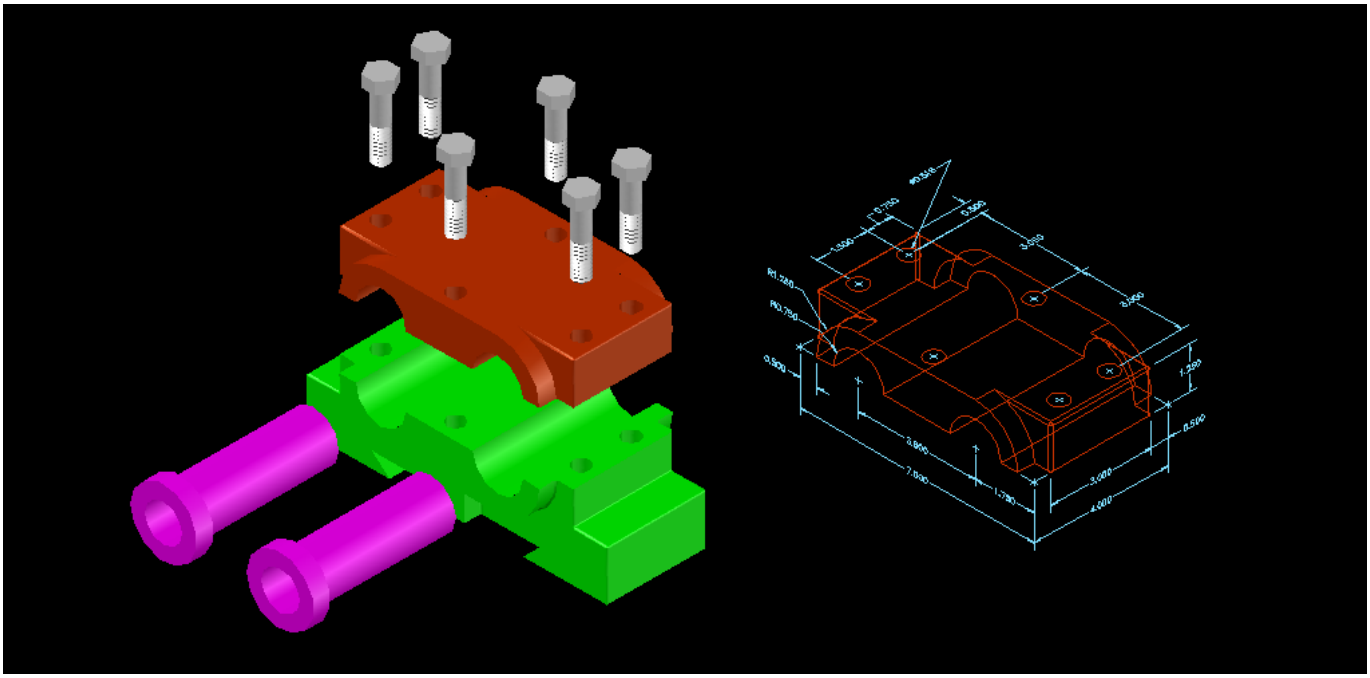
Academic Program/Discipline Review
Computer Aided Design and Drafting (CAD)



CADD Career and Program Description

Design drafters are skilled technicians who interpret engineering data to produce sketches, plans and detailed working drawings used in manufacturing and construction. Career opportunities exist for drafters in many areas, including: Product design, Sheet metal layout, Structural steel detailing, Tool and fixture design, and Machine design. Graduates are found working for manufacturing firms, construction companies, engineering firms, city, state and federal agencies or they may be self-employed. Advancement to positions of designer or engineering technician is possible.

The PCC Computer Aided Design and Drafting (CAD) program provides the necessary instruction and personal guidance to meet the workforce obligations expected by local industries. The CADD program takes pride in providing the best learning modalities and computing resources as we prepare students for entry into the world of technology. Combining the principles and techniques set forth in drafting, the PCC CADD program utilizes the most sophisticated and advanced CAD software in developing a comprehensive skill set for our graduates.

Mark Hagen, *Department Chair*
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Portland Community College
Sylvania Campus

April 15, 2011

Program/Discipline Review

Computer Aided Design and Drafting (CAD)

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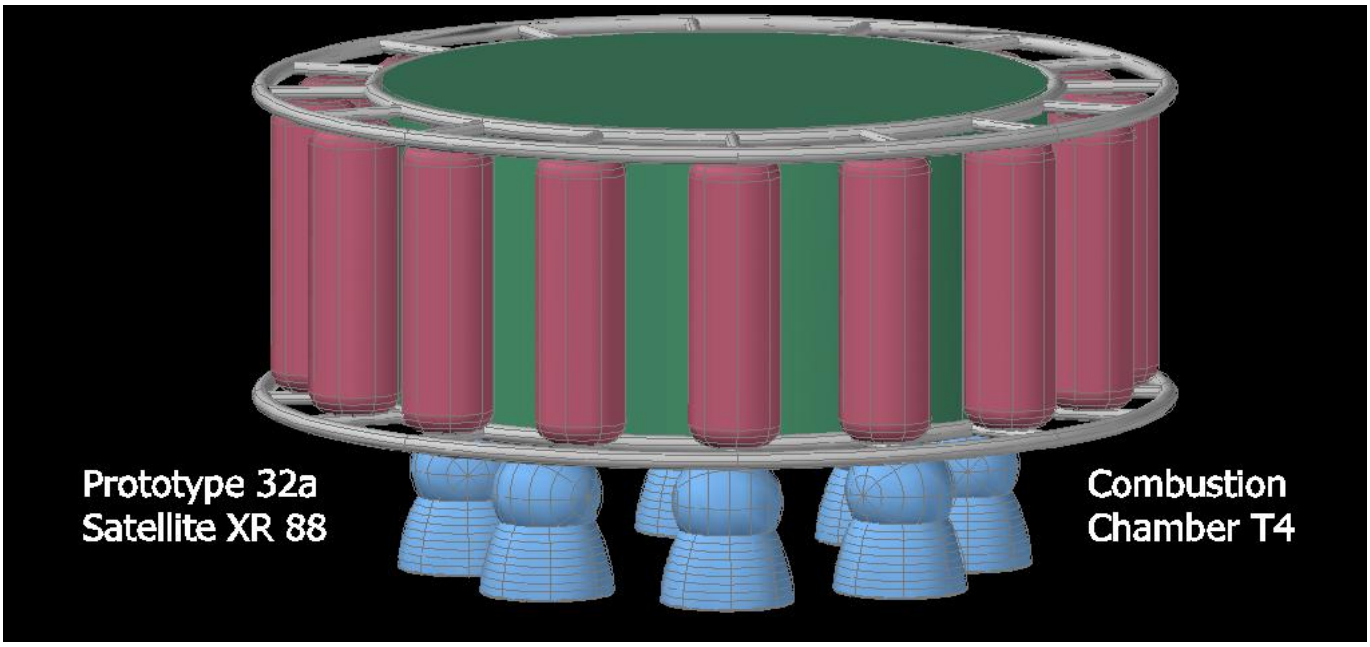

Degree/Certificate Outcomes for CADD:

1. Use current Computer Aided Design technology to design, and subsequently print, two-dimensional industry standard drawings.
2. Use a variety of advanced parametric Computer Aided Design software applications to design, and subsequently print, three-dimensional parts, assemblies, and sub-assemblies.
3. Use American National Standards Institute guidelines when designing and producing drawings.
4. Work as an integrated member of a drafting technology design team, collaborating on concepts and ideas related to a working project.
5. Apply a generalized understanding of design principles involving trigonometry and geometry when solving drafting design problems.

1. Program/Discipline Overview

A. What are the educational goals or objectives of this program/discipline?

Educational Goals

Our primary goal is to continue to teach and develop curriculum that supports learning for students.

Being a part of a rapidly changing profession that interfaces with the manufacturing industry, teaches ever-changing CAD software, keeps pace with evolving ANSI drafting standards, and is aware of emerging technologies, the primary goal is accomplished by:

- Delivering contemporary curriculum to meet degree outcomes of the program.
- Improving the quality of teaching and learning by refining methodologies, and enhancing the relationship between the instructor and student.
- Participating in continuing educational opportunities that enhance our relationship to both industry and the community.

Our secondary goal is to prepare and track our students as they enter into a competitive workforce.

In collaboration with PCC Employment Services, the department is the prime mover in preparing our CADD students for entry into a highly-competitive workforce. Issues surrounding this goal include:

- Utilizing the most highly-advanced and sophisticated software available, which provides the student with the CADD knowledge base that employers desire.
- Working with current employers and potential firms that incorporate our graduates as full time and part time employees. Continuing education is an added incentive for these companies.
- Placement of work coop students into supportive companies, as these individuals experience the required skills to succeed as an evolving learner.

- Tracking each individual through various means of communication, as we connect to both the graduate and the firm who employees them. Feedback provides vital information for shaping curriculum and refining the educational conduit to the professional workplace.

A third goal is to shape a curriculum that is sensitive to the sustainability issues that confront our world and local communities.

Manufacturing processes and products have changed significantly in the last 10 years. The PCC CADD program needs to be critically aware and proactive regarding the changes currently taking place, which includes the following:

- Educate both full time and part time faculty regarding the latest technologies that drive our manufacturing economy, including practices that enhance sustainability.

- Incorporate green technology, and sustainability principles and practices, into a portion of our CADD curriculum.

- Introduce students to both legacy and contemporary workplace systems that mesh older technologies with new technologies that endorse sustainability and conservation.

B. What changes have been made as a result of the last program review , or are the goals expected to change in the next five years?

Changes in goals since the last review

Our overall goals have not changed significantly since our last review, but the complexity of the design profession has. In response to this, our faculty professional development has expanded, and the program has incorporated a variety of modifications to the curriculum. Subtle changes include various refinements to the CCOG's, and upgrades to course assignments that reflect contemporary business practices. Other areas that are currently under development or being enhanced since our last review:

New and existing CAD software. Each year, a new release of AutoCAD, SolidWorks and Inventor is leveraged into the manufacturing marketplace. Department faculty are in a continuous mode of upgrading their skills to stay abreast of new functionality.

Adjust CCOG's to match new ANSI Standards or changes to CAD software. Legacy CCOG's did not reflect current technology ANSI standards or new CAD functions that impact curriculum. Progressively, the CADD department has evolved the curriculum to match what is endorsed by industry.

Refine the CADD department's focus on what matters to our students. By offering the most advanced and contemporary software-based courses, we continuously respond to the requirements of industry and the students we cater to. We've also made subtle adjustments to the schedule and advising times to best accommodate the needs of our students. The DRF 100 course, offered during the student's first quarter, was augmented to include additional tours that would stimulate new student interest.

Projected goals for the next 5 years (2011-2015)

Our goals for the next five years will include a number of elements worth noting, including faculty training and curriculum enhancements, that are responsive to the changes in industry:

Continue to strengthen our curriculum. Critically manage and adapt our course offerings to reflect best teaching practices, and provide the most up-to-date content that matches the requirements dictated by industry. Address instructional, thematic issues that ultimately confront our department and our students (i.e. application of sustainability and materials conservation). Offer more classes during the summer term to accommodate students that can only participate during this time of year.

Invest in "cross training" for full time and part time faculty. Progressively, encourage full and part time faculty to participate in cross training venues that diversify their skill set, notably CAD. By this action, our faculty will be able to instruct and advise on a number of platforms other than those they already know. Without question, this adds educational value to each member of our staff.

Incorporate new CAD technologies into the department's list of course offerings. By providing access to new hardware and software-based tools (i.e. Rhino, Google, Autodesk Maya and 3D Studio Max), we increase our educational opportunities to the public. New students and industry alike will deem PCC as a viable institution, where current (and emerging) trends in CADD technology are addressed by the PCC faculty that represents it.

Build an Advisory Board that represents the full spectrum of manufacturing. Currently, the CADD Advisory Board represents 3 (three) major areas: Contract drafting and programming services, Machine design and assembly line production, and Structural steel. We have part time faculty that attend the meetings as well (CAD instructors), and an advisor that provides academic and personal counseling to students. Additional areas that the CADD department could include would be the Transportation industry, Electrical transmission systems, and Green technologies like windmill farms.

Provide CAD certification testing. With our current CAD licensing, which includes AutoDesk and SolidWorks products, we are uniquely positioned to offer proficiency certification in a number of softwares. Certification testing could take place at multiple campus locations, where tests could be administered during the weekdays, evenings or weekends. Certification testing verifies a student's knowledge base in a specific software area, providing a competitive resume entry. Additionally, this element would provide another potential revenue stream for the College.

Consider the move towards an AAS Degree. A number of years ago, the Drafting Technology and Design program was reduced to a 1-year certificate. The department should revisit the prospect of rebuilding towards an AAS degree. In light of Clackamas Community College deleting their Drafting program nearly 2 years ago, this leaves a large void in 2-year Drafting programs. The remaining 2-year program is based in Salem, which provides instruction in only a few vital categories. Continued discussion should bring about a determination regarding the growth of the PCC CADD program.

C. Place the program within the context of the institution. Describe how the college's Mission, Value and Goals are addressed.

How the college's Mission, Value and Goals are addressed

The CADD program offers opportunities for:

Academic and professional growth, by providing instructors with high-level qualifications to teach professional level skill sets. Professional growth may be obtained through instructional grants and personal training opportunities supported by the department and the college as a whole.

Students of all ages, races, and cultures, by providing timely and personalized student advising through our Student Resource Specialist, and referrals to the many resources at PCC. A variety of age groups and cultures are represented in the CADD program, and we strive to provide individualized attention to each student.

Students of all economic levels, by providing advising through our Student Resource Specialist, and connection to scholarships for our students such as the Angelina and Pete Costanzo Scholarship Fund, and the State Energy Sector Partnership Training Funds.

Students of previous academic experience, by providing academic assessment and advising through our Student Resource Specialist, waiver of course pre-requisites in light of prior learning, and through transcripts in connection with Clackamas Community College's legacy Drafting program.

Lifelong learning and continuing education, by providing contemporary course work in topics of interest to casual students and practicing professionals, including AutoCAD, Inventor and SolidWorks. The CADD program also provides rolling year-round admissions, and offers both day and evening classes.

Fostering civic responsibility and engagement, through participation with an external Advisory Board, contact with various software vendors, and collaboration with numerous manufacturing firms to arrange tours and engage in technical discussions.

Training and learning opportunities for the workforce, by providing up-to-date training on popular software, and through our Cooperative Work Education Program (DRF 280).

Continuous professional and personal growth of faculty, as our instructors make use of professional development opportunities to update skills and critical knowledge in CAD, Drafting principles (ADDA National Conference), American Design Drafting Association affiliation, and contemporary design and manufacturing principles.

2. Curriculum

A. Reflect on the learning outcomes and assessment, teaching methodologies and content in order to improve quality of teaching, learning and student success.

Learning outcomes. The CADD Department adheres to specific ANSI industry standards and guidelines for instruction in the basic core of classes, including DRF 117, 133, 135 and 251. Learning outcomes are shaped by the language set forth in the CCOG's for these 4 (four) courses, where curriculum development (i.e. Orthographic Layouts and 3D Modeling Assemblies for Industry) is a direct reflection of technical drawings that program students will generate in industry.

The 4 (four) core courses facilitate a comprehensive understanding of the world of drafting technology from a basic design point of view. Within this core, the DRF 133, 135 and 251 classes incorporate CAD as a design tool to promote an overall on-the-job perspective of the field of drafting. For these 3 (three) courses, combining drafting principles, manufacturing standards, and a uniform, effective graphics language (CAD) enables the student to realize critical design outcomes.

The CAD courses offered through the CADD program provide learning outcomes that are directly linked to various design industries that rely heavily on computer-aided design. The department CCOG's for CAD, including DRF 126, 136, 185, 246, 270, 271 and 285, are geared towards developing the vital knowledge base that graduates will depend upon in completing required job-related tasks. Here, the outcomes support what industry demands of our students: a rich, CAD skill set that addresses the needs of the manufacturing sector.

Assessment. This topic may be viewed in 2 (two) separate ways. As it refers to "How are we doing as it applies to the outcomes set forth by the College" is addressed later in this document. As it applies to staffing, and the academic/professional services provided therein, the CADD department excels in the methods and delivery of instructional material:

- Each part time faculty member has at least 5+ years of instructional experience, and utilize the latest technologies in delivering content. Each member has at least 10+ years of professional experience utilizing PCC course tools such as Inventor and SolidWorks.

- Each full time member has over 20+ years of instructional experience, and are equally as experienced in the delivery of content. Each member has at least 10+ years of professional experience utilizing PCC course tools such as AutoCAD.

Mastery of technology has been demonstrated in a number of areas, primarily in computing, operating printing and plotting peripherals, and various projection devices.

Assessment Continued. The CADD Department Chair has determined that yearly classroom observations would be vital to the continuing development of each faculty member, which was confirmed and acceptable to each of the participating staff. For the past 2 years, each member has scored an aggregate of 9.5 (out of a possible 10 points) for categories such as organization, responsiveness to student questions, comprehensive assignments that reflect the intent of the CCOG's, and delivery of content. Additionally, various student evaluations have confirmed that teaching faculty are highly adept at instructional delivery, conveying the content and assignments, availability (via email or office) and overall professional character.

Shown below is a recent classroom observation that was conducted on 27-May-2010:

Shown below is an evaluation "synopsis" regarding your instructional session.

I've based my critique on a graded scale from 1–10, with 10 being exemplary in performance.

1. *Lecture Pace: 10 – Your presentation has a nice "flow". I noticed that you moved at a pace that was comfortable for all participating students. You exhibited your professional analysis in a well-composed and methodical way to help build student confidence and retention.*

2. *Audibility: 10 – All students could hear your lecture. I was sitting in the back of the computer lab, and could hear you just fine. I could hear all the words at the same auditory level. You did a great job in this area.*
3. *Scanning the Audience: 9.5 – You consistently checked for student comprehension. Nearly all the students were following your lecture on queue, with a few students moving quickly to catch up. On a more frequent basis, you might want to poll your audience with a query, such as "How's everyone doing?" or "Does anyone need help?" As you know, some students are very reluctant to raise their hand seeking assistance.*

4. *Content-Thoroughness: 10 – Very precise and extensive in material coverage. Your use of dialogs and related visual material was employed extensively throughout the lecture portion of the class. You had excellent eye contact when explaining the design aspects of the Audiosource trade show module. You inserted various Inventor capabilities into your demonstration. It was a nice link into a functional, real-world design.*
5. *Content-Explanation: 9 – Content was explained clearly. Again, you may want to scan your audience from time to time searching for those who stray from your lecture. It requires additional minutes that could be devoted to actual instruction, but I know your students appreciate the personal attention. Still, your thoughts were articulated very well.*

6. *Interaction with Students: 9.5 – Showed interest in student performance and instructional queries. You seem to know all your students by their first name. Excellent!*
7. *Answered Questions: 10 – Answered questions as needed, both verbally and through computer graphics demonstrations. Student satisfaction is this area appeared high.*
8. *Internet exploration with related subject matter: 10 – Nice fusion of CAD + Internet.*

The CADD Department will be assessing the full complement of CCOG's this Spring 2011, as we make this area a high priority agenda item for the Spring 2011 District-Wide SACC Meeting. We place vital importance on retaining CCOG's that exhibit the most current, and detailed, course content. Guides will be assessed, and updated as required, to match the current state of affairs in drafting technology.

As it stands now, the CCOG's are assigned the following dates of completion:

24-April-2008: DRF 251
30-May-2007: DRF 100, 117, 133, 135, 185, 246, 270, 271, 280, 285
13-September-2006: DRF 126, 136, 237, 256

Teaching Methodologies. The primary methods of teaching would include a personal lecture format, laboratory assignments with supervisory support, beyond classroom tutoring (via email and phone), and the **Desire2Learn** distance learning format. The department is continuously refining instructional content, and matching those materials with the best method for delivery. For the past 2 years (2009-11), the **Desire2Learn** delivery method (or related off-campus delivery method such as the PCC Portal) has assisted both faculty and students with assignments and evaluation for DRF 246, 251, and 256. Additional courses (and related course work) will be conveyed in a similar style. Combining teaching methods has proven to be extremely beneficial, and exciting, for staff and students alike. In some cases, such as extra-credit assignments outside of normal class time, distance learning is the best format.

Course Content. The instructional content, generated and delivered by experienced staff, is a direct reflection of what each student will witness in a work environment. Great care has been exercised to ensure that all materials adhere to ANSI manufacturing standards and practices. As stated, curriculum is aligned to the procedures and requirements of our target industries. Additionally, content is revised as needed to provide a contemporary look and feel to match what is witnessed in the work place.

Final thoughts on learning outcomes, assessment, methodologies and content. The CADD program is providing an instructional environment that is conducive to learning and growth. Learning outcomes are closely matched to the intent and scope of the CCOG's, assessment is conducted at frequent intervals both interpersonally and through Department Chair supervision, methodologies are constantly refined and tailor-made to suit the given instructional event, and ANSI-driven, instructional materials are continually evolving to match the needs of industry.

B. Identify and explain changes that have been made to course content and/or outcomes since the last review. Are assessments that address the outcomes described in the CCOG's? Give evidence that students are meeting these outcomes.

Changes made to course content and outcomes since the last review. The CADD Department has not added (or revised) any additional outcomes since the last review, and changes to course content have kept pace with the expectations from the manufacturing industry. As mentioned in the previous section of this review, a thorough inspection of all CCOG's will take place to ensure continuity with new ANSI industry standards and design practices, and enhancements in CADD software. From our last review, here is a summary of some of the content refinements found in our courses:

- DRF 126: Added a section regarding block attributes, which mimics the same protocol as used by industry. Supplementary self-paced tutorials have been added to this course in the last 3 years.

- DRF 136: Added a comprehensive section of 3D primitives to the list of functions. This will act as a bridge to the next course in the series, DRF 246 – AutoCAD 3D Modeling. Supplementary self-paced tutorials have been added to this course in the last 3 years.

- DRF 246: This course is one of 3 CAD courses taught for Winter term. During this term, program students are exploring three dissimilar CAD courses, each providing a level of complexity that is difficult to understand. Without compromising the integrity of the content, DRF 246 is currently being offered as a "hybrid", where half of the content is delivered on site, while the other half is provided through the PCC Portal. Students have thrived in this approach, responding favorably.

- DRF 133 and DRF 135: Refinements have been made to these 2 offerings, where new exercises were created to simulate existing procedures currently used in manufacturing. A heavier reliance upon using CAD as a design tool is embedded in these courses compared to 3 years ago.

- DRF 185/285 and DRF 270/271: For the Inventor and SolidWorks series of classes, great strides have been taken to incorporate real-world design projects into the curriculum. Projects include virtual stereo systems and trade show displays from Audiosource, and educational displays for use at OMSI. Supplementary self-paced tutorials have been added to this course in the last 3 years.

Are assessments that address the outcomes described in the CCOG's. The CADD Department has not incorporated assessment information into the body of the content guides. Discussions between department members, and the CADD Advisory Board, take place before CCOG modifications are made. In future revisions, an assessment component could be a vital piece set within each guide.

Give evidence that students are meeting these outcomes. Evidence that students are meeting course outcomes is determined primarily by:

- Incorporation of current ANSI guidelines and practices into the curriculum, and evaluation of each student as they apply these elements into their design work.
- Incorporation of contemporary design projects into the assignment framework of the CAD courses, and subsequently evaluated by practicing, part time instructors.
- Confirmation from Advisory Board members that target skill sets are being met, and refined, through the curriculum offered by the CADD Department.
- Positive and constructive feedback from Cooperative Work Education sites, and Employment sites alike.
- Positive and constructive feedback from CADD graduates now working as drafting and design consultants within industry.

C. Describe how courses in the program address the College Core Outcomes. What strategies are used to determine how well students are meeting the College Core outcomes? Give evidence that students are meeting the Core outcomes.

Addressing the College Core Outcomes. The CADD Department addresses the following College Core Outcomes in a variety of ways:

Communication: Skills are developed and expressed through graphic format via hand sketches, computer generated drawings, and plotting. Students develop verbal skills through presentation and evaluation methodologies, as they present finished project drawings to faculty and peers.

- Strategies for meeting core outcomes: Incorporate discussion elements and procedures into each course, where a portion of the evaluation process centers on written and verbal effectiveness. Critical feedback is rendered when applicable, via written format (i.e. PCC Portal).
- Evidence that students are meeting the core outcomes: For DRF 100, students prepare written technical reports for industry tours they attend. Approximately, 7 (seven) tours are scheduled per Fall term. Reports are critiqued, and instructor feedback is provided. For DRF 271 and 285, students complete 3D mechanical assemblies that are analyzed for accuracy and function. Students are required to respond to instructor queries regarding said parameters.

Community and Environment Responsibility: Issues (elements) of accountability and responsibility relating to the community and environment are reinforced in the basic core courses. Thematic concerns such as clean and lean manufacturing practices are echoed in many of our courses.

- Strategies for meeting core outcomes: Introduce students to manufacturing processes that can be monitored for materials usage, disposal methods, and energy conservation. Discuss strategies than can be implemented to minimize community impact, or create community awareness.

- Evidence that students are meeting the core outcomes: For DRF 133 and 135, students are apprised of the methods used in selecting the appropriate materials (i.e. proper size and type) in order to conserve on cost and reduce waste. Additionally, energy-saving procedures regarding welding materials (i.e. fabricated assemblies) are discussed. For DRF 271, students complete 3D conceptual displays that are potentially used in a community-public forum (i.e. OMSI).

Critical Thinking and Problem Solving Skills: Students are expected to utilize critical thinking and problem solving skills when developing technical drawings for industry. The CADD discipline imparts drafting and design knowledge, where students develop confidence and competence in their decision making. The application of appropriate technologies (i.e. CAD graphics, Calculators) to analyze, solve, and present solutions to design problems is of the highest order.

- Strategies for meeting core outcomes: Encourage students to use both conventional, and unconventional, thinking when solving design problems. Build course assignments that incorporate methods and procedures that endorse efficiency and cost-effectiveness. Solutions may be in the form of sketched elements, written instructions, or CAD drawings. Communication is also an important piece in the critical thinking process.

- Evidence that students are meeting the core outcomes: For DRF 117, students are often presented with assignments that go beyond basic sketching. For example, CADD instructor Glen Truman prepared the following assignment that introduces the student to critical thinking processes. The illustration was dispatched for approval for the SAC Learning Assessment Report:

1. **Please describe your plan of action for 2009-2010 Academic Year (Critical Thinking Exercise)**:
   In one class, DRF 117 Drafting Fundamentals, students received instruction in the correct methods of dimensioning based on Industry Standards. Then, the students were given a project to add dimensions to. When they finished dimensioning the project, they submitted the assignment. The plan was to have the students evaluate a project from another student for proper dimensioning technique.

2. **When your project is completed, please describe the method(s) you used**:
   When students submitted their assignments, I made copies of each submission. Each assignment was given a number after I had removed the students name to preserve their anonymity. Then, the projects were randomly handed out to students in the class. The instructions were to draw the project based on the dimensions placed by the first student. If dimensions were inadequate, or missing, the second student was to note that on the drawing. The drawing assignments were then handed back in, and given to the first student to see how the drawing assignment was evaluated.

3. **What did you learn**?
   I feel the project was beneficial to the students. It emphasized the importance of correct dimensioning for the size and location of various features. I also learned that additional instructions should have been given regarding the use of negative verbal-written comments (i.e. poor dimensioning technique, and the opinions expressed by the student doing the evaluation).

For the most part, the students were challenged in their critical thinking and problem solving skills in placing the dimensions correctly in accordance with Industry Standards, as well as, in the evaluation of dimensions placed by other students. Several students made comments about seeing the importance of correct dimensioning.

4. **What changes, if any, are you making or recommending as a result**?
   This project was an opportunity for students to apply dimensions (according to ANSI standards) to a project, then evaluate dimensioning done by another student. Perhaps a rubric could be developed to direct a student to a more specific evaluation of a project.

Cultural Awareness: Students should be able to demonstrate an understanding and sensitivity to a variety of human cultures, perspectives, and forms of expression. A number of indicators point to the diversity present within the CADD program. Per The SAS System (PCC Banner End-of-Term Extracts), the following data provides sound evidence that our program is inclusive of cultural diversity:

Race/Ethnicity Distribution (2007-2010 averages):
African American, 3.3% Asian, 10% Hispanic, 3.3% White, 83%

Gender Distribution Demographics (2007-2010 averages):
Male, 77.6% Female, 22.4%

Age Distribution Demographics – 5 Main Age Categories (2007-2010 averages):
Ages 21-25, 15.6% Ages 26-30, 15.6% Ages 31-40, 26.8% Ages 41-50, 16.5% Ages 51-60, 13.3%

- Strategies for meeting core outcomes: Encourage students to identify and acknowledge cultural perspectives and values different from their own. Work in a team environment (i.e. CADD design problems) to develop solutions with students from various cultures, gender differences, and age ranges.

- Evidence that students are meeting the core outcomes: For the upper-level courses such as DRF 246, 271, and 285, students are often presented with assignments that require collaboration between team members. As supported by statistical data, the CADD program exhibits a wealth of cultural diversity where various members often work together to forge design solutions. Language, culture, age and gender differences are blended together to form creative alliances when competing complex tasks.

  Group discussion, and subsequent mutual understanding, is important to the world of design. One prime example revolves around the aspect of linear units. A number of students from foreign countries have a working knowledge of Imperial Units (Feet and Inches) versus their native system of Metric (Meters and MM). The CADD department offers detailed instruction in the analysis and application of numerous linear systems and angular measurement. This approach helps to bridge the gap between what we're accustomed to in U.S. culture as opposed to non-native cultures.

Professional Competence: Participants of the CADD program develop refined, technical skills through a carefully designed curriculum. Each student must demonstrate a level of mastery that enables them to succeed in a number of professional environments. The CADD program provides a challenging array of courses intended to expose the student to the rigors of the professional workplace. Course

sequencing is important in evolving a level of technical knowledge, where students will apply their skills to produce professional-quality CADD design projects.

- Strategies for meeting core outcomes: Through the initial acquisition and careful evolution of critical-thinking skills and technical CAD development, students will be prepared for entry into the design workforce. Utilizing instructor guidance and advisory support, new graduates will be capable of producing professional quality drawings in many CADD-related areas.

- Evidence that students are meeting the core outcomes: For the upper-level courses such as DRF 246, 251, 271, and 285, student skill sets are honed to the level of a semi-professional design drafter. This is accomplished by "building" virtual manufacturing assemblies that imitate the rigors of a professional work environment. The graphic illustrations that are scattered throughout this document represent the application of a professional approach to design.

  Examples of course-driven design projects completed by CADD students:

  For DRF 246: Fire hydrant assembly with threaded couplings, nozzles and top cap.
  For DRF 251: Centrifugal fan and chain-drive assembly utilizing various gears and belts.
  For DRF 271: Sheet metal enclosure with parametric capability and part constraints.
  For DRF 285: Stereo system – Entertainment console with multiple parts in assembly.

  All projects were completed in real-world units, simulating actual parts in finished assemblies.

Self-Reflection: The aspect of self-reflection begins the first few weeks of the student's participation within the program. New concepts and basic review are provided each week, as students are thrust into a continuum of learning and reflection. The outcome is a prepared individual who is ready for the next challenge, with an eye on the future and a strong educational foundation that will serve him/her well.

- Strategies for meeting core outcomes: Provide instructional-based materials that progressively move students along in the discipline, relying on new concepts and past lessons that mould the individual into a complete professional. The application of review materials that "refresh" the student's critical comprehension of subject matter can not be overstated.

- Evidence that students are meeting the core outcomes: For the upper-level courses such as DRF 246, 251, 256, 271, and 285, students are compelled to reflect upon basic subject matter that supports the rigors of high-end graphics assignments. Part profiles and sub-assemblies are the backbone of complex assemblies, where the student relies on numerous design criteria forged in previous courses. The application of ANSI standards (i.e. Modern Graphics Communication and the Machinery's Handbook) is carried throughout the curriculum, and invoked from Day 1.

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

Distance Modality Instruction: The department is continuously refining instructional content, and matching those materials with the best method for delivery. For the past 2 years (2009-11), the **Desire2Learn** delivery method (or related off-campus delivery method such as the PCC Portal) has

assisted both the faculty and students with assignments and evaluation for DRF 246, 251, and 256. Additional courses (and related course work) will be conveyed in a similar style, and the department is currently engaged in topic discussions regarding distance learning.

Revelations Regarding Distance Modality Instruction: Most program students are engaged in family and employment activities that force them to divide their time. Since the CADD program is primarily "night school" oriented, a large majority of our students prefer some deference to distance learning. In some cases, such as extra-credit assignments normally created outside of scheduled class time, distance learning is the best format to use. Through normal evaluation procedures, no marked "drop off" of student performance or comprehension was noticed when distance learning procedures were applied (Versus full term, on-site presentation methods ; Example DRF 246: 6 weeks standard in-class / 5 weeks distance learning).

Concerns and Obstacles to Distance Modality Instruction: There are basic concerns regarding the application of Distance Modality Instruction:

- Distance Modality methods are not a panacea for all course work. The most glaring examples include hand sketching in the DRF 117 class, manufacturing tours found in the DRF 100 class, and the work coop education class which is DRF 280. Related course elements are found throughout the curriculum, where on-site class discussions are imperative to the learning process.

- The level of technical support, which includes existing infrastructure, may be insufficient or compromised by a number of aspects. The area of true Distance Modality is still relatively new in terms of development and transmission. As support personnel (and technical capability) expand and refine, advancements will pave the way to more D.L. opportunities. Additionally, over-the-shoulder training venues need to be offered as faculty investigate the partial conversion to distance learning. As it stands, the CADD Department offers only 3 courses with embedded Distant Modality instruction.

- Sharing of instructional resources across various departments and campuses. When a Distance Modality is considered a viable form of instructional delivery, it often involves the work of more than one program. As the CADD Department moves from its current location (Sylvania – ST 208 to SE Center Campus), changes to Distance Modality methodologies (i.e. how it impacts content delivery across multiple campuses involving multiple faculty) will need to be addressed. Sharing of ideas and teaching strategies is not confined to the CADD program, where faculty often interface with others who share the same content affinities. The porting of instructional materials may be impacted by multi-campus involvement.

E. 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.

Educational Initiatives: Aside from Inquiry-Based Learning, the CADD Department has not explored the other avenues of instructional (or student enrichment) possibilities as described in this question.

Inquiry-Based Instruction is a student-centered and teacher-guided instructional approach that engages students in investigating real world questions. Inquiry-Based Instruction complements

traditional instruction by providing a vehicle for extending and applying the learning of students in a way that connects them with their interests. Within the CADD program, students acquire and analyze information, develop and support propositions, provide solutions, and produce design documents that demonstrate their critical thinking and make their learning visible. Inquiry-Based Instruction (acquiring and dispensing of vital, technical knowledge) is currently accomplished through extended-time format courses, where students fully explore real-world design problems via Sketching, CADD application and and Internet research.

3. Students and the Community

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

A Brief Summary of CADD Demographics: Per The SAS System (PCC Banner End-of-Term Extracts), the following data provides information regarding the demographics of the CADD program:

Race/Ethnicity Distribution Demographics (2007-2010 averages):
African American, 3.3% Asian, 10% Hispanic, 3.3% White, 83%

Gender Distribution Demographics (2007-2010 averages):
Male, 77.6% Female, 22.4%

Age Distribution Demographics – 5 Main Age Categories (2007-2010 averages):
Ages 21-25, 15.6% Ages 26-30, 15.6% Ages 31-40, 26.8% Ages 41-50, 16.5% Ages 51-60, 13.3%

Degree Seeking and Non-Degree Seeking Distribution Demographics (2007-2010 averages):
Degree Seeking, 64.3% (trending up) Non-Degree Seeking, 35.7%

Full-Time, Half-Time, Part-Time Enrollments Distribution Demographics (2007-2010 averages):
Full-Time, 29.1% (trending up) Half-Time, 32.1% Part-Time, 38.8%

Over 75% of students currently attending the CADD program have previous college course work.

Demographics Impact: The demographical summary provided above points to a wide variety of learning styles, cultural diversity, age representation, work experience, previous college background and scheduling requirements. Students enrolled in the CADD program arrive with a number of expectations regarding participation and completion:

- Learning styles: The majority of students enrolled in the program are by definition "Visual Learners". By its very nature, "Graphics" implies a medium that conveys meaning and ideas via sketched illustrations or computerized drawings. Each of our students is attracted to the program because they have an interest in graphic design for manufacturing. With that in mind, our students rely on computers to produce nearly 90% of their work, and are dependent upon electronic technologies to grow their academic skill set. This aspect of the program creates a number of challenges, ranging from computer workstations that operate properly to lecture pace when demonstrating the creation of a virtual part. The CADD program is poised to meet these challenges by creating a supportive environment that pays critical attention to student acquisition of knowledge (via computers), and offering viable instruction at a relaxed pace.

- Cultural Diversity: A number of ethnic groups (and ethnic backgrounds) are represented in the student body here at PCC. The CADD program also reflects a number of ethnicities of which we are very proud of. Specifically, the number of Asian participants appears to be growing, and our faculty are very experienced in the area of recognizing cultural differences between students from traditional Western culture and those of Asian backgrounds. Additional training in learning styles and customs regarding our foreign students is under consideration. To date, we only have Caucasian faculty members; however, we rely on staffing that represent various cultural heritages (i.e. the areas of technology and advising support).

- Gender Distribution: Traditionally, the field of mechanical drafting has been primarily male oriented. In the last few years, however, an increasing number of female students have enrolled in the program. By all appearances, the balance between female and male participants in the manufacturing sector has been shifting, where females are represented in higher numbers. This is quite possibly due to the displacement of hard-labor industry workers with technology jobs that are computer-based, and therefore, may be more attractive to females. We do have female faculty members that interface with our students, and there is no deference to gender as it applies to instruction or advising.

- Age Representation: Over 50% of our program students are aged 31 years or older, and nearly 1 in 3 of our program students are aged 41 years or older. As witnessed by the "aging population" phenomenon within the United States, one could surmise that the CADD program is experiencing the same pattern of growth. Our program is exploring the attitudes, expectations and behaviors towards later life and the inherent learning process, and what implications this may have for our job-seeking graduates. With the assistance of the PCC Job Placement Office and supportive staff, we are actively seeking occupational openings that may be best suited to our older graduates (i.e. those jobs with industrial experience or a "seasoned" work history). The CADD program has a majority of faculty over the age of 50, and are well suited to handle the needs of an older student body.

- Work Experience: Based on conversations with our students, including informal surveys given in class, the vast majority of our participants have very little to no related experience in the world of CAD graphics and drafting. This is not an impediment to the learning process, since each of our students is very well prepared in the aspect of computing operations, and are eager to learn the rudiments of CAD drafting and design. On the other hand, it does impact their chances of obtaining a job that reflects their new academic talents. There are a number of current job seekers that have a fair amount of relative experience, but very few that have the balance of solid computing and layout skills our graduates have. Many of our graduates will struggle to find work, but it exists. Work coop placements are currently being pursued, and many of our graduates will "free lance" in today's occupational marketplace.

- Previous College Background: Over 75% of the students currently attending the CADD program have previous college course work. While the vast majority do not have Graphics course experience, many of our students have taken classes in Mathematics and Writing. This level of participation contributes greatly to the area of feeling prepared (and cognizant) for the rigors of college life. Maturation and sound organizational skills are seen especially in our older adult students. Classroom performance (i.e. comprehension, assignment completion, higher test results) can be enhanced by previous college course work.

- Scheduling Requirements: The vast majority of CADD program students enjoy the night offerings present within our schedule. Factors such as daytime employment, family obligations during the mornings or afternoons, and lifestyle preferences have shaped the schedule currently being used. Our program will continue to be offered primarily at night due to these factors, and enrollment statistics are quite favorable in regards to the evening schedule that has evolved.

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

Current and Projected Enrollment Pattern: The CADD program enrollment patterns continue to be stable from the past 3 years, and are growing in specific areas (i.e. Parametric solid modeling software, SolidWorks and Inventor). Within the program, classes are basically full for each term of instruction, including Summer term. Demand continues to be high, especially in the area of current-release software training. Please inspect the following Excel spreadsheet:

Enrollment Figures for CADD: Calender Years 2008/09, 2009/10, 2010/11

Fall Term - 2008/09	Class Size	Winter Term - 2008/09	Class Size	Spring Term - 2008/09	Class Size	Summer Term - 2008/09	Class Size
DRF 100 - 11 Weeks - 43463	22	DRF 133 - 11 Weeks - 14033	25	DRF 135 - 11 Weeks - 23791	22	DRF 126 - 1st 6 Wks - 30365	11
DRF 117 - 11 Weeks - 41363	26	DRF 185 - 11 Weeks - 12043	25	DRF 251 - 11 Weeks - 21901	21	DRF 136 - 2nd 6 Wks - 34128	11
DRF 126 - 1st 6 Wks - 41446	25	DRF 246 - 11 Weeks - 11091	23	DRF 256 - 11 Weeks - 27575	24		
DRF 136 - 2nd 6 Wks - 40115	26	DRF 270 - 11 Weeks - 11648	25	DRF 271 - 11 Weeks - 21477	21	Cross Listed - ARCH 126	10
				DRF 285 - 11 Weeks - 21902	26	Cross Listed - ARCH 136	15
Total:	99	**Total:**	98	**Total:**	114	**Total:**	22

Fall Term - 2009/10	Class Size	Winter Term - 2009/10	Class Size	Spring Term - 2009/10	Class Size	Summer Term - 2009/10	Class Size
DRF 100 - 11 Weeks - 42640	27	DRF 133 - 11 Weeks - 12982	21	DRF 135 - 11 Weeks - 23002	21	DRF 126 - 1st 6 Wks - 30325	9
DRF 117 - 11 Weeks - 41203	24	DRF 185 - 11 Weeks - 11630	26	DRF 251 - 11 Weeks - 21599	22	DRF 136 - 2nd 6 Wks - 32524	9
DRF 126 - 1st 6 Wks - 41267	20	DRF 246 - 11 Weeks - 10962	25	DRF 256 - 11 Weeks - 24839	25		
DRF 136 - 2nd 6 Wks - 40103	20	DRF 270 - 11 Weeks - 11363	24	DRF 271 - 11 Weeks - 21276	21	Cross Listed - ARCH 126 / ID	16
				DRF 285 - 11 Weeks - 21600	24	Cross Listed - ARCH 136	15
Total:	91	**Total:**	96	**Total:**	113	**Total:**	18

Fall Term - 2010/11	Class Size	Winter Term - 2010/11	Class Size	Spring Term - 2010/11	Class Size	Summer Term - 2010/11	Class Size
DRF 100 - 11 Weeks - 42369	14	DRF 133 - 11 Weeks - 12717	23	DRF 135 - 11 Weeks - 22703	21	DRF 126 - 1st 6 Wks	
DRF 100 - 11 Weeks - 48749	14	DRF 185 - 11 Weeks - 11524	28	DRF 251 - 11 Weeks - 21482	22	DRF 136 - 2nd 6 Wks	
DRF 117 - 11 Weeks - 41112	23	DRF 246 - 11 Weeks - 10917	26	DRF 256 - 11 Weeks - 23864	25		
DRF 126 - 1st 6 Wks - 41169	27	DRF 270 - 11 Weeks - 11288	22	DRF 271 - 11 Weeks - 23863	19	Cross Listed - ARCH 126 / ID	
DRF 136 - 2nd 6 Wks - 40087	23			DRF 285 - 11 Weeks - 21483	24	Cross Listed - ARCH 136	
Total:	101	**Total:**	99	**Total:**	111	**Total:**	0

Observations Regarding Projected Enrollments: The following observations can be derived in part from the statistics shown in the above spreadsheet:

- CADD program enrollments continue to be consistently high across multiple, consecutive years.

- CAD course offerings garner the most students. Both degree-seeking students and industry professionals seek the academic experience and design expertise provided by CADD faculty. Enrollment trends in this area will continue to press upwards.

- Overall enrollment numbers will continue to be very high. With the demand for 3-term sequence training, and the absence of any competing, institutional training venues (i.e. Recent deletion of the Clackamas Community College Drafting Program) the CADD program stands poised to receive increasing numbers of program participants.

- Per The SAS System (PCC Banner End-of-Term Extracts), FTE Enrollment numbers for roughly the same period include: 2007-08, Total: 42.8 2008-09, Total: 49.2 2009-10, Total: 51.0
  For the academic period 2010-11, FTE Enrollment is expected to produce at the same statistical level as the previous year.

Enrollment Pattern Impact on the CADD Program: With sustained enrollment patterns, the CADD program remains a viable, healthy entry within the list of certificates offered at PCC. Careful growth needs to be examined in the area of expanding the parametric modeling courses at PCC. With an eye towards bond measure expansion and campus-to-campus program transitioning, we should consider the impact of adding an additional course (or two) to the current list of offerings in CADD. Collectively, it is our opinion that the manufacturing industry demands additional course offerings in the discipline of parametric modeling.

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

Strategies to Facilitate Access and Diversity: A number of strategies have been implemented to increase the levels of access, awareness and diversity within the CADD program:

- The services of a Student Resource Specialist – Academic Advisor has been key for new and continuous enrollees that require support while attending program classes. The assistance in this academic services area cannot be overstated.

- Presentations to an academically, and ethnically, diverse group(s) of high school students has increased awareness regarding our 1-year CADD Certificate.

- Scheduling CADD courses at two campuses (Existing: Sylvania / New: SE Center Campus) has provided additional access to new students, especially to various cultures and ethnicities that reside on the east side of Portland.

- A proposed CADD Fair slated for late-May or early-June will expose the community and interested businesses to the diverse range of software training we have to offer.

D. 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, please describe.

Feedback from students and associated entities: A variety of feedback has enabled us to chart a course on structuring our program, from scheduling times to thematic content. The following list of summary points should provide an overview of this feedback:

- This academic year 2010-11, the CADD department conducted an informal survey of the students participating in the program. In regards to geographic location, the students were asked whether the Sylvania Campus was better for them over the SE Center Campus. There was a slight number of students who preferred the Sylvania Campus, but the margin was negligible (about 55% to 45% favoring Sylvania).

- A CADD Student Census Tract (per Microsoft Navteq Software) performed during Fall 2010 revealed that the lion's share of students originate west of Interstate 5 by nearly a 2:1 ratio. In some large district comparisons, the ratio was in the range of 3:1 favoring the "West" side.

- In regards to instructional effectiveness (per teacher, in-class evaluations), participating students have responded quite favorably to teaching techniques, course content, access to open labs, and times that courses are offered.

- From the various authorized software dealers and vendors, the CADD program has received high marks in the areas of content coverage and diversity in software course offerings.

- Numerous industry tour providers have provided positive comments in regards to the "completeness" of our 1-year certificate. They have also conveyed the idea that additional academic offerings need to be provided in our core of parametric modeling courses.

- Our Advisory Board has confirmed that the CADD 1-year certificate meets the basic needs of both large and small manufacturing industries. Similar to the industry tour providers, there exists a desire for more content in the area of parametric modeling.

4. Faculty: Reflect on Composition, Qualifications and Development of Faculty

A. Provide information on:

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

** Extent of faculty turnover and changes anticipated for the future.*

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

CADD Department Faculty:

- ***Mark Hagen, Department Chair, Full Time Faculty***
  Primary Professional Experience (Past): Silver Eagle Manufacturing Company
  Title: Design Drafter and Programmer
  Professional Responsibilities: Draft and design welding structures for the trucking and pulp-paper industries. Provide programming support for CAD and CNC equipment.
  Years of experience with CAD software (professional and academic): 26
  Years of experience with the Drafting industry (professional and academic): 28+

- ***Glen Truman, SACC Chair, Full Time Faculty***
  Primary Professional Experience (Past): Precision Castparts Corporation
  Title: Design Drafter
  Professional Responsibilities: Draft and design manufacturing facilities, equipment layouts, and production machine design.
  Years of experience with CAD software (professional and academic): 15
  Years of experience with the Drafting industry (professional and academic): 35+

- ***Phil Eichmiller, Inventor Software Specialist, Part Time Faculty***
  Primary Professional Experience (Past or Present): MCAM Northwest
  Title: Applications Engineer
  Professional Responsibilities: Pre and post-sales manufacturing technology support and training.
  Years of experience with CAD software (professional and academic): 14
  Years of experience with the Drafting industry (professional and academic): 14+
  Note: Graduate of Portland Community College, AAS in Drafting Technology

- ***Susan Hooper, AutoCAD Software Specialist, Part Time Faculty***
  Primary Professional Experience (Past or Present): Harris Group International
  Title: Senior Structural Engineer
  Professional Responsibilities: Designing manufacturing equipment and steel structures for the wood and bioscience processing industries.
  Years of experience with CAD software (professional and academic): 18
  Years of experience with the Drafting industry (professional and academic): 30+

- ***Adam Scheible, SolidWorks Software Specialist, Part Time Faculty***
  Primary Professional Experience (Past or Present): Beaverstate Dental / OMSI
  Title: Design Drafter and Programmer, CAD/CAM Specialist
  Professional Responsibilities: Draft and design mechanical components and structures for in-house usage and sales exhibits.
  Years of experience with CAD software (professional and academic): 20
  Years of experience with the Drafting industry (professional and academic): 20+
  Note: Graduate of Portland Community College, AAS in Drafting Technology

Quantity and quality of the faculty needed to meet the needs of the program/discipline:
Since the beginning of the 1-year Certificate, the CADD Department has provided the entire array of required courses with 2 Full Time and 3 Part Time faculty members. At this time, no additional faculty is anticipated. The high quality of instruction has been verified through student and departmental evaluation.

Extent of faculty turnover and changes anticipated for the future:
No turnover or changes are anticipated for the immediate future. When the eventual transition is made to the SE Center Campus, new faculty may be required to teach new courses (as they arise).

Extent of the reliance upon adjunct faculty:
Adjunct faculty, qualified in both the academic and professional world, represent a major portion of our teaching core. Without their tireless contributions, this program would suffer immensely. They bring years of dedicated teaching service to the college, and have unparalleled professional experience.

B. Report any changes the SAC has made to instructor qualifications and the reason for the changes.

Aside from contemporary skills in the software medium they wish to teach, there are no changes.

C. 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.

Professional development activities that have contributed to the strength of the program:

- Advisory Board: Various professionals collaborating with college faculty in an effort to maintain a healthy, progressive program while implementing new ideas and strategies for growth. Personal connections meetings have transpired between various board members and CADD faculty regarding instructional content and the future of the drafting industry.

- ADDA Membership and participation: Continuous membership in the largest drafting-affiliated body in the world. CADD instruction is based on the current ANSI standards and practices for drafters, and certified testing is available on the Sylvania Campus.

- CADD Fair: A proposed CADD Fair at the Sylvania Campus will bring working professionals, vendors and educators together to share new concepts, ideas and techniques in the field of mechanical design. There will be a "roll out" of Inventor Professional 2012.

- Serving on Committees: Over the past few years, Glen Truman and Mark Hagen have served on various committees that support the college's mission of excellence. Glen is currently participating in PCC Bond meetings on the both the Sylvania and SE Center campuses. Mark is currently serving on the Entrepreneurial Committee. Service on these respective committees will foster growth for the college, as well as, provide valuable experience to take back to the department.

- ADDA National Conference: Glen Truman participated in the ADDA National Conference in St. Louis recently. The focus of the conference was to present new ideas and collaborative techniques for the contemporary field of drafting technology.

- SolidWorks: For a number of years, Adam Scheible has served as the Portland Area SolidWorks User Group President. He has attended numerous SolidWorks World Expositions as both a leader and a presenter.

- Inventor: Phil Eichmiller has provided on-site, collaborative, engineering expertise for software applications to countries in SE Asia, including China.

- Design Conferences: Susan Hooper has attended a number of design conferences focusing on structural steel and weldment processes.

5. Facilities and Support

A. Describe how classroom space, computers/technology and library/media, laboratory space and equipment impact student success.

Classroom space, computers/technology, library/media, laboratory space and equipment:
It is no mystery that the college's technical infrastructure (i.e. computer labs, library, related equipment) is the backbone for CTE programs. The CADD Department is no exception. Issues related to this vital aspect of instruction include:

- Classroom Space: The amount of classroom space that caters to CTE programs is "dwindling" at best. The competition for computer labs (and related classroom resources) is steep, where large enrollment numbers typically win the day. Growing CTE programs, such as Architectural Design and Interior Design, have all but taken over computer labs once occupied by CADD. While this transformation is understandable, and with merit, it really puts the squeeze on our program to find available space. Currently, the CADD program shares ST-205 with the Math program, and AM-105 with the Business Administration program. Since the CADD Department Chair does 99% of the scheduling for those 2 labs, our program usually gets the space it needs. However, there have been challenges to this process (time conflicts between departments), and a sense of urgency has arisen over future allocations. A potential move to the SE Center Campus may help to alleviate this strain.

- Computers / Technology: Without question, the computing workstations (including the plotting devices) are at the heart of nearly everything the CADD Department stands for. The current CAD workstations we have on the Sylvania and SE Center Campuses are very good to excellent. As the PCC District moves towards a "universal" operating system (i.e. Windows 7), and continued commitments are made in regards to timely, computer purchases, the CADD Department stands ready to deliver the best instruction on these contemporary platforms. Related technology, such as plotting devices and high-quality projection systems, are important pieces to this picture, as well. As software technology continues to evolve, and the needs of industry continues to grow, so must our commitment to viable computing platforms that deliver the necessary performance.

- Library / Media: Our program does not rely on the resources provided by the Library. We supply copies of required or recommended textbooks to the Sylvania Library, but that's about the extent of it. It is possible that future needs will require the services of the Library, but the CADD Department does not foresee any large-scale support at this time.

- Laboratory Space: Our lab space is directly related to the availability of classroom space. Yes, we would enjoy having more open lab space on the 2 campuses (Sylvania, SE Center), but at this moment it's a luxury that we may not be able to deliver upon. The Architecture Department has established ST-238 and ST-240 as an open lab (during the morning hours), and that's all we have available during the week. During the weekend, we are fortunate enough to have ST-238 set aside as an open lab area with a tutor in place. We have not appropriated any open lab times for

the SE Center Campus. As we continue our association with this campus, open lab opportunities will be designated.

- Equipment: Aside from the aforementioned computer lab and peripheral requirements, the only other consideration is software. Of course, we could not operate a program without AutoCAD and SolidWorks. This area of our expenditures is vital to the success of our program, and the inevitable employability of our graduates. The expectation is that funds are available on a continuous basis to purchase the required software(s) for not only the CADD program, but also the Architecture and Interior Design programs, as well.

Final thoughts on classroom space, computers/technology, library/media, laboratory space, etc.
The future and success of the CADD program is critically tied to the infrastructure we provide to the community. The students who participate in our program expect the latest advancements that technology can supply (i.e. latest software releases, contemporary workstation), and rely upon "real-time" access to our CAD laboratories . Simply put, the computing environment and instructional support that we furnish should match the requirements set forth by the industries that we serve.

B. Describe how students are using the library or other outside-the-classroom information resources.

Outside-the-classroom information resources
The CADD students typically purchase or download educational copies of AutoCAD and SolidWorks to complete their assignments, and further their understanding of these award-winning software tools. In addition to this point, students are required to use internet resources (i.e. Manufacturing companies and related industries websites, Machinery's Handbook) to complete various assignments for classes such as DRF 100, DRF 133, DRF 135 and DRF 251.

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

Clerical, technical, administrative, tutoring support
The CADD program, along with Architecture, Interior Design, and Building Inspections are supported by a .60 FTE clerical assistant, a 1.0 lab technician (used primarily for Architecture), and an occasional part-time weekend lab assistant. The provides most of the support for our students and faculty.

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

Advising and The Office for Students with Disabilities
The Office for Students with Disabilities (OSD) is extremely helpful for our program. We typically have a few students in our 1-year Certificate program with documented disabilities. Instructors meet with Disabilities counselors for further insight on working with these individuals. It's a collaborative effort that maximizes their chances for success in a competitive classroom environment. Our Student Resources Specialist (whom we may "lose" next year) provides excellent academic advising, career guidance, and referrals for our program students. In view of this potential loss, an electronic email "package" consisting of program data and FAQ's will be sent to interested parties. Additionally, we

may schedule advising sessions similar to the venues being furnished now.

E. 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.

Patterns of scheduling that address pedagogy and the needs of the students

This point has been addressed earlier in this document. The degree requirements set forth match the needs of the industries regardless of when our classes are offered. Our program, which is almost entirely night driven, serves those needs in every capacity. Of course, the needs and expectations of our students come first, and the night schedule provides the ultimate flexibility (allows for daytime commitments) that our enrollees are searching for.

6. Career and Technical Education Programs

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

Impact of the Advisory Committee

The Advisory Committee is composed of a number of experienced, working professionals from a variety of industrial areas. Here are just a few of our members:

- Peter Douglas, Structural Steel Design Consultant for over 30 years (employees a PCC CADD grad)
- Charles Rose, Technical Services Contractor for the NW Region (has employed numerous grads)
- Dudley Keen, Engineer for A-Dec Corporation (has assisted numerous grads in job placement)

Our Advisory Board provides substantial feedback that enables our curriculum to keep pace with evolving industry demands, and helps us to prepare our students to meet the requirements (i.e. skill set) that industry is looking for. The Board provides critical insights on program content and outcomes, as well as, has provided excellent assistance in grooming our graduates (such as on-site training). They have also seen, and approved, of the types of industry-related assignments that we direct towards our students. We meet at least 2 times a year, and always have a fruitful discussion on program content and trends in manufacturing and related industries. Needless to say, this wonderful relationship has ultimately had a very positive impact on our students!

B. Degree and Certificate Outcomes [From the 2010 Interim Accreditation report: "The college must show progress in demonstrating, through regular and systematic assessment, that students 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.*

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

** Identify and give examples of assessment-driven changes that have been made to improve students' attainment of degree and certificate outcomes.*

Degree and Certificate Outcomes

The Degree and Certificate Outcomes, and the methods/time-table to assess them, is shown below:

Degree/Certificate Outcomes for CADD:

1. Use current Computer Aided Design technology to design, and subsequently print, two-dimensional industry standard drawings.
2. Use a variety of advanced parametric Computer Aided Design software applications to design, and subsequently print, three-dimensional parts, assemblies, and sub-assemblies.
3. Use American National Standards Institute guidelines when designing and producing drawings.
4. Work as an integrated member of a drafting technology design team, collaborating on concepts and ideas related to a working project.
5. Apply a generalized understanding of design principles involving trigonometry and geometry when solving drafting design problems.

Maps to Core:

- For CADD Outcome #1 : Communication / Professional Competence
- For CADD Outcome #2: Communication / Professional Competence
- For CADD Outcome #3: Critical Thinking and Problem Solving / Professional Competence
- For CADD Outcome #4: Communication / Community and Enviro. / Critical Thinking and P.S.
- For CADD Outcome #5: Critical Thinking and Problem Solving / Professional Competence

Assessment Setting / Method:

- For CADD Outcome #1 : Print working drawings / Generate a course portfolio / Critique by college staff and outside industrial professionals
- For CADD Outcome #2: Print working drawings / Generate a course portfolio / Critique by college staff and outside industrial professionals / Exit or Final exam
- For CADD Outcome #3: Student projects submitted for critical evaluation at specific intervals
- For CADD Outcome #4: Orientation to the world of drafting including speakers and tours / Promote awareness to environmental trends in the design process / Internet research
- For CADD Outcome #5: Student projects submitted for critical evaluation at specific intervals

Year of Application:

- For CADD Outcome #1 : Year 1 (2010 – 2011)
- For CADD Outcome #2: Year 1 (2010 – 2011)
- For CADD Outcome #3: Year 1 (2010 – 2011)
- For CADD Outcome #4: Year 2 (2011 – 2012)
- For CADD Outcome #5: Year 1 (2010 – 2011)

The CADD program outcomes listed above (with their related assessment goals) have been fulfilled in a number of ways:

- Program students are using current Computer Aided Design technology to design, and subsequently print, two-dimensional industry standard drawings. This skill set is being forged in DRF 117 and DRF 126, where two-dimensional graphics (by hand and computer) are generated as orthographic layouts, auxiliary views and section details.

- Program students use a variety of advanced parametric Computer Aided Design software applications to design, and subsequently print, three-dimensional parts, assemblies, and sub-assemblies. This skill set is being forged in DRF 136, DRF 246, DRF 185, DRF 285, DRF 270 and DRF 271. Students utilize AutoCAD 3D, SolidWorks and Inventor to complete industry-driven assignments and projects that focus on three-dimensional design and analysis.

- Program students use American National Standards Institute guidelines when designing and producing drawings. This skill set is being forged most directly in DRF 117, DRF 126, DRF 136, DRF 133, DRF 135 and DRF 251. Students complete industry-driven assignments and projects that are governed by the principles and practices embedded in ANSI standards.

- Program students work as an integrated member of a drafting technology design team, collaborating on concepts and ideas related to a working project. This skill set is developed in upper-level courses like DRF 251, DRF 271 and DRF 285 where students complete complex assemblies both as individuals and within a design team.

- Program students apply a generalized understanding of design principles involving trigonometry and geometry when solving drafting design problems. This skill set is developed in upper-level courses like DRF 251, DRF 271 and DRF 285 where students complete complex assemblies using mathematics and geometric applications as directed by specific design criteria.

Comments Regarding CADD Certificate Assessment Matrix

The following peer comments were provided by Shirlee Geiger and the Learning Assessment Council:

CADD peer comments:

Peer reviewers found a lot to like about your assessment plan. For example, one review team noted these aspects as exemplary:

- portfolio critiques
- participation by industry professionals.
- Mapping of degree/certificate outcomes to core outcomes makes sense

The reviewers also noted that your plan includes direct assessment, and that the settings have been determined. They did have this comment:

> For the critiques and portfolios, we assume a rubric needs to be developed and mentioned or included in the plan.

Additionally, where rubrics are designed and used by multiple evaluators, there is often a session to norm or callibrate the use of the rubric in order to insure consistent evaluations. If you would like more information on this step, or help in planning such a session, please contact your assessment coach.

In response to the question, "Are there any Core outcomes not addressed? If so which?" the reviewers noted that self-reflection was not listed in your mapping. It is important that we assess only those outcomes that are actually targeted in our classes and programs, so if you are not addressing this outcome, it should not be listed! The Learning Assessment Council will be taking up the issue of whether all SACs need to address all core outcomes at a later time, so look for a future message on this question.

The review teams believe that your plan meets the requirement of our accreditors to begin assessment of student learning that leads to the improvement of teaching and learning.

If you would like further one-on-one conversation about your plan and this review information, our assessment coach is: **Shirlee**

Please convey my thanks to all members of the CADD SAC who have worked on, or will participate in, this project. You have a wonderful start on an assessment project, and one that is crafted in a way to be useful in the particular focus on the core outcomes that you offer through your SAC. This is a major milestone for assessment here are PCC. Thank you for this wonderful work.

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

Job Placement Data

Internal job placement data for the CADD program is relatively scant, and is an area in need of improvement! With the continued support of our Advisory Board and the PCC Job Placement Office, we should be able to develop tools for tracking our graduates. The following charts (per U.S. and Oregon Department of Labor stats) show a positive trend towards employment potential for our graduates. For Oregon (extracted 4/6/2011), the categories of construction, manufacturing, durable goods, computing and transportation best apply:

Data Series	Back Data	Sept 2010	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011
Labor Force Data							
Civilian Labor Force (1)		(6) 1,984.6	(6) 1,987.1	(6) 1,989.4	(6) 1,991.7	1,993.1	(P) 1,995.4
Employment (1)		(6) 1,772.8	(6) 1,775.7	(6) 1,778.4	(6) 1,780.9	1,785.4	(P) 1,791.3
Unemployment (1)		(6) 211.8	(6) 211.4	(6) 211.0	(6) 210.8	207.6	(P) 204.2
Unemployment Rate (2)		(6) 10.7	(6) 10.6	(6) 10.6	(6) 10.6	10.4	(P) 10.2
Nonfarm Wage and Salary Employment							
Total Nonfarm (3)		1,595.3	1,602.1	1,604.5	1,608.5	1,615.2	(P) 1,625.0
12-month % change		0.0	0.6	0.8	1.1	1.3	(P) 2.0
Mining and Logging (3)		6.7	6.6	6.6	6.8	6.9	(P) 7.0
12-month % change		3.1	1.5	3.1	4.6	3.0	(P) 6.1
Construction (3)		66.4	66.8	66.8	67.7	68.3	(P) 70.3
12-month % change		-6.5	-4.8	-3.7	-2.0	-1.0	(P) 2.8
Manufacturing (3)		163.6	164.7	164.5	164.1	165.1	(P) 167.5
12-month % change		0.4	1.8	1.6	1.4	1.4	(P) 2.8
Trade, Transportation, and Utilities (3)		306.9	309.6	310.7	313.2	311.0	(P) 312.4
12-month % change		-0.6	0.8	1.3	2.2	1.2	(P) 1.7
Information (4)		32.3	32.4	32.5	32.7	32.4	(P) 32.6
12-month % change		-0.9	1.3	-0.3	-0.3	2.2	(P) 2.5
Financial Activities (3)		92.2	92.4	92.9	91.9	92.2	(P) 92.8
12-month % change		-2.7	-2.8	-1.8	-2.8	-1.9	(P) -0.5
Professional & Business Services (3)		181.6	182.1	183.0	184.3	184.6	(P) 186.7
12-month % change		2.7	2.9	2.5	2.9	2.7	(P) 4.0
Education & Health Services (3)		229.1	229.6	230.2	229.5	233.1	(P) 232.1
12-month % change		1.8	2.0	2.2	2.0	2.9	(P) 2.5
Leisure & Hospitality (3)		161.9	162.2	160.7	162.3	164.5	(P) 166.1
12-month % change		-0.1	0.2	-0.6	1.0	2.0	(P) 2.8
Other Services (3)		58.0	57.6	57.7	57.3	58.2	(P) 58.5
12-month % change		1.4	1.1	0.9	0.5	2.1	(P) 2.8
Government (3)		296.6	298.1	298.9	298.7	298.9	(P) 299.0
12-month % change		-0.4	-0.2	0.4	0.2	0.3	(P) 0.4
Mass layoffs							
Layoff events, all industries (5)		17	22	28	25	36	9
Initial claimants, all industries (5)		1,635	2,540	2,676	2,234	4,390	896

Footnotes

(1) Number of persons, in thousands, seasonally adjusted.
(2) In percent, seasonally adjusted.
(3) Number of jobs, in thousands, seasonally adjusted.
(4) Number of jobs, in thousands, not seasonally adjusted. See About the data.
(5) See About the data.
(6) Reflects revised population controls, model reestimation, and new seasonal adjustment.
(P) Preliminar

Multnomah Nonfarm Employment

(Not Seasonally Adjusted)

	Feb 2011	Jan 2011	Feb 2010	Change -month-	Change -year-	% Change -month-	% Change -year-
Total nonfarm employment	426,300	422,900	423,100	3,400	3,200	0.8%	0.8%
Total private	351,400	348,400	348,000	3,000	3,400	0.9%	1.0%
Mining and logging	0	0	0	0	0	?	?
Construction	15,000	14,800	15,000	200	0	1.4%	0.0%
Manufacturing	31,600	31,500	30,800	100	800	0.3%	2.6%
Durable goods	19,800	19,700	18,800	100	1,000	0.5%	5.3%
Computer and electronic product manufacturing	2,300	2,300	2,200	0	100	0.0%	4.5%
Transportation equipment manufacturing	4,500	4,500	4,500	0	0	0.0%	0.0%
Nondurable goods	11,800	11,800	12,000	0	-200	0.0%	-1.7%
Trade, transportation, and utilities	77,500	78,000	77,900	-500	-400	-0.6%	-0.5%
Wholesale Trade	20,400	20,400	20,700	0	-300	0.0%	-1.4%
Retail trade	37,100	37,600	37,000	-500	100	-1.3%	0.3%
Food and beverage stores	7,200	7,300	7,200	-100	0	-1.4%	0.0%
General merchandise stores	5,800	5,800	5,700	0	100	0.0%	1.8%
Transportation, warehousing, and utilities	20,000	20,000	20,200	0	-200	0.0%	-1.0%
Information	9,400	9,400	9,400	0	0	0.0%	0.0%
Financial activities	29,000	29,100	29,600	-100	-600	-0.3%	-2.0%
Finance and insurance	19,400	19,500	19,800	-100	-400	-0.5%	-2.0%
Real estate and rental and leasing	9,600	9,600	9,800	0	-200	0.0%	-2.0%
Professional and business services	61,100	60,700	60,200	400	900	0.7%	1.5%
Professional and technical services	27,200	27,000	26,700	200	500	0.7%	1.9%
Management of companies and enterprises	14,600	14,600	14,700	0	-100	0.0%	-0.7%
Administrative and waste services	19,300	19,100	18,800	200	500	1.0%	2.7%
Educational and health services	66,600	64,500	64,800	2,100	1,800	3.3%	2.8%
Educational services	14,900	13,000	14,000	1,900	900	14.6%	6.4%
Colleges and universities	9,000	7,700	8,700	1,300	300	16.9%	3.4%
Health care and social assistance	51,700	51,500	50,800	200	900	0.4%	1.8%
Hospitals	14,700	14,600	14,300	100	400	0.7%	2.8%
Leisure and hospitality	44,300	43,700	43,700	600	600	1.4%	1.4%
Arts, entertainment, and recreation	5,700	5,400	5,700	300	0	5.6%	0.0%
Accommodation and food services	38,600	38,300	38,000	300	600	0.8%	1.6%
Accommodation	5,200	5,100	5,200	100	0	2.0%	0.0%
Food services and drinking places	33,400	33,200	32,800	200	600	0.6%	1.8%
Other services	16,900	16,700	16,600	200	300	1.2%	1.8%
Government	74,900	74,500	75,100	400	-200	0.5%	-0.3%
Federal government	11,800	11,900	12,200	-100	-400	-0.8%	-3.3%
State government	13,300	13,100	13,000	200	300	1.5%	2.3%
Local government	49,800	49,500	49,900	300	-100	0.6%	-0.2%
Local education	23,300	23,000	23,700	300	-400	1.3%	-1.7%
Local government excluding educational services	26,500	26,500	26,200	0	300	0.0%	1.1%

7. Recommendations for Improvement

A. Identify the strengths of your program.

PCC, CADD Department – Notes on Program Strengths, 2011

Advisory Board: Various professionals collaborating with college faculty in an effort to maintain a healthy, progressive program while implementing new ideas and strategies for growth.

Degree courses: High levels of enrollment in degree courses, as well as, large class sizes in other CADD offerings. See enrollment statistics for the past 3 years. Uniquely positioned as a 1-year certificate rather than a 2-year degree program. Addition of viable program offerings may lead to a more-than-1 year Certificate.

Faculty distinctions: Mark Hagen and Glen Truman have dedicated over 20 years (each) as full time faculty, providing professional and academic support in the classroom and in the office as advisors. Part time faculty includes former students now employed professionally, including former full time faculty member Susan Hooper. Cross-trained in a number of CAD areas including AutoCAD, Inventor and SolidWorks.

ADDA Membership and participation: Continuous membership in the largest drafting-affiliated body in the world. CADD instruction is based on the current ANSI standards and practices for drafters. We offer ADDA certified testing at the Sylvania Campus.

High Schools / PAVTEC: Collaborate with local area high schools participating in dual credit programs.

Expansion to the SE Campus: Future intent is expressed by transitioning the CADD program to the SE Center campus. The program will see enhanced visibility by establishing a new CADD presence that is close to downtown Portland. The CADD program will be able to distinguish itself as a "stand alone" certificate that offers training apart from Architecture or Interior Design. Will help to fill the void left by the elimination of the drafting program at Clackamas Community College. We are the only one of its kind in the Portland metro area.

Software: The CADD program utilizes the most current and advanced software(s) available to the design community, including AutoCAD 2011, Inventor Professional 2011, and SolidWorks 2010. No other state sanctioned, academic program in the Portland metro area offers what we do. Full and Part time faculty are instructing said software in a manner commensurate with the demands of industry. Contrast that to what Clark College, Vancouver, WA is doing, as well as, Imaginit and Shounco. Remember, we teach students how to draft, with its related principles, not just how to use the software. We secured a perpetual license for the Autodesk Academic Suite of software during Summer 2010. We are also in the process of establishing an Autodesk Testing Center for AutoCAD software tests.

CADD Fair: A proposed CADD Fair at the Sylvania Campus will bring working professionals, vendors and educators together to share new concepts, ideas and techniques in the field of mechanical/manufacturing design. Roll out of Inventor Professional 2012 would be included in the Fair.

Job Prospects: Employment opportunities continue to rise for drafters and drafter designers in the area. Manufacturing "starts" and existing manufacturing sites for our region have shown slow, but steady, increases in hiring mechanical drafters. On the contrary, Architecture and related educational strands have seen sluggish activity for employment opportunities in their area. For the 2010-11 academic calendar, the CADD department has seen numerous, recent ARCH graduates seek alternate training in the CADD (manufacturing) area. This is one

indicator that employment prospects in architecture are experiencing a downturn due to so many graduates flooding the market. Confirmed by Kathleen Kuba, PCC Job Placement Specialist at Sylvania.

SACC Meetings: We (Glen and Mark) have regularly scheduled SACC meetings to discuss items such as Course content, Course outcomes, Course changes, New courses, Connections to industry and to the high schools, and collaboration with the Advisory Board. We have 2 District-wide SACC Days, as well.

Working with related PCC departments: Glen and Mark teach courses that are offered by different departments on the Sylvania Campus. Glen teaches structures and CAD for both Architecture and ID. Mark teaches engineering graphics for Engineering Technology. This adds strength to those respective departments by providing well-defined instruction from industry-experienced individuals. Glen is working with Machine Technology (Pat Kraft) on various assignments involving rapid-prototyping machinery and drafting schematics. Students have the opportunity of taking a virtual part (CADD) and creating that shape in the Machine Technology area. This provides a more realistic experience as they go from tape to shape.

Outcomes for CADD: We have completed a set of outcomes that are contemporary and applicable to the field of manufacturing and mechanical drafting. Those outcomes have been submitted to the college and have been approved by management. Outcomes are currently being shaped and revised to match the demands and expectations of the industries to which we serve. Classroom teaching materials, which includes tests and quizzes, are generated to meet the requirements set forth by the language of the outcomes.

Serving on Committees: Over the past few years, Glen and Mark have served on various committees that support the college's mission of excellence. Glen is currently participating in PCC Bond meetings on the both the Sylvania and SE Center campuses. Mark is currently serving on the Entrepreneurial Committee.

Scheduling: Mark collaborates with various programs to schedule class rooms for instruction. Programs include CADD, Arch, Engineering, Math, and Business Administration. The number of classrooms is 6 (six), with a total number of 25 computer workstations for each classroom.

Advising: A fair majority of student advising takes place within our office area in ST 208. With some assistance from Choul Wou, advisor for ARCH / ID / CADD, Glen and Mark provide comprehensive assistance to new and currently-enrolled students. Assistance takes the form of registering the students each term, providing advice on current trends in the labor market, writing letters of reference, and connecting students with the PCC Job Services area of the college.

B. Identify the areas in need of improvement.

Tracking graduates – Where do they go? Are they involved with CADD in some capacity?

Learning new CAD software for both Full time and Part time faculty

Working more closely with the SE Center Campus in regards to scheduling and program transitioning

Establishing closer ties with local area high schools in regards to bringing their students on board

Developing additional coursework in a Distance Learning format

Marketing our program to the community