with CCWD, ODE and BOLI, proposed a statewide apprenticeship AAS degree and certificate of completion pathway implemented through an administrative consortium. The following framework provides additional access to courses for apprentices, aligns BOLI standards, fosters easier transfer of credit among partner institutions, and increases degree and credential completion.

Apprenticeship “related training” technical courses and electives are open to the public. Non apprentices as well as apprentices are presented the same curriculum. However, only students
who have completed a registered apprenticeship program [gained through an approved JATC] can receive an Apprenticeship degree or certificate. Despite hefty Apprenticeship enrollments, historically few students have finished the degree requirements. We have highly publicized the new statewide apprenticeship degree and certificate pathways and are receiving a significant amount of inquiries. We have seen a slight rise in graduation petitions and expect to see an increase in students returning at a later date for completion. However, since the development of these degree and certificate tracks are relatively new, we do not have much data to quantify at this time.

**Statewide Apprenticeship Pathways:**

**AAS Degrees and Certificate of Completions**

The Consortium developed three pathways: Electrical, Construction and Industrial Manufacturing. All apprenticeship related training requirements and courses are aligned with Bureau of Labor and Industries requirements and standards. The BOLI standards are a minimum while the local Joint Apprenticeship Training Committees (JATC’s) may have additional standards requiring additional courses. The degree and certificate of completion will include a designation in one of approximately six to eight approved BOLI trades. Students have the option of pursuing the AAS degree by laddering the certificate of completion and completing additional general education courses. The statewide AAS degree and certificate of completion curriculum requirements only pertain to the related training and Credit for Prior Certification. The General Education requirements are up to the individual institution.

**Criteria**

1. Colleges have three options: participate in the statewide program, degrees and/or certificates by offering or obtaining program approval for each trade.

2. For colleges participating in the statewide program, all related training and general education courses should be credit per the Oregon OARs. This verbiage allows previous non-credit coursework to obtain accountability.

3. For OCCUR’s reporting, colleges report courses under ACTI code 23.

4. The apprenticeship consortium has identify by-laws, a regular curriculum review process, and other self-organizing protocols. Members agree to follow the Statewide AAS and Certificate of Completion requirements.
**Program Approval**

As this is a “closed enrollment” degree and certificate program, the ODE modified approval process is recommended. Eligible participants must have journey-level status or complete without benefit of license to earn the apprenticeship degree or certificate. To participate we submitted:

- The Notice of Intent “For Information Only” form (2008),
- Request to Participate in a Statewide AAS and Certificate Program form (2006), and
- A letter with program highlights/changes.

**Teach Out Strategy**

This is a three-year (2007, 08 & 09) strategy gradually phasing out “umbrella type” AAS degrees such as Crafts and Trades and Industrial Technology. Students were given a choice of completing the AAS phased-out degree through an institutional teach-out strategy or rolling their credits over into the new certificate of completion or AAS of Apprenticeship Technology degree. Each college was responsible to make sure:

- There should be evidence of informing students of the change and evidence that the institution (each community college) is doing due diligence to both inform students and assure there are no negative impact for the student as we make this transition.
- Make sure we explain the implications, if any, to the students of this change.
- Each institution needs to notify NWCCU about these or any changes since accreditation issues are linked to each individual institution not a consortium.

A formal “teach out” has to do with programs that are ending so the above efforts should provide the same necessary assurances to provide students with options to follow through with their intentions with undue hardship.

**Existing Trade Specific Degrees and Certificates of Completion**

According to ODE records, a few community colleges had trade specific degrees on the books. In order not to confuse their apprentices with duplicate credentials already on record as approved, community colleges had to 1) drop their existing certificates of completion/AAS “umbrella type” degree in favor of the statewide certificate of completion and AAS degree or 2) only participate in the statewide AAS degree and obtain program approval for each trade specific degree or certificate of completion.
Non-Credit to Credit Course Conversion

To ensure transferability of course credit, colleges could crosswalk and bundle non-credit courses into credit bearing equivalents. Appropriate assessments should be linked to equivalent credit bearing courses. (Umpqua, Lane, LBCC, and MHCC)

Common Numbers

Colleges will agree to use 100-200 level and credit-bearing courses. The prefix, scheme, and suffix are still under consideration. Four of the Consortium Colleges are using Common Course Numbering. The Consortium plans to work toward Common Course Numbering in the future.

Oregon Community College Apprenticeship Consortium (OCCAC)

Central purposes of the statewide consortium are 1) to monitor and administer the statewide Apprenticeship Pathways (Electrical, Construction and Industrial Manufacturing) that includes an Associate of Applied Science degree (AAS) and certificate of completions, 2) ensure seamless and efficient transfer of apprenticeship program credits among Oregon community colleges and four-year institutions, 3) promote and advocate the apprenticeship degree and certificate of completion, 4) sponsor and coordinate professional development for apprenticeship program faculty, 5) foster communication and trust, and 6) collaborate with Bureau of Labor and Industries, the Statewide Apprenticeship Committee, employers, the Oregon Department of Community Colleges and Workforce Development, and the Oregon Department of Education.

Membership

The Consortium is composed of Oregon community colleges offering the statewide AAS and certificate of completion. Advisory members include representatives from the Professional Technical Deans, the Bureau of Labor and Industries, the Oregon State Apprenticeship Training Council, four-year institutions, the Department of Community Colleges and Workforce Development. Additional advisory members may include an employer, a student, and a representative from the K-12 system.

Design Making Process

One vote per community college. Quorum equals 50% + 1 or by proxy. If no quorum, an abstained vote will be counted if that vote is submitted [email is ok] to the secretary/treasurer within end of the following business day of the submission of the minutes.

Sponsoring College

Blue Mountain Community College is the sponsoring college and is responsible for seeing the degree and certificate of completion through program approval.
In Summary:

The prior Apprenticeship Degree, an Associates of Applied Science (AAS) in Industrial Technology, was redesign at the State level. The new Statewide Apprenticeship degree pathways replaced the old degree and offers AAS degrees and certificates in electrical, manual construction trades, and industrial mechanics and maintenance. Each college determined the rollout of the new apprenticeship pathways based on their local control rights. For PCC, the transition to the new Statewide Apprenticeship Degrees and Certificates went into effect on August 29, 2008 with a ‘Sunset Period’ for the Industrial Technology Degree from Summer Term, 2008 through Spring Term, 2009.

Evaluate the impact of the Advisory Committee on curriculum and instructional content methods, and/or outcomes.

The Advisory Committees have been instrumental in moving the program forward. The Facilities Maintenance Program is growing and changing with the ‘green movement’ and demand for efficiency. In 2008 the department programs went through a major overhaul. The advisory committee members helped to develop the 2008 revisions. The Facilities Maintenance Technology Program was converted to a 100 and 200 level course numbering system. At this time, the department reviewed the program and course pre-requisites. It was found that a few changes were needed and have been implemented to help our students be more successful.

Degree and Certificate Outcomes [From the 2010 Interim Accreditation report: the college must show “progress in demonstrating, through regular and systematic assessment, that student who complete their programs have achieved the intended learning outcomes of degrees and certificates.”]

This section may refer to, include or summarize the results of annual assessments carried out over the last 5 years.

List your degree and certificate student learning outcomes, and identify the strategies that are in place to assess them

Associate of Applied Science in Facilities Maintenance Technology (FMT) Outcomes:

- Practice safety measures in all areas to prevent occupational incidents
- Determine problems in facilities systems
- Perform corrective maintenance in facilities systems
- Perform preventative maintenance in facilities systems
- Recognize interrelationships of facilities systems to avoid negative impact
- Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors
The strategies in place are to assess the outcomes of the FMT program:

**Practice Safety Measures** – The department requires all students to take ELT 220 – OSHA 30 Hour Safety Training and to pass an Industry Certified Final Exam. This outcome correlates to the Communication, Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Determine problems in facilities systems** – The department requires all students to take a combination of Labs and Final Examinations in Refrigeration I, II, and III; Electrical Motor Controls; Direct Digital Controls; Programmable Logical Controls; Boilers; and Chillers. The assessment is accomplished on ‘real world facilities’ equipment in a lab setting. This outcome correlates to the Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Perform corrective maintenance** – The department requires students to take FMT 280A – Cooperative Work Experience in a facility or with a HVAC/R Service Company for a total of 240 hours. “Employers” evaluate the students’ performance using a checklist and narrative. This outcome correlates to the Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Perform preventative maintenance in facilities systems** – The department requires all students to take FMT 280A – Cooperative Work Experience in a facility or with a HVAC/R Service Company for a total of 240 hours. “Employers” evaluate the students’ performance using a checklist and narrative. This outcome correlates to the Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Recognize interrelationships of facilities systems to avoid negative impact** – The department requires all students to take FMT 280A – Cooperative Work Experience in a facility or with a HVAC/R Service Company for a total of 240 hours. “Employers” evaluate the students’ performance using a checklist and narrative. This outcome correlates to the Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Properly install equipment and systems to specifications** – The department requires all students to take FMT 280A – Cooperative Work Experience in a facility or with a HVAC/R Service Company for a total of 240 hours. “Employers” evaluate the students’ performance using a checklist and narrative. This outcome correlates to the Community and Environmental Responsibility, Critical Thinking and Problem Solving and Professional Competence.

**Operate facilities equipment in accordance with manufacturers’ specifications to meet varying conditions** – The department requires all students to take and pass a combination of
labs and final examinations for Refrigeration III, Direct Digital Control, Variable Speed Drives, and Programmable Logical Controllers with a background in the Refrigeration Mechanical Series and using ‘Real World’ facilities equipment in a lab setting. This outcome correlates to the Communication, Community and Environmental Responsibility, Critical Thinking and Problem Solving, and Professional Competence.

**Communicate Effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors** – The department will use a checklist to assess this requirement. This assessment will take place in our second year of assessment and therefore can be measured at the next program assessment. This outcome correlates to the Communication, Critical Thinking and Problem Solving, Cultural Awareness and Professional Competence.

**Actively search for continuous improvement by analyzing the workplace for effectiveness and efficiencies** – The department requires all students to take a combination of Labs and Final Examinations in Refrigeration I, II, and III series of courses; Direct Digital Controls; Programmable Logical Controllers; with a background in the Refrigeration Mechanical Series using ‘Real World’ facilities equipment in a lab setting. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

### Apprenticeship

**Associate of Applied Science in Electrician Apprenticeship Technologies Outcomes:**

- Complete 4000, 6000 or 8000 hours State of Oregon-approved on-the-job-training - Hours vary by trade

- Apply theory to electrical wiring

- Repair and/or install electrical wire devises according to licensure regulations to meet NEC and OSC for Inside Electrician, Limited Energy Technician-License A, Limited Manufacturing Plant Electrician, Sign Assembler/Fabricator, Sign Maker/Erector, Stationary Engineer, Limited Energy Technician- License B, Limited Maintenance Electrician, Limited Renewable Energy Technician, and Limited Residential Electrician

**Associate of Applied Science in Construction Trades, General Apprenticeship Outcomes:**

- Complete a minimum of 4000, 6000 or-8000 hours State of Oregon-approved on-the-Job Training (OJT) - Hours vary by trade

- Repair, install, and maintain a variety of building construction projects using trade specific tools and techniques in compliance with building codes and OSHA regulations for the Brick Mason, Concrete Finisher, Floor Covering Installer, Glazier/Glass Worker, Laborer,

**Associate of Applied Science in Industrial Mechanics & Maintenance Technology Apprenticeship Outcomes:**

- Complete a minimum of 4000 or 8000 hours State of Oregon approved on-the Job Training (OJT) - Hours vary by trade
- Repair, install, and maintain a variety of industrial equipment using trade specific tools and techniques in compliance with state regulations for the Air Frame and Power Plant Technician, Boiler Operator, Programmable Logic Controller, Boiler/Turbine Operator, Die Cast Mold, Heat and Frost Insulator, Industrial Mobile Mechanic, Instrumentation Technician, Machinist, Millwright, Motor Winder, Pipefitter, Roll Turner, and Welder

**Certificate of Completion in Construction Trades, General Apprenticeship Outcomes:**

- Complete a minimum of 6000 or 8000 hours State of Oregon-approved on-the-Job Training (OJT) - Hours vary by trade
- Repair, install, and maintain a variety of building construction projects using trade specific tools and techniques in compliance with building codes and OSHA regulations for the Asbestos Removal, Carpenter, HVAC/R, Exterior/Interior Finisher, Painter, Pile Driver, Plumber, Scaffold Erector, and Sheet Metal Worker

**Certificate of Completion in Electrician Apprenticeship Technologies Outcomes:**

- Complete 6000 or 8000 hours State of Oregon-approved on-the-job-training Apply theory to electrical wiring - Hours vary by trade
- Repair & install electrical wire devices according to licensure regulations to meet NEC and OSC for Inside Electrician, Limited Energy Technician-License A, Limited Manufacturing Plant Electrician, Sign Assembler/Fabricator, Sign Maker/Erector, and Stationary Engineer

**Certificate of Completion in Industrial Mechanics & Maintenance Technology Apprenticeship Outcomes:**

- Complete a minimum of 8000 hours State of Oregon approved on-the Job Training (OJT) - Hours vary by trade
- Repair, install, and maintain a variety of industrial equipment using trade specific tools and techniques in compliance with state regulations for the Boiler/Turbine Operator, Die Cast Mold, Heat and Frost Insulator, Industrial Mobile Mechanic, Instrumentation Technician, Machinist, Millwright, Motor Winder, Pipefitter, Roll Turner, and Welder
Certificate of Completion in Limited Electrician Apprenticeship Technologies Outcomes:

- Complete 4000 hours State of Oregon-approved on-the-job-training (OJT) - Hours vary by trade
- Repair or install electrical wire devices according to limited licensure regulations to meet NEC and OSC code for Limited Energy Technician- License B, Limited Maintenance Electrician, Limited Renewable Energy Technician, and Limited Residential Electrician

Certificate of Completion in Manual Apprenticeship Trades Outcomes:

- Complete a minimum of 4000 hours State of Oregon-approved on-the-Job Training (OJT) - Hours vary by trade
- Repair, install, and maintain a variety of building construction projects using trade specific tools and techniques in compliance with building codes and OSHA regulations for the Brick Mason, Concrete Finisher, Floor Covering Installer, Glazier/Glass Worker, Laborer, Plasterer, and Roofer

Certificate of Completion in Mechanical Maintenance Apprenticeship Outcomes:

- Complete a minimum of 4000 hours State of Oregon approved on-the Job Training (OJT) - Hours vary by trade
- Repair, install, and maintain a variety of industrial equipment using trade specific tools and techniques in compliance with state regulations for the Air Frame and Power Plant Technician, Boiler Operator, and Programmable Logic Controller

The strategies in place are to assess the outcomes of the Apprenticeship program:

Complete 4000, 6000 or 8000 hours State of Oregon-approved on-the-job-training - Hours vary by trade – The department requires all students to take APR 204 – LME Electrical Code Level III, or APR 226 – Electrical Code Level III, and are the final courses students take prior to sitting for the State of Oregon License Examination. Collect and check the results of the final examinations in APR 104 and APR 226. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

Apply theory to electrical wiring – The department requires all students to take APR 204 – LME Electrical Code Level III, or APR 226 – Electrical Code Level III, and are the final courses students take prior to sitting for the State of Oregon License Examination. Collect and check the results of the final examinations in APR 104 and APR 226. This outcome correlates to the Critical Thinking and Problem Solving and Professional Competence.
Repair and/or install electrical wire devises according to licensure regulations to meet NEC and OSC for Inside Electrician, Limited Energy Technician-License A, Limited Manufacturing Plant Electrician, Sign Assembler/Fabricator, Sign Maker/Erector, Stationary Engineer, Limited Energy Technician- License B, Limited Maintenance Electrician, Limited Renewable Energy Technician, and Limited Residential Electrician – The department requires all students to take APR 204 – LME Electrical Code Level III, or APR 226 – Electrical Code Level III, and are the final courses students take prior to sitting for the State of Oregon License Examination. Collect and check the results of the final examinations in APR 104 and APR 226. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

Complete a minimum of 4000, 6000 or-8000 hours State of Oregon-approved on-the-Job Training (OJT) - Hours vary by trade – After the completion of the Apprenticeship program, the department requires all student to take their appropriate State of Oregon License or Journey Card examination, pass successfully, and obtain the correct license or Journey Card, in addition to meeting the General Education and Basic Competency requirements for an Associates of Applied Science Degree. The department also requires all electrical students to take APR 204 – LME Electrical Code Level III, or APR 226 – Electrical Code Level III, and are the final courses students take prior to sitting for the State of Oregon License Examination. Collect and check the results of the final examinations in APR 104 and APR 226. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

Repair, install, and maintain a variety of building construction projects using trade specific tools and techniques in compliance with building codes and OSHA regulations for the Brick Mason, Concrete Finisher, Floor Covering Installer, Glazier/Glass Worker, Laborer, Plasterer, Roofer, Asbestos Removal, Carpenter, HVAC/R, Exterior/Interior Finisher, Painter, Pile Driver, Plumber, Scaffold Erector, and Sheet Metal Worker – After the completion of the Apprenticeship program, the department requires all student to take their appropriate State of Oregon License or Journey Card examination, pass successfully, and obtain the correct license or Journey Card, in addition to meeting the General Education and Basic Competency requirements for an Associates of Applied Science Degree. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

Complete a minimum of 4000 or 8000 hours State of Oregon approved on-the Job Training (OJT) - Hours vary by trade – After the completion of the Apprenticeship program, the department requires all student to take their appropriate State of Oregon License or Journey Card examination, pass successfully, and obtain the correct license or Journey Card, in addition to meeting the General Education and Basic Competency requirements for an Associates of Applied Science Degree. The department also requires all electrical students to take APR 204 – LME Electrical Code Level III, or APR 226 – Electrical Code Level III, and are the final courses students take prior to sitting for the State of Oregon License Examination. Collect and check the
results of the final examinations in APR 104 and APR 226. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

**Repair, install, and maintain a variety of industrial equipment using trade specific tools and techniques in compliance with state regulations for the Air Frame and Power Plant Technician, Boiler Operator, Programmable Logic Controller, Boiler/Turbine Operator, Die Cast Mold, Heat and Frost Insulator, Industrial Mobile Mechanic, Instrumentation Technician, Machinist, Millwright, Motor Winder, Pipefitter, Roll Turner, and Welder** – After the completion of the Apprenticeship program, the department requires all student to take their appropriate State of Oregon License or Journey Card examination, pass successfully, and obtain the correct license or Journey Card, in addition to meeting the General Education and Basic Competency requirements for an Associates of Applied Science Degree. This outcome correlates to the Communication, Critical Thinking and Problem Solving and Professional Competence.

**Summarize the results of the assessments of these outcomes.**

**Practice Safety Measures** – For the outcome: “Practice safety measures in all areas to prevent occupational incidents”, we collected and analyzed the final test results for course ELT-220 – Occupational Safety and Health Administration (OSHA) 30-Hour Safety Training. ELT 220 is only taught by a certified OSHA instructor and the Final Examination given in the class is a detailed, Federal-OSHA approved examination. In order to pass this test, a student must have a thorough understanding of federally mandated OSHA safety procedures universally applied throughout industry and on the job. We analyzed two-classes, one with 12 students and one with 23 students.

The pass rate for all 35 students was 98% with one failing because he stopped attending. All 34 students passed with a letter grade of “A”. The pass rate of 98% was much better than we expected.

**Determine problems in facilities systems** – For the Outcome: “Determine problems in Facilities Systems,” we collected and analyzed the final test results for one course, FMT -113 – Refrigeration Electrical III; and we developed a skills checklist that each student had to complete for a second course being FMT 102 – Refrigeration 102. In the FMT program there are many courses where students are required to perform troubleshooting on real-world, HVAC/R equipment in the Classrooms/Labs. ELT-201 – Electrical Motor Controls and ELT-125 – Basic Programmable Logic Controllers are other examples. FMT-113 and FMT-102 were chosen because they are the most representative.

For FMT-113, we collected and analyzed the final exam results of one class of 16 students. Refrigeration Electrical III is mostly trouble shooting of gas-furnaces, heat pumps, and air-
conditioners. If a student is unable to do the trouble shooting lab exercises on the equipment, it is a certainty that the student could not pass the final exam. A passing grade was 70%. Six grades were 90% - 100%, nine grades were 80% - 90%, and one grade was 70% - 80%.

There were no specific areas of the exam where a majority of students gave incorrect answers.

The course content for FMT 102 centers on Commercial Refrigeration Equipment. During the course of the labs in FMT 102, students must complete nine specific tasks working with copper refrigeration tubing and also recovering refrigerants, evacuating and charging refrigeration systems, using proper tools and instruments. Successful completion of each task must be signed off on the Course/Lab sheet by the instructor. Students are performing these tasks on the same equipment found in real-world Industry.

One class of 16 students in the FMT-102 was analyzed and all 16 students received a passing sign off on each of the nine tasks. Only two students were asked to repeat a total of three tasks for a second time in order to receive the instructor sign off.

The results of the two assessments in FMT-113 and FMT-102 were better than we expected, given the intense “hands- on” component of these two courses.

Perform corrective maintenance – For the Outcomes: “Perform corrective maintenance in facilities systems; Perform preventative maintenance in facilities’ systems; Recognize interrelationships of facilities systems to avoid negative impact”, a team of two FMT Instructors and one Academic Professional collected and analyzed the “evaluation rubrics” from course FMT-280A - Co-operative Work Experience. FMT students are required to perform 240 hours of work in an approved facility or an approved HVAC/R service company. The employer/supervisor is the “instructor” for the student during these real-world work hours. Each 30 hours of facilities maintenance work earns 1 credit for the student and 8 credits are required for the Degree. The “evaluation rubric” includes a skills checklist and also narrative comments from the employer/supervisor.

The evaluation of 23 FMT-280A students were collected and analyzed over three terms. There was a large range of employers/supervisors offering these 23 students a co-op work site. The Veterans Administration Hospital, Enteck Corporation, Hunter-Davidson HVAC/R Service Company, and the Portland Community College Facilities Management Department are some examples of the sites and types of employers/supervisors involved in the FMT Co-op work program. All 23 employer/supervisors completed “evaluation rubrics” for the student.

There were no “unsatisfactory” marks given on any of the 23 evaluations in any skill area. There were only 2 marks indicating “need for improvement” on the 23 evaluations. The huge majority of marks given were identified as “out-standing” and “very good” on the same 23 evaluations.
The instructors and the Academic Professional analyzing the evaluations focused much of their attention on two main areas: “Job Learning/Skill Improvement and Quality of work”. All marks in these two areas were in the “Outstanding” or “Very Good” and the preponderance of written remarks were positive for all 23, FMT-280A students.

One narrative comment asked of employer/supervisors on the rubric is, “Would you recommend this student for employment in your own of another firm?” Nineteen employer/supervisors said “yes” and only 4 did not respond to the question. An example of a comment by an employer/supervisor in answer to this question is: “very much so, competent with tools and personal interaction.”

The overall results of evaluations for the FMT-280A are higher than we expected. We did not expect so many narrative comments be on the positive side, or so few “unsatisfactory” marks. Our overall conclusion is that our department is doing very well providing the technical hands-on skill to the FMT student, but, looking at the overall results, our department could do a better job in providing students the “soft” skills of effective communication and customer service necessary for the successful Facilities Maintenance/HVAC/R Technician.

**Communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors –**

For the outcome: “communicate effectively through appropriate media with co-workers, customers, contractors, suppliers, and supervisors,” we once again chose course FMT-102 Refrigeration II, which centers on Commercial Refrigeration, to do this assessment. However, we used FMT 213 - Commercial Refrigeration Shop, which is an elective, hands-on Lab component of FMT-102, for this assessment.

During the course of FMT 213, students must work in teams to write, present, and execute a work order with an accompanying “invoice” and actually perform the service on a commercial refrigeration system, such as an ice maker. The student teams must then, verbally, walk the instructor through the entire process – to the satisfaction of the instructor before a passing grade is given. The work orders, invoices, and procedure are all recorded by the instructor and saved. Passing this lab means satisfactory completion of these real-world tasks.

We collected and analyzed the final grades for FMT-213 for one class of 20 students during Winter Term, 2011. All students passed and received a letter grade of “A”.

The remaining FMT and Apprenticeship assessments will be conducted in year two and therefore will be ready for the next program review.
**Identify and give examples of assessment-driven changes that have been made to improve students’ attainment of degree and certificate outcomes.**

Our Department SAC has, as of the writing of this student assessment report, identified two changes that should be implemented but requires further discussion.

First, we will add one more topic to the evaluation rubric for FMT-280A-Co-op Work Experience, titled “Overall Facilities Troubleshooting”. This evaluation will be done by the employer-supervisor. Some FMT-280A students that have already received evaluation of these skills during their Co-op work identify that an additional written check off would be clearer.

Second, the student assessments indicate that we are providing adequate, skillful, and technical instruction, but our students could benefit from more discussion/instruction around workplace communication and customer service. There is already plenty of Instruction in our FMT 100, 101, 102, 103, 111, 112, 113, 122, 125, 128, 204 and 213 courses, around these “soft” skills, but we need to emphasize more Instruction which is already in place.

**Review job placement data for students over the last five years, including salary information where available. Forecast future employment opportunities for students.**

**Job Forecasting:**

The Obama administration has estimated 5 million jobs (direct and indirect) can be created by The American Recovery and Reinvestment Act. Obama developed an economic recovery program to spur job growth and create new ‘green’ jobs.

Oregon has seen a 20% to 30% decrease in unemployment rates due to green jobs. Obama’s plan would create an estimated 27,306 jobs in Oregon. Across the world green efficiency in buildings is estimated to create 2 to 3.5 million green jobs in Europe and the United States. The department is trying to respond to this need. We have developed new courses such as building commissioning and other NSF grant funded classes.

Several job search sites all predict a large growth in the maintenance, mechanical, electrical, construction and repair industries. Monster Jobs quotes: “With billions of stimulus dollars going toward energy efficiency, home weatherization, and maintaining and improving our transportation infrastructure, maintenance and repair workers are expected to see an increased demand for their services.”
Speciality Careers Related to Facilities Maintenance

- Facilities Maintenance Electrician Wages
- FMT vs. Specialty Wages
- PLC Programmer Wages

Comparisons across Oregon and National levels.
Analyze any barriers to degree or certificate completion that your students face, and consider the reason that students may leave before completion.

Block Transfer

The OCCAC Consortium goal is to provide a portable statewide apprenticeship degree pathway for students. Since all colleges do not have every apprenticeship trade, a block transfer articulation agreement was constructed. Any community college with an apprenticeship program participating in the statewide degree and certificate pathway (even though it may not have the trade at its institution) will be able to participate in all three pathways and confer all three AAS degrees through the block transfer agreement. With a statewide articulation agreement, students will be able to transfer as a whole package the related training and prior certification credits to any participating statewide apprenticeship program at an Oregon community college. Once at an institution, students will need to take general education credits and meet residency requirements.

The Consortium developed a crosswalk for the credit conversion. However, the consortium has not readily shared the crosswalks for each college due to local control issues. The Trades & Industry Department has offered to compile the crosswalks into one uniform working document. This document should be ready by the next program review.

Describe and explain any additional changes (not already addressed above) that have been made to the program since the last program review.

Our last program review was in 2002. Since then, the department had a major overhaul of the apprenticeship degrees and certificate as stated throughout this document. In addition, we have strengthened our internal and external customer service, marketing, recruitment and over
all image. The department is participating in monthly recruiting and marketing across the United States. The Facilities Maintenance Program is said to be the best state-of-the-art Building Maintenance Training Facility in the Northwest. We have had people relocate here from across the country to take our training program. Past students are constantly reporting back that they have landed a great job or that they have been accepted into the apprenticeship program of their choice. The department has had a lot of growth since the last review. Enrollment has continued to rise and we have had an increasing number of graduation students that document the successfulness of the program, curriculum and ultimately the students.

**Recommendations**

**Identify recommendations related to teaching and learning based on assessment of student learning outcomes (course, degree, certificate and/or College Core Outcomes).**

Based upon our Department’s assessment of student learning outcomes, the Trades and Industry Department should study, review, and implement all concrete means through which our SAC can increase our support and better address the PCC Core Outcome for “Cultural Awareness”.

Based upon our Department’s assessment of student learning outcomes, the Trades and Industry Department should continue to pursue training for our students using real-world, diverse types of HVAC-R and Electrical Equipment. This training should be hands-on. We should continue to upgrade and increase the training equipment our students are currently using either through direct purchase with available PCC funds or through our donation campaigns targeting the HVAC-R and Electrical Industries.

Based upon our Departments assessment of student learning outcomes, the Trades and Industry Department should continue to employ part time Faculty who are professionals in their field and who continue to demonstrate professional competency in their job, as well as in the classroom.

Based upon our Department’s assessment of student learning outcomes, our department should continue our membership in the Oregon Community College Apprenticeship Council and continue to increase and fine-tune the Degree and Certificate programs now available statewide for persons who have completed Apprenticeship programs and who have obtained a License or Journey Card.

We further recommend that our department pursue establishing two new Apprenticeship Programs, for which we would supply the coursework and also the services of Administrator:
Limited Building Maintenance Electricians (LBME) and Limited Renewable Energy Technicians (LRT). Both programs would provide a vital service to Industry and job growth.

Identify recommendations relevant to areas such as maintaining a current curriculum, professional development, access and success for students, obtaining needed resources, and being responsive to community needs. (For recommendations that require additional funding, please identify those that are of greatest importance to the SAC)

We further recommend that our Department upgrade our existing Programmable Logical Controller (PLC) Lab by replacing our older PLCs with an upgraded model. The use of PLCs is continuing to increase in order to provide efficiency to an increasing number of industrial processes, including efficient operation of commercial buildings. Cost of this upgrade is in the Range of $23,000.00 to $25,000.00.

We further recommend that our Department re-emphasize the green and sustainable content within our curriculum and that we also add more new green and sustainable courses. Target courses would be solar voltaic installation and commissioning courses, more Building Commissioning courses, an advanced building Energy Management class, our existing Direct Digital Control Class, our existing Heat Pumps and Natural Gas classes.

We further recommend that our department conscientiously do our part to accomplish the build out of the new Swan Island Facility and that we explore the means to become a good steward of that site. PCC has purchased five acres of land on Swan Island as part of the current Bond Construction. After careful study by a Steering Committee, the Department of Trades and Industry has been selected to move to the Swan Island site, and the Facility Planning Phase for that move is currently under way. We further recommend that we productively use this new facility to expand and improve our instruction and training.

Finally, we recommend that our current budget for Lab and Instructional materials be reviewed and increased due to rising costs of parts, equipment and supplies used during lab sessions. Some examples are copper tubing and refrigerants. In addition, increased funding would provide room for expansion in the renewable energy fields as well as continued quality for existing courses.
Industry Partners

OSATC has reaffirmed Oregon Administrative Rule (OAR) 839-011-0084, which requires each committee to adopt certified curriculum for all new standards. In addition, OSATC directives and federal apprenticeship revisions [29 CFR 29], make the .0084 criteria mandatory benchmarks for all existing committee curricula. This essentially requires each JATC committee to maintain and provide documentation to show that its related training curriculum meets independent accreditation benchmarks. As such, we are developing a growing client base for which we are contracting to provide related training for their apprentices.

Related Training Apprenticeship Partners: PCC Structural Deer Creek, Conmet, ON Semi Conductor, PCC Structurals Deer Creek Electricians, Blue Heron Paper Co., Leupold And Stevens Inc., Toyo Tanso USA, COP-TAC, OSEA Chapter 9 & Hood River County School District, City of Portland, and Solaicx.


All Labor Partners support the Pre-Apprenticeship classes, APR 100 and APR 200.

State /Governmental Agency Partners: Bureau of Labor and Industries – Apprenticeship & Training Division (BOLI-ATD), Oregon Apprenticeship and Training Council (OSATC), Oregon Building Code Divisions (BCD), and Oregon Department of Transportation (ODOT).

Apprenticeship Administration Partners: Metro Limited Maintenance Electrician /Stationary Engineer JATC MA 1040 and Metro Manufacturing Plant Electrician JATC MA 1018.


PGE partnership secured a $5000 apprenticeship scholarship for a student to attend VOLTA Climbing School.

PCC Department Partners: Career Pathways, Cascade Campus Career Services (to include participation in the PCC CA Job Fair), Margret Carter Skill Center, Evening Trades Apprenticeship Program (ETAP), Electronic Engineering Technology, Education Department, and Customized Workforce Training (CWT).


Platt Electric sponsors an annual PCC Trade Show and has a dedicated scholarship program for our electrical and apprenticeship students.
Appendix

Trades & Industry Department

APR
  Apprenticeship
    Unduplicated Headcount
      FY 09-10: 223 Students
      FY 10-11: 201 Students

ELT
  Electrical Trades
    Unduplicated Headcount
      FY 09-10: 313 Students
      FY 10-11: 291 Students

FMT
  Facilities Maintenance Technology
    Unduplicated Headcount
      FY 09-10: 283 Students
      FY 10-11: 279 Students
### Enrollment Matrix 4-A

#### Enrollment Trends – C40316 Trade Extension – End of Term Data

<table>
<thead>
<tr>
<th>Season</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2010-11 # Change</th>
<th>10-11 % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>45.00</td>
<td>52.33</td>
<td>52.91</td>
<td>0.58</td>
<td>1.1%</td>
</tr>
<tr>
<td>Winter</td>
<td>31.53</td>
<td>48.76</td>
<td>49.90</td>
<td>1.14</td>
<td>2.3%</td>
</tr>
<tr>
<td>Spring</td>
<td>37.18</td>
<td>50.80</td>
<td>51.82</td>
<td>1.02</td>
<td>2.0%</td>
</tr>
<tr>
<td>Summer</td>
<td>8.90</td>
<td>13.46</td>
<td>20.61</td>
<td>7.15</td>
<td>53.1%</td>
</tr>
</tbody>
</table>

### Enrollment Matrix 4-B

#### Enrollment Trends – Apprentice – End of Term Data

<table>
<thead>
<tr>
<th>Season</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2010-11 # Change</th>
<th>10-11 % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>10.18</td>
<td>11.06</td>
<td>12.58</td>
<td>1.52</td>
<td>13.7%</td>
</tr>
<tr>
<td>Winter</td>
<td>0.00</td>
<td>10.82</td>
<td>11.99</td>
<td>1.17</td>
<td>10.8%</td>
</tr>
<tr>
<td>Spring</td>
<td>0.00</td>
<td>13.27</td>
<td>11.34</td>
<td>-1.93</td>
<td>-14.6%</td>
</tr>
<tr>
<td>Summer</td>
<td>11.57</td>
<td>4.71</td>
<td>8.95</td>
<td>4.24</td>
<td>90.1%</td>
</tr>
</tbody>
</table>
Electrical Trades ~ Full Time vs. Part-Time

Facilities Maintenance Technology ~ Full Time vs. Part-Time
## Full Time Faculty Bio’s

<table>
<thead>
<tr>
<th>Name</th>
<th>Teaching Experience</th>
<th>Industry Experience</th>
<th>Different Industry Positions</th>
<th>Education/Credentials</th>
<th>Additional Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Page, Dwight</strong></td>
<td>- 20 years; 3 years at PCC</td>
<td>- 25 years</td>
<td>- JW, Foreman, General Foreman, Project Manager</td>
<td>Oregon General Journeymen License, AET, AAS, AAS Voc Ed, ISACCST Level 1 Instrument Tech</td>
<td>- ASE Certified Mechanic</td>
</tr>
<tr>
<td><strong>Shaw, John</strong></td>
<td>- 30 years; 12 years at PCC</td>
<td>- 36 years</td>
<td>- Foreman, Engineer, Business Owner, Instructor</td>
<td>Perry Technical Institute, AA, BA, Manufacturing Engineer, M Ed</td>
<td>- HVAC Certification, Certified Welding Inspector, Certified Vocational Educator, General Contractor</td>
</tr>
<tr>
<td><strong>Willebrand, Rick</strong></td>
<td>- 11 years at PCC</td>
<td>- 28 years</td>
<td>- Business Owner, Manager, LME, Foreman, Sales/Service Person</td>
<td>- BFA - Fort Wright College, - Technical Writing Certificate – PCC, - Many Industry Training Certificates and Seminars</td>
<td>- Department Chair, Trades &amp; Industry</td>
</tr>
</tbody>
</table>
Part Time Faculty Bio’s

**Brennan, Greg**
Teaching Experience: 29 years; 24 years at PCC
Industry Experience: 34 years
Current Employer: VAI Inc.
Different Industry Positions: Company Owner
Education/Credentials: BS Economics and Business Management; Involved in environmental clean-up

**Brown, John**
Teaching Experience: 4 years at PCC
Industry Experience: 21+ years
Current Field Employer: Lattice Works of Oregon
Different Industry Positions: Maintenance Foreman, Metro LME JATC Chair, Metro MPE JATC Member
Education/Credentials: Oregon Manufacturing Plant Electrician, Hazmat Certified

**Buck, Jon**
Teaching Experience: 8 years, 4 years at PCC
Industry Experience: 21+ years
Current Field Employer: Hunter-Davison
Different Industry Positions: Service Technician
Education/Credentials: Oregon Journeyman HVAC Technician and Limited Energy Electrician

**Cochenour, Randy**
Teaching Experience: 7 years at PCC
Industry Experience: 18 years
Current Employer: Nalco Water.
Education/Credentials: Veteran

**Cody, Bret**
Teaching Experience: 3 years at PCC
Industry Experience: 19+ years
Current Employer: PCC – Physical Plant
Different Industry Positions: Lean Electrician
Education/Credentials: Oregon General Journeyman
**Cook, Dennis**
Teaching Experience: 29 years; 10 years at PCC
Industry Experience: 33 years
Current Field Employer: Intel
Different Industry Positions: Tech Supervisor, Manager
Education/Credentials: BS Business, Nuclear Propulsion Plant Supervisor

**Faulkner, Scott**
Teaching Experience: 24 years; 7 years at PCC
Industry Experience: 44 years
Current Field Employer: City of Portland
Different Industry Positions: Inspector, Supervising Electrician
Education/Credentials: 24 years teaching Apprentices and Journeymen Electricians

**Fortune, Judy**
Teaching Experience: 9 years; 5 years at PCC
Industry Experience: 15 years
Current Field Employer: IBEW Electrician
Different Industry Positions: Journeyman & Foreman
Education/Credentials: BS WOSC, Masters PSU, Oregon Journeyman Electrician

**Freuler, Robert**
Teaching Experience: 34 years; 7 years at PCC
Industry Experience: 37 years
Current Field Employer: Siemens Building Technologies
Different Industry Positions: Regional Sales Manager, Technical Services Manager
Education/Credentials: BA, OSU, USAF Technician

**Gayman, Brent**
Teaching Experience: 5 years at PCC
Industry Experience: 25 + years
Current Field Employer: Self Employed
Different Industry Positions: Field Work, Business Owner
Education/Credentials: PCC, HVAC
Hodgson, Tim
Teaching Experience: 18 years at PCC
Industry Experience: 34 + years
Current Field Employer: Larry and Chucks (President)
Different Industry Positions: Installing, Trouble Shooting, Repairing HVAC, Business Owner
Education/Credentials: Oregon Polytechnic Institute AEET

Houle, Charlie
Teaching Experience: 7 years at PCC
Industry Experience: 33 years
Current Field Employer: PCC
Different Industry Positions: Installer, Technician, Sales
Education/Credentials: EPA and HVAC Instructor, AAS LCC

Kozera, Roger
Teaching Experience: 13 years at PCC
Industry Experience: 33 years
Current Field Employer: Gray Bar
Different Industry Positions: Customer Training Presentations on Control Logic Products
Education/Credentials: ASEE Clackamas Community College

LeCarno, John
Teaching Experience: 30 years at PCC
Industry Experience: 45 + years
Current Field Employer: AF Military Base
Different Industry Positions: Electrician, Metro LME JATC Secretary, Metro MPE JATC Member
Education/Credentials: Military, Oregon General Journeyman Electrician

Martin, John
Teaching Experience: 26 years; 22 1/2 years at PCC
Industry Experience: 37 years
Current Field Employer: United Refrigeration
Different Industry Positions: Engineer, Sales, Logistics
Education/Credentials: Certificate Member with RSES
**McCamish, John**  
Teaching Experience: 11 years; >1 year at PCC  
Industry Experience: 18 years  
Current Field Employer: NECA IBEW Training Center  
Different Industry Positions: Foreman, Electrician  
Education/Credentials: BS University of Oregon, General Journeyman Supervising Electrician

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**Toburen, Todd**  
Teaching Experience: 10 years; >1st year with PCC  
Industry Experience: 12 years  
Current Field Employer: Alpenrose  
Different Industry Positions: Safety, Industrial Refrigeration  
Education/Credentials: Military, Clark College, PCC 4 year MPE Apprenticeship Graduate

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**von Entress, Dee**  
Teaching Experience: 12 years; 5 1/2 years at PCC  
Industry Experience: 11 years  
Current Field Employer: EC Company  
Different Industry Positions: JW, Safety Committee  
Education/Credentials: BS, AAS, General Journeyman Electrician

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**Weber, Ron**  
Teaching Experience: 24 years, 39 years at PCC  
Industry Experience: 39 years  
Current Field Employer: PCC Part Time Faculty  
Different Industry Positions: Maintenance engineer, HVAC Technician  
Education/Credentials: Ph D, BS, BA from PSU, AAS from PCC

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**Webster, Michael**  
Teaching Experience: 4 + years at PCC  
Industry Experience: 25 + years  
Current Field Employer: PCC Part Time Faculty & Retired from Boyd’s Coffee  
Different Industry Positions: Millwright, Machinist, Consultant, Metro MPE JATC Secretary, Metro LME JATC Member  
Education/Credentials: AAS from MHCC, Manufacturing Plant Electrician Supervisor

Not all instructors were available for a photo and bio. A complete list is available in the PCC catalog.
References:


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http://www.employment.oregon.gov/


http://www.indeed.com/salary?q1=PLC+programmer&l1=

http://www.oregon.gov/ccwd

http://www.pcc.edu/about/catalog/apprentice.pdf

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http://www.pcc.edu/resources/academic/program-review/index.html

http://www.qualityinfo.org/olmisj/CES?action=rsS4&areacode=21038900
The Birth of the School

A small vocational and adult education program through Portland Public Schools grows into a community college.

In 1961, the Vocational and Adult Education Division of Portland Public Schools officially changed its name to Portland Community College.

In 1963, (the same year Dr. Martin Luther King Jr. delivers his “I Have A Dream” speech PCC’s dream comes true. The first bond measure was passed leading to the remodel of the Failing School (where Vocational Classes were held) and Shattuck School.

In 1966, PCC begins its first accreditation process and splits academics into five divisions.

In 1969, the Ross Island (formerly Failing School) and the Stadium Center (formerly the Multnomah Bible School) are purchased by PCC. The Stadium Center is PCC’s second location in downtown Portland with Failing School being the first. Later that year PCC officially separates from Portland Public Schools to become its own organization.

In 1975, PCC becomes fully accredited through the Northwest Association of Schools and Colleges.

In 1978, PCC purchases a large industrial building on Southeast 82nd Avenue, the old Southeast Center which will later become the home of our program then called Industrial Occupations.

In 1984, PCC sells the Stadium Center and the department moves to Rock Creek and The Southeast Center.

In 2003 or 2004, the new Southeast Center opens and becomes our home until our new shared Technology building is built.

In 2004 or 2005, the Trades & Industry Department moves to our current state-of-the-art training facility at Cascade Campus.

In 2012, the Trades & Industry Department prepares to move to its own building at the proposed Swan Island Apprenticeship & Trade Center.

The college was born with a small vocational program and the department feels we will be full circle when we move to our own center for which we can better serve our growing diverse student population.