

# Computer Aided Drafting and Design Program Review January 2016





### **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, Tool and Fixture Design, Structural Steel Detailing, Health Care Related Product Design (dental equipment and medical devices), Rapid Prototyping 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 Computer Aided Drafting and Design (CADD) Program at PCC 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 CADD Program at PCC utilizes the most sophisticated and advanced CADD software in developing a comprehensive skill set for our graduates.

**Glen Truman**, *Department Chair*

**Justin Mortensen**, *SAC Chair*

**Alfred McQuarters**, *Division Dean of Math, Science and CTE Programs*

**Portland Community College**

**Southeast Campus**

**January 15<sup>th</sup>, 2016**



## 1. Program/Discipline Overview:

- A. **What are the educational goals or objectives of this program/discipline? How do these 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?**

### Educational Goals

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

Computer Aided Drafting and Design is a rapidly changing profession. It interfaces with the manufacturing industry, and keeping up with the industry's needs requires teaching ever-changing CADD software, keeping pace with evolving drafting standards set by the American National Standards Institute (ANSI) and a continual awareness of emerging technologies. Our 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 the student
- Participating in continuing educational opportunities that enhance our relationship to both industry and the community

We also seek to prepare and track our students as they enter into jobs of economic value.

In collaboration with PCC Employment Services, the department provides the foundational preparation for our CADD students to enter into a highly-competitive workforce. Our instruction is designed to establish the skills and habits that will prepare students for positions in the industry. 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
- Tracking each individual through various means of communication, as we connect to both the graduate and the firm who employs them. Feedback provides vital information for shaping curriculum and refining the education conduit to the professional workplace

We aspire 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 ten years. The CADD Program at PCC 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, as well as 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

Finally, it is important for the CADD program to support other departments and divisions in the district. Many programs hosted at other campuses require CADD classes and they feel that their programs would be deficient without the CADD offerings. Mike Farrell, from the Sylvania campus engineering department has told us, "CADD is an important part of Engineering. Many of the Engineering transfer students are required to take CADD classes."

Tara Nelson said, "Our Civil Engineering Technology and Mechanical Engineering Technology students take computer aided drafting (CAD) courses. Many of our graduates use CADD regularly for their jobs. In fact, our Industry Advisory Committee members have recommended that we improve the CAD skills of our students. Responding to the IAC recommendation we will be collaborating more with the CADD department."

### **Trends in Computer Aided Drafting and Design**

Research on drafting trends reveals several topics which should be incorporated into the CADD program: True Position and Geometric Tolerancing, Decimal and Metric Dimensioning, Functional Drafting, Automated Drafting, and Drawing Reproductions. Other national trends we see are Three Dimensional Modeling, Modifying CAD Drawings, Reproduce CAD Drawings, Simulation of Mechanisms, Database Creation and Scan Paper Drawings. A number of these national trends are already incorporated into the CADD Certificate Program.

Although we significantly revised the program after the last program review, our dedication to our students' success, our aspiration to prepare students for future employment, and our commitment to sustainability has not changed. These core goals will continue, even with the changes we propose to the program in sections seven and eight. This proposal incorporates additional national trends in addition to what we have incorporated previously and positions the CADD program for success for many years to come.

CADD Labor Market Information showing trends in employment available in Appendix A.



**B. Briefly describe changes that were made as a result of SAC recommendations and/or administrative responses from the last program review.**

The SAC recommended a total revamping of the course prefix and numbering of the CADD Certificate program courses, which we completed after the last program review. With the revamping we examined CCOG's for each class and revised them to increase assessability.

A table indicating these changes is included in Appendix B.

**2. Outcomes and Assessment: Reflect on learning outcomes and assessment, teaching methodologies and content in order to improve the quality of teaching, learning and student success.**

**A. Course-Level Outcomes: The College has an expectation that course outcomes, as listed in the CCOG, are both assessable and assessed with the intent that SACs will collaborate to develop a shared vision for course-level learning outcomes.**

**i. What is the SAC process for review of course outcomes in your CCOGs to ensure they are assessable?**

The SAC meets to discuss course outcomes and determines if they are assessable. The CADD Certificate Program has two full time instructors and meetings occur on SAC days, allowing faculty the opportunity to regularly discuss situations that develop from classroom observation. SAC meetings have included the two primary adjunct instructors as well. Assessment and student achievement has been a topic of discussion. We have discussed how best to assess students' compliance with the American National Standards Institute guidelines. These guidelines are used and discussed in the core drafting class of CADD 160 Drafting Fundamentals, CADD 165 Intermediate Drafting and CADD 265 Advanced Drafting. The assessment is done on a finished technical drawing submitted by the students. The use of advanced parametric Computer Aided Design software applications to design, and subsequently print, three-dimensional parts, assemblies, and sub-assemblies, are assessed by the students submitting electronic files of parts, assemblies, and sub-assemblies. We have discussed teaching to a standard as a method of assessing student success. It would be helpful for the SAC to focus on developing a formal method of implementation and a process for recoding the implementation of topics discussed.



- ii. **Identify and give examples of changes made in instruction to improve students' attainment of course outcomes, or outcomes of requisite course sequences (such as are found in MTH, WR, ESOL, BI, CH, etc.) that were made as a result of assessment of student learning.**

The CADD Certificate Program is a skills-based course of study. Instruction is given and a variety of software is used to complete technical drawings to ANSI industry standards. Students make use of a range of specific software, such as AutoCAD, Inventor and SolidWorks.

In the drafting and design industry, technical drawings are completed and then submitted for review. If corrections or omissions are found, the drawing is 'red-lined' and returned to the drafter to make the changes until the drawing is correctly completed. The CADD Certificate Program strives to emulate that process in order to prepare students for the industry environment they will enter upon completion of the Certificate.

Typically assessment is made by how well the student completes the project using the assignment instructions. There are two methods of submission: either an electronic file is submitted, or a hardcopy, a print or a plot of the assignment is submitted. In some instances the student is allowed to make corrections or add omissions.

When students submit drawings that contain more than the usual errors or omissions, the instructor will revise the curriculum to provide an example of a correct drawing, and explain the importance of being careful and accurate in developing an industry-correct drawing. This revision is not necessary for all students, but those who need additional guidance find it helpful. This is employed when student assessments show it is needed.

## **B. Addressing College Core Outcomes**

- i. **Update the Core Outcomes Mapping Matrix.**  
<http://www.pcc.edu/resources/academic/core-outcomes/mapping-index.html>  
**For each course, choose the appropriate Mapping Level Indicator (0-4) to match faculty expectations for the Core Outcomes for students who have successfully completed the course. (You can copy from the website and paste into either a Word or Excel document to do this update, and provide as an Appendix.)**

Please see updated Core Outcomes Mapping Matrix in Appendix C.



**C. For Lower Division Collegiate (Transfer) and Developmental Education Disciplines: Assessment of College Core Outcomes**

- i. Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of the Core Outcomes.
- ii. Do you have evidence that the changes made were effective (by having reassessed the same outcome)? If so, please briefly describe.
- iii. Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?
- iv. Are there any Core Outcomes that are particularly challenging for your SAC to assess? If yes, please identify and explain.

This section is not applicable to the Computer Aided Drafting and Design program.

**For Career and Technical Education Programs: Degree and Certificate Outcomes**

- i. Briefly describe the evidence you have that students are meeting your Degree and/or Certificate outcomes.

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.

The evidence that we have that students are meeting our Certificate outcomes is in the student work itself. The Certificate Outcomes are stated above. Student work is assessed against those outcomes as skills based evidence.



- ii. **Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of your Degree and Certificate outcomes.**

One example of an assessment project is to give students a specific drafting assignment such as a Tool Holder. Students are asked to draft the Tool Holder with proper ANSI standard dimensioning. When the assignment is completed by all students, the drawings have the students names removed. The drawings are then dispersed to the other students in the class, making sure that they don't receive their own drawing. They are instructed to look at the drawing, and if they can duplicate the drawing with the information given, no corrections need to be made to the drawing. If they find any omissions or corrections needed to that drawing, they mark the drawing and it is returned to the original student. It is an eye-opener for the students as they find errors or omissions. It is a great opportunity to illustrate to the students the degree to which drafting is an exacting profession.

- iii. **Do you have evidence that the changes made were effective (by having reassessed the same outcome)? If so, please describe briefly.**

Citing the above example, another drafting assignment would be given later in the term. The assignment would be a different mechanical item, such as an Index Feed, with proper ANSI standard dimensioning. In this example students would be instructed to have a fellow classmate check their drawing for errors and omissions. If the changes were effective there should be a decrease in 'Red Lines' on the checked drawings.

- iv. **Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?**

The CADD program provides 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 by yearly classroom observations. Methodologies are constantly refined to match the given instructional content, and are ANSI-driven. Instructional materials are continually evolving to support the needs of industry.

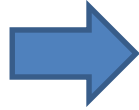
- v. **Are any of PCC's Core Outcomes difficult to align and assess within your program? If yes, please identify and explain.**

Many of the Core Outcomes align very well with The CADD program, including Communication, Community and Environmental Responsibility, Critical Thinking and Problem Solving, and Professional Competence. As can be seen in the Core Outcomes Mapping Matrix, Cultural Awareness and Reflection are the two most difficult for the CADD program. Students do have some exposure to Reflection during the red-lining process, but it is not as emphasized as it might be in the



Liberal Arts Division. In the presentation of parts seven and eight you will see that a proposal exists to more successfully incorporate those Core Outcomes into the Certificate Program.

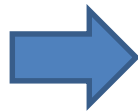
### **Communication**



Communicate effectively by determining the purpose, audience and context of communication, and respond to feedback to improve clarity, coherence and effectiveness in workplace, community and academic pursuits.

**Students learn the ability to technically communicate including scientific, engineering, or other technical information through drawings and 3D computer models. Students learn report and technical writing to strengthen technical communication abilities. They also learn communication skills with collaborative projects completed in class.**

### **Community and Environmental Responsibility**



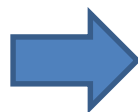
Apply scientific, cultural and political perspectives to natural and social systems and use an understanding of social change and social action to address the consequences of local and global human activity.

The CADD program has partnered with The STEM Center to assist in outreach to local K-12 students. With CADD Faculty assisting, The STEM Center at PCC Southeast offered two great events for the benefit of local high school students and their families. The Tech Bridge: Linux Computer Family Workshops were held at the SE Campus in The STEM Center, on September 26th and October 10th.

Thanks to a generous donation from Intel, we were able to give families the opportunity to learn how to assemble-- and take home-- their own Linux computer. The computers were donated to Sylvania Campus, who offered to share them with the Southeast campus to help Southeast families.

Intel asked that we get the computers into the hands of local high school students who may not have access to a home computer. We in turn asked Portland Public Schools, as well as some local community organizations, to recommend families that might benefit. CADD Instructors taught a lecture on 3D Solid Modeling. Students and families were extremely grateful for this opportunity.

### **Critical Thinking and Problem Solving**



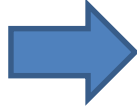
Identify and investigate problems, evaluate information and its sources, and use appropriate methods of reasoning to develop creative and practical solutions to personal, professional and community issues.

**Students solve real life design problems as part of their curriculum. Projects assigned are often open ended and require synthesis of requirements to develop the most appropriate solution. They have replicated via 3D printing a major component of a piece of furniture that was damaged. CADD students designed**



and created jewelry for a fund-raiser for the English as a Second Language program. Funds from this project were used to purchase textbooks for needy students.

### Professional Competence



Demonstrate and apply the knowledge, skills and attitudes necessary to enter and succeed in a defined profession or advanced academic program

The CADD program prepares students for entry into the workforce by including industry standards in the curriculum. The Drafting Orientation requires students to visit potential work sites and study employee processes, regulations and standards. We also include professional speakers in the curriculum to speak about the importance of work ethic and professionalism in the field.

### 3. Other Curricular Issues

- A. Which of your courses are offered in a Distance Learning modality (online, hybrid, interactive television, etc.), and what is the proportion of on-campus and online? For courses offered both via DL and on-campus, are there differences in student success? (Contact the Office of Institutional Effectiveness, either Laura Massey or Rob Vergun, for course-level data). If so, how are you addressing or how will you address these differences? What significant revelations, concerns or questions arise in the area of DL delivery?**

CADD 255 Kinematics Drafting is taught as a hybrid course. This is one of the thirteen courses in the Certificate Program. The course is set up with two components: a classroom and online portion. Students who are able can attend a classroom session. Students who can't attend have an online option to receive instruction through D2L and video lecture presentations. Some of the assignments are submitted electronically and some as a hard copy. Students that are able to attend the classroom sessions seem to be able to be a little more successful, but not significantly. The assessment is skills-based, and these skills are evaluated from a rubric. The D2L option is well-liked and allows students who need it the opportunity to complete a course for the certificate. The D2L delivery works well. There are some students that attend the classroom presentation as well as using the video presentation to review or clarify questions. There are no concerns with the D2L format.

We are considering adding one class taught completely through distance learning. The classes being considered for an online format are CADD 100 Drafting Orientation or CADD 255 Kinematics Drafting.



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

The SAC has not made any curricular changes as a result of exploring/adopting educational initiatives.

- C. Are there any courses in the program offered as Dual Credit at area High Schools? If so, describe how the SAC develops and maintains relationships with the HS faculty in support of quality instruction.**

There are four courses that are offered as Dual Credit:

1. CADD 126 Introduction to AutoCAD
2. CADD 160 Drafting Fundamentals
3. CADD 165 Intermediate Drafting
4. CADD 185 Inventor Fundamentals

These four classes are offered at seven high schools all over the Portland Metropolitan Area:

**Aloha High School**

- CADD 126
- CADD 160
- CADD 165

**Beaverton High School**

- CADD 126
- CADD 160

**Canby High School**

- CADD 126
- 

**Glencoe High School**

- CADD 126

**Newberg High School**

- CADD 185

**Sabin-Schellenberg Center**

- CADD 126

**Wilsonville High School**

- CADD 126

In all, there are:

- 6 schools offering CADD 126
- 3 schools offering CADD 160
- 1 school offering CADD 165
- 1 school offering CADD 185

The full time faculty made classroom visits to each Dual Credit High School last spring term to discuss course content and teaching modality.

A map of all local high schools and the dual credit CADD classes they offer is available in Appendix D.



**Please describe the use of Course Evaluations by the SAC. Have you developed SAC-specific questions? Has the information you have received been of use at the course/program/discipline level?**

The individual instructors use the course evaluations to assess teaching and learning. We use the standard district suggested template for these evaluations.

**D. Identify and explain any other significant curricular changes that have been made since the last review.**

Significant curricular changes were made after the last program review; each course in the Certificate Program was assigned a new prefix, from DRF to CADD. Some courses received a new number as well. In the process of changing the course prefix, each course outcome was reviewed and modified to outcomes that were easier to assess. A chart of the prefix and numbering changes is included in Appendix B.

**4. Needs of Students and the Community**

**A. Have there been any notable changes in instruction due to changes in the student populations served?**

Over the past five years there have been no notable changes in the student population. The student demographics chart in Appendix D illustrate the majority of students as White Non-Hispanic, followed by Asian and Hispanic. Many fields have challenges recruiting underrepresented minorities. We are still working to change the legacy our society has created, and we are grateful to see the student diversity increase in recent years. Serving these populations is an integral part of the CADD program—students can be successful in this program no matter what their background. The CADD Certificate Program has been most successful in recruiting and retaining students with an evening program of course offerings. Evening students typically work during the day, often with little on-campus resources compared to the day students (no gym or cafeteria, no administrative assistants, and no advisors). Many of the PT faculty also work during the day and have only one office hour per week to support the students. For these reasons, the full-time (FT) faculty communicates with the part-time (PT) faculty by inviting them to SAC In-Service and meets with them once a year to facilitate course improvement.

A demographic graph for our student population is available in Appendix E.

**B. What strategies are used within the program/discipline to facilitate success for students with disabilities? What does the SAC see as particularly challenging in serving these students?**

The faculty receives disability forms from The Office for Students with Disabilities (OSD), and makes accommodations as necessary. OSD is extremely helpful for our program. We typically have a few students in our one-year certificate program with documented disabilities. Instructors meet with disabilities counselors for further insight on working



with this individuals. It's a collaborative effort that maximizes their chances for success in a competitive classroom environment.

The most challenging disabilities we seem to encounter are students that need extra time for completing work, permission to record a lecture or special equipment to assist in taking notes. There have been occasions where a student has requested a special chair for the long periods they need to sit at a computer. We are able to accommodate their needs, ensuring that students with disabilities are able to succeed in the CADD program.

**C. Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes? If so, please describe (if this has not been addressed elsewhere in this document).**

We have a very dedicated and active advisory committee; the members are detailed in this report and have been instrumental in making changes to existing courses to keep them relevant. We have recruited some new members recently and the proposed goals in sections seven and eight reflect their input.

**5. Faculty: Reflect on the composition, qualifications and development of the faculty**

**Provide information on:**

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

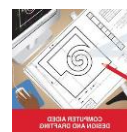
The number of full-time and part-time faculty in the CADD Certificate Program has remained relatively consistent over the past 5 years. There are 2 full time faculty, and 5 part time faculty, one of which is a women. The 5 part time faculty are used in various terms throughout the school year.

Despite the fact that drafting is a white, male-dominated field, the CADD faculty includes individuals with experience in diverse backgrounds. The current staff works with a more diverse student population than they would encounter in an industry work environment. They have proven to be culturally competent as they relate to the student population.

**CADD Department Faculty:**

**Cory Derico, SolidWorks Software Specialist, Part Time Faculty**

- Primary Professional Experience (past or present): Technical Illustration/Designer
- Title: Technical illustrator
- Professional Responsibilities: Create technical drawings of Aerospace products, Model creation and repair



- Years of experiences with CADD software (professional and academic): 10 years with SolidWorks, Certified SolidWorks Expert.
- Years of experience in the Drafting industry (professional and academic): 12

**Phil Eichmiller, Autodesk Inventor Specialist, Part Time Faculty**

- Primary Professional Experience (past or present): Autodesk Inc.
- Title: Senior Software Quality Assurance Engineer
- Professional Responsibilities: Functional testing of 3D CADD software for mechanical design, customer community ambassador, writing and presenting seminars on 3D CAD best practices.
- Years of experiences with CADD software (professional and academic): 18+
- Years of experience in the Drafting industry (professional and academic): 18+
- Note: Graduate of Portland Community College, AAS in Drafting Technology

**Mark Hagen, AutoCAD Software Specialist, Part Time Faculty (retired Full Faculty)**

- Primary Professional Experience (past or present): 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 CADD and CNC equipment.
- Years of experiences with CADD software (professional and academic): 30+
- Years of experience in the Drafting industry (professional and academic): 30+

**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 bio-science processing industries.
- Years of experiences with CADD software (professional and academic): 20+
- Years of experience in the Drafting industry (professional and academic): 30+

**Justin Mortensen, SAC Chair, Full Time Faculty (One Year Temporary)**

- Primary Professional Experience (past or present): Boeing, Rosen Aviation, LSI Logic.
- Title: Mechanical Engineer, Sr.



- Professional Responsibilities: Engineering design of aerospace and data storage systems equipment
- Years of experience with CADD software (professional and academic): 16+
- Years of experience with the Drafting industry (professional and academic): 15+

#### **Adam Scheible, SolidWorks Software Specialist, Part Time Faculty**

- Primary Professional Experience (past or present): Forest Dental Products/Beaverstate Dental/OMSI
- Title: New Product Engineering Manager/Design Drafter and Programmer. CADD/CAM Specialist
- Professional Responsibilities: Draft and design mechanical components and structures for in-house usage and sales exhibits
- Years of experiences with CADD software (professional and academic): 25+
- Years of experience in the Drafting industry (professional and academic): 20+
- Note: Graduate of Portland Community College, AA General Studies

#### **Glen Truman, Department Chair, Full Time Faculty**

- Primary Professional Experience (past or present): Precision Castparts Corporation
- Title: Design Drafter
- Professional Responsibilities: Draft and design manufacturing facilities, equipment layouts, and production machine design.
- Years of experiences with CADD software (professional and academic): 20+
- Years of experience in the Drafting industry (professional and academic): 40+

#### **B. Changes the SAC has made to instructor qualifications since the last review and the reason for the changes. (Current Instructor Qualifications at:**

**<http://www.pcc.edu/resources/academic/instructor-qualifications/index.html> )**

The SAC has not made changes to the instructor qualifications since the last review, but new changes are being considered with the course changes proposed in section seven and eight. The current staff that is listed has been doing the instruction since the last program review, with the exception of Justin Mortensen, who began Fall 2015. We have had a very stable work force, but due to some recent and future retirements this is changing. Mark Hagen, a full time instructor with PCC for 25 years, retired as of June 2015. A temporary full time instructor has been hired for this current school year. The other full time instructor, Glen Truman, will retire at the end of spring 2017. The strength of the CADD Certificate Program has been the stable and experienced staff.



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

The program has been able to recruit and retain experienced instructors, which complete professional development in several ways. They have received further training in SolidWorks as well as serving on a range of committees.

With CADD, it is very important to keep abreast of fluctuating industry needs, and to maintain this Instructors have kept part-time positions in the industry. This involvement is very effective for keeping current with shifting industry trends.

Significant changes are discussed in sections seven and eight that reflect the changes that the CADD Certificate Program needs to embrace to keep it relevant to our local industry and the advances in technology of drafting and design.

## **6. Facilities and Academic Support**

- A. Describe how classroom space, classroom technology, laboratory space, and equipment impact student success.**

We have two dedicated classrooms for CADD use. One classroom has 30 student computers, the other classroom has 24. The Certificate Program has been very in-demand the last several years. If we had two classrooms with 30 student computers we could serve more students. We also have had a large influx of students this year, which required scheduling an additional classroom, which was a challenge.

Classroom technology has kept pace with our software demands. We receive superior IT support for technology challenges.

Laboratory and equipment has been a challenge.

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

The library has six computers that have the necessary software that support the CADD Certificate Program. The library is probably underutilized as a resource for our students. The CADD computer labs seem to be sufficient for student learning and research as they are equipped with internet access.

- C. Does the SAC have any insights on students' use of Advising, Counseling, Disability Services, Veterans Services, and other important supports for students? Please describe as appropriate.**

We see on a department level that students start their educational experience at PCC by using Advising, Counseling, and other student services. A goal would be to develop better communication and interaction with Advising, Counseling, and other departments in order to better advise students interested in starting the CADD Certificate Program. This



could be facilitated by arranging a meeting with the Advising, Counseling, and CADD Departments.

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

**A. Evaluate the impact of the Advisory Committee on curriculum and instructional content methods, and/or outcomes. Please include minutes from the last three Advisory Committee meetings in the appendix.**

Over the past several meetings with the advisory team, changes to the PCC SE CADD program certificate have been discussed. This discussion has included the need to reduce the content amount of 2D based design software tools, implement a 3D printing course as well as a manufacturing processes (casting) course. The committee would like to incorporate more design methodologies and product development processes into the curriculum, in addition to the drafting component.

The administration and advisory board members at PCC have expressed a strong desire to extend the CADD certificate into a full one year program. This has the benefit of allowing for integration of several career pathway certificate programs and provides a gateway into the one year certificate program. Ideally, a one year certificate could also act as the foundation for enabling a student moving toward an AAS program at PCC. A one year certificate could act as a **feeding** mechanism to other department programs such as Civil and Mechanical Engineering Technology or Machine Manufacturing Technology.

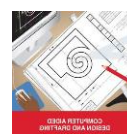
The skill sets that are required by today's employers focus on principles, concepts and logical thinking versus being able to navigate a specific software package. These skills could be integrated into the current program through projects, theory, foundational concepts and hands on application.

In the most recent meeting with the advisory committee on November 9th, 2015, requests from industry representatives and administration included the following:

Reconfiguration of the CADD certificate program to have an emphasis on design (product design and development) methodologies, tools and concepts versus curriculum centered on specific software tools.

Enhancing the curriculum to orient students to the product development and design process and identify the distinct phases, outcomes, deliverables and tools used for this process.

Embed general education, including fundamental mathematical, engineering or scientific principles that are most commonly utilized in the design process. Enable students to develop effective, robust designs from conception all the way to production. These are



the highly desirable skill sets that employers seek today. Students need to understand the big picture and how their work is integrated into the process and how decisions affect upstream and downstream deliverables.

These requests represent a significant impact upon the current program and curriculum. As such, a redesign of the program is desired to meet these changing trends. Details of this redesign are discussed in section eight.

Minutes from the last three meetings have been included in Appendix F.

**Advisory Committee:**

**Brian Branche**

Tech, CAD Designer and Sales Executive for Sunset Solar Electric and owner for Soltech

3 yrs of CAD experience

**Barrett Faneuf**

Mechanical Engineer at Intel Corporation

16 years of industry experience

**Dudley Keen**

Senior Engineer for A-Dec. Inc

45 years in the industry (18 yrs of CAD experience)

**Chris Weber:**

Project Manager for David Evans and Associates, Inc.

20 yrs of CAD experience

Works with past graduates and current students

**Charlie Rose:**

Owner of Rose Technical Graphics

**B. Describe current and projected demand and enrollment patterns. Include discussion of any impact this will have on the program.**

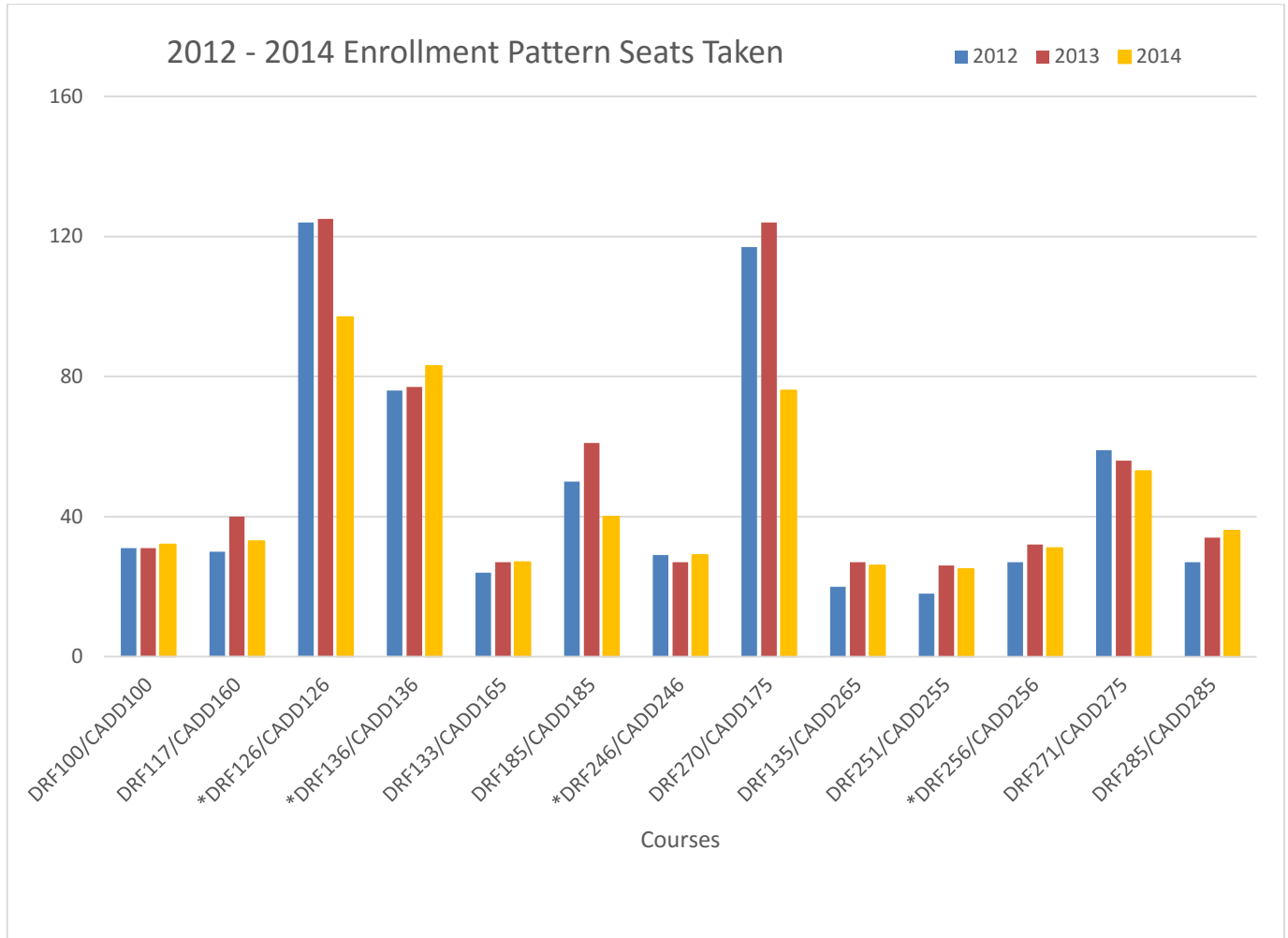
Current enrollment for the CADD program is healthy. The core courses for the certificate are being filled with more than sufficient enrollment.



The table below shows the total number of seats taken total for the last several years. Courses with DRF descriptions are included because for some periods from which the data was drawn classes were still classified as DRF courses.

Enrollment Data	2012	2013	2014
DRF100/CADD100 Drafting Orientation	31	31	32
DRF117/CADD160 Drafting Fundamentals	30	40	33
DRF136/CADD126 Introduction to AutoCAD	124	125	97
DRF136/CADD136 Intermediate AutoCAD	76	77	83
DRF133/CADD165 Intermediate Drafting	24	27	27
DRF185/CADD185 Inventor Fundamentals	50	61	40
DRF246/CADD246 AutoCAD 3-D and Solid Modeling	29	27	29
DRF270/CADD175 SolidWorks Fundamentals	117	124	76
DRF135/CADD265 Advanced Drafting	20	27	26
DRF251/CADD255 Kinematics Drafting	18	26	25
DRF256/CADD256 Advanced AutoCAD	27	32	31
DRF271/CADD275 SolidWorks Advanced	59	56	53
DRF285/CADD285 Advanced Inventor	27	34	36





**Raw Data Available in Appendix G**

The bar graph of enrollment trends show a consistent class load in the main drafting certificate courses. In addition, 3D modeling courses that outreach to the community adding to the certificate classes typically have the highest enrollment. However, we have seen a concerning trend of declining enrollment in 2014 for these 3D modeling courses. The cause of this trend may need to be reviewed.

**C. Explain how students are selected and/or prepared (e.g., prerequisites) for program entry.**

Students are required to have the following pre-requisite courses for entry into the less than one year CADD certificate: Completed MTH020 or tested into MTH060 and WR115.

Students are otherwise allowed to enroll in courses in the less than one year CADD certificate program. No other experience or background is required. Courses that are designated as “advanced” require either the prerequisite course or industry or other academic experience.



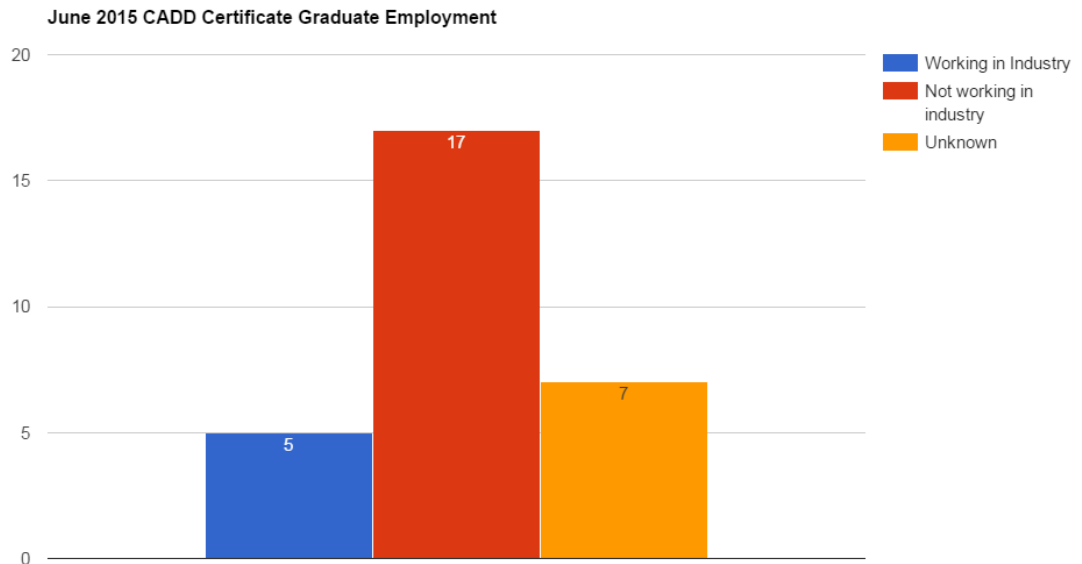
**D. Review job placement data for students over the last five years, including salary information where available. Forecast future employment opportunities for students, including national or state forecasts if appropriate.**

Actual job placement data for graduates is currently not a metric the CADD program actively maintains. However, a recent survey of the June 2015 graduates revealed information about their work status.

A total 22 of 30 students surveyed responded.

Of the total, 5 are employed in the CAD or Drafting industry. A total of 17 were either not employed, employed in other industries or decided to return to school. Of the 5 employed in CADD or drafting, two were employed in the civil/construction industry with the balance in manufacturing industries. One individual was already employed in the industry before starting the program.

Future forecasts for employment in the sector is strong. Appendix A presents data for drafters and mechanical drafters. As the data shows, there exist opportunities in industry for employment. Per the surveys, recent graduates seeking employment were able to obtain interviews for positions that are open. However, lack of work experience and weakness in the interview process were major factors in graduates not being able to secure positions.



**E. Please present data on the number of students completing Degree(s)/Certificate(s) in your program. Analyze any barriers to degree or certificate completion that your**



**students face, and identify common reasons that students may leave before completion.**

The table below presents completion data for less than one year CADD certificate students. This is compared to enrollment for the required introductory course, DRF117/CADD160, which students take in the fall of the year they enter the drafting program.

Enrollment Data	2010	2011	2012	2013	2014
DRF117/CADD160	23	20	30	40	33
Certificates Awarded	13	21	19	18	30

Completion rates for the previous year is excellent. We have a fluctuation in completion, but the most recent year shows improvement. These trends will be monitored and action taken if subsequent years show a reversal of the positive trends taking place.

The CADD certificate does allow for flexibility by offering courses in the evening time frame for those who work during the day.

There seem to be to 3 areas in which barriers to completion fall:

1. Financial need
2. Personal life challenges
3. Dedicated student support – program advising

Some students are unable to go to school without also working, leading some to drop out due to insufficient time to study or work in labs. Child care expense can also create an overwhelming financial burden.

Personal life challenges such as divorce, children, caring for older parents, death of a family member. Time management can be an issue, especially when a student is working or has family obligations. Housing insecurity (homelessness or frequent moves), food insecurity, and health challenges have also impeded some of our students in the earning of a certificate.

The CADD Certificate Program is 42 credits. To qualify for Perkins funding of a student support specialist the program would need to be increased to 45 credits. Our goal is to revise the program to increase the credits to 45 and embed the general education components. This would allow for Perkins funding and a student support staff that would increase student retention and completion rates.



**F. Describe opportunities that exist or are in development for graduates of this program to continue their education in this career area or profession.**

The current less than one year program is a stand-alone terminal degree. Students complete the certificate and search for employment in the field. If students find employment, they can participate in continuing education programs for employees.

As part of recommendations, we suggest moving to a one year certificate to allow for better transition into other PCC programs. This might include working toward an AAS degree in CMET or MCH programs. A redesigned one year certificate will be proposed to allow students to continue their education. In addition, new courses will be rolled out that former students can take to improve their skills and obtain experience. This is discussed in section eight.

**8. Recommendations**

**A. What is the SAC planning to do to improve teaching and learning, student success, and degree or certificate completion?**

As a result of discussions with the advisory committee and with other PCC departments, it is determined that with significant revision, the CADD program would meet the needs of the student population well into the future. This reconfiguration will include eliminating some courses and bringing new courses online. The new courses shall directly address the current industry trends of drafting and designer occupations merging. It will also provide the skill sets, fundamental concepts, problem solving abilities and design experience students need for successful employment. The program enhancements will provide for a one year certificate as well as improving integration with AAS programs and implementation of Career Pathways options. As part of the overall changes, it is recommended to increase the mathematics prerequisite to completion of MTH060 or testing into MTH065. These changes will enable a robust CADD certificate moving forward and continue to strengthen the reputation of the program with employers.

Our goal is to achieve a regionally positive reputation for generating the best product design students, both highly effective and desirable to employers.

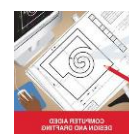
The following lists a summary of the courses currently offered in the program and the proposed changes noted in bold.



Current Course Offerings CADD 2015			Proposed Course Offerings CADD 2017-2018 1-Year Certificate		
CH	Course	Title	CH	Course	Title
3	CADD 100	Drafting Orientation	3	CADD 100	Orientation & Technical Communications
3	CADD 126	Introduction to AutoCAD	3	CADD 105	Statics & Strength of Materials Design Concepts
3	CADD 136	Intermediate AutoCAD	3	CADD 126	Computing Fundamentals with AutoCAD
4	CADD 160	Drafting Fundamentals	4	CADD 136	Materials and Design for Manufacturing Processes
4	CADD 165	Intermediate Drafting	4	CADD 160	Drafting Fundamentals with CAD
3	CADD 175	Solidworks Fundamentals <i>Merge with CADD 185</i>	4	CADD 165	Advanced Drafting with CAD
3	CADD 185	Inventor Fundamentals	4	CADD 177	Intro to 3-D Computer Aided Design Tools
3	CADD 246	AutoCAD 3-D & Solid Modeling	3	CADD 185	Exploring STEM with CADD
3	CADD 255	Kinematics Drafting	3	CADD 246	Product Design & Development Fundamentals
3	CADD 256	Advanced AutoCAD	3	CADD 255	Mechanisms, Kinematics Design & Drafting
3	CADD 265	Advanced Drafting	4	CADD 265	Technical Mathematics
3	CADD 275	Solidworks Advanced <i>Merge with CADD 285</i>	4	CADD 277	Advanced 3-D Computer Aided Design Tools
3	CADD 285	Advanced Inventor	3	CADD 296	Approved Technical Elective
TOTAL CREDIT HOURS: 42			TOTAL CREDIT HOURS: 45		

New Courses and Content shown in red – Course numbers may be adjusted in the future

Appendix H and I presents a comprehensive description of each NEW course and outlines any modifications of each EXISTING course.



Program review presents an opportune time to reconfigure the program. With the rapid developments in manufacturing it is vital to update the program. Part of this roll-out includes replacing retiring full-time faculty. New faculty would start transitioning over to the new courses upon hire. This timeline facilitates a roll out for fall of 2017. All courses being deprecated shall be taught out by Spring 2017.

The course titles listed in red will be new or otherwise enhanced. These courses will require the majority of the effort in implementing the “One Year CADD Certificate” program.

New courses requiring new CCOG’s and curriculum:

Statics and Strength of Materials Design Concepts  
 Materials and Design for Manufacturing Processes  
 Exploring STEM with CADD  
 Product Design and Development Fundamentals  
 Technical Mathematics

These courses will require substantial development of curriculum. Various efforts will need to take place around textbook selection (if applicable) or other media, lecture materials, syllabi, testing standards, lab versus lecture configuration, assignments and problem sets, etc. Learning objectives for each course should be clearly defined and approved before making detail level course related decisions.

The following courses will fundamentally remain the same, but will require updates to the CCOG’s as content is added or delivery methods are revised:

Computing Fundamentals with AutoCAD  
 Drafting Fundamentals with CAD  
 Advanced Drafting with CAD  
 Introduction to 3D Computer Aided Design Tools  
 Mechanisms, Kinematics Design & Drafting  
 Advanced 3D Computer Aided Design Tools

As part of the above changes, a revision to overall program outcomes and objectives will be released. These should be aligned with the advisory committee suggestions and employer needs.

Dual credit impact

The dual credit program with local area high schools is an excellent program for students to obtain college credits. This aligns with state goals of every high school student earning college credit before graduation. The PCC CADD program has strong connections with



institutions around the area. The existing courses that are offered via dual credit will continue to function with minor changes. The Dual Credit program will continue fundamentally unchanged, as the course changes will not have a great impact on the existing classes offered in the Dual Credit program. As the program moves forward, it is recommended to implement the Exploring STEM with CADD course via dual credit. Such a course shall be designed to allow for dual credit application and deployment at the high school level.

- B. What support do you need from the administration in order to carry out your planned improvements? For recommendations asking for financial resources, please present them in priority order. Understand that resources are limited and asking is not an assurance of immediate forthcoming support, but making the administration aware of your needs may help them look for outside resources or alternative strategies for support.**

#### Personnel Requests

In order to achieve the planned changes, the highest priority is to ensure a seamless transition to new faculty members. For successful implementation, it is recommended to continue with two full time faculty members and the current amount of adjunct faculty moving forward. The current faculty composition includes one full time faculty member and a one year temporary faculty member. The existing continuous appointment full-time faculty member has announced retirement in Spring 2017.

It is recommended to have the full time faculty members replaced as existing faculty either retire or at the end of temporary contracts. It is a high priority to have replacements for these faculty as the positions become open, even if it means executing an out of sequence hiring process. Approving full time permanent positions is a priority in order to obtain the best qualified candidates. Any new faculty should have the credentials, background and ability to teach any course in the One Year CADD certificate. New faculty will have the main responsibility for developing the new courses and implementation of new curriculum for Fall 2017. It is critical to hire the new faculty as soon as possible when the position(s) become available, which requires hiring outside the block hire process in order to have permanent instructors for Fall 2016. New faculty should have sufficient time to prepare and provide for a smooth transition for the Fall of 2017 One Year CADD certificate program.

The SAC needs to review and update the instructor qualifications as the search for permanent full time instructors continues. The administration needs to realize that to fully support the CADD Certificate Program, and position it to be a leading training program for the community, it needs to hire permanent full-time instructors.



Funding for faculty to spend additional time in developing the new courses is requested. This might include, but not limited to, summertime work compensation during the summers leading up to the Fall 2017 One Year CADD Certificate roll out.

#### Student Work Study Opportunities

Strong support for students and learning is a goal of the CADD departments. As such, we request funding for more work study opportunities for students. These students would show high aptitude in coursework and would work part-time in labs and provide tutoring for students who need extra one-on-one help. This would be an opportunity for a student to gain related work experience, which has been identified as a weakness. Students contacted via surveys and phone interviews explained that not having any work experience was the number one reason for not obtaining industry related work.

#### Facilities and Equipment Requests

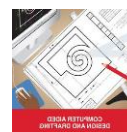
All current classrooms, facilities and equipment for the redesigned program are requested. As curriculum is developed, these needs may be redefined. This might include new classroom “design studio” style-layout to facilitate team learning and interaction. It is requested to have support for such new layouts from IT and facilities management. Such changes would require little to no additional funding, but rather utilize existing space and equipment in a reconfigured manner. There is no space in the computer labs to adequately make use of new technology such as 3D printing, laser cutting, or CNC milling. Resources need to be in place to support these areas.

The CADD program supports relationships with related programs at other campuses, such as CMET, Engineering, Microelectronics, Dental Hygiene, Allied Health and Welding. We would like to equip the CADD program with any of the needed resources to support these respective programs.

The CADD program desires a strong relationship with the STEM Center Lab and obtaining blocks of time when CADD program students can use the facilities. Future CADD students will need a space to store, assemble and fabricate projects. Partnering with the STEM Center will build on synergies and provide the best outcomes for students and the community. This might include CADD students mentoring STEM or High School students as part of their respective projects. The specific course Exploring STEM with CADD would be a very good bridge for this relationship. As part of this course, desktop fabrication equipment such as a laser cutting machine and a laser scanner (for reverse engineering activities) could be co-purchased and improve the STEM Center capabilities.

#### Non-profit Income Generation Opportunities

The CADD program believes faculty and students have skills that can generate income for the program. The CADD program would like to explore these possibilities once new



courses are implemented and program redesign activities have stabilized. Local businesses may come to see the CADD program at PCC as a way to produce needed tools or equipment without the high cost of a manufacturing firm. This has the dual benefit of providing students with real-life applicable drafting and design opportunities as well as providing ongoing capital for equipment or facilities.

This may require developing a class specifically for these tasks, which could also have an entrepreneurship component. When the class is completed, students could include specific examples of their work as part of their resume.

This income would also contribute to the sustainability of the program.

#### Some ideas for revenue generation:

- Authorized training center for a software vendor
- Services provider: drafting, design, rapid prototypes
- Design, production and marketing of home grown products meeting local needs
- Co-develop with business and marketing departments

At this point, we estimate that as much as 10% of the cost of the program could eventually come from this income. This concept needs further development and could be a point of discussion at the next program review. However, support is requested in these activities.

#### Conclusion

With the impending faculty changes, the future of the CADD program at SE is at a critical time. Great potential exists for this program. The recommendations presented are still conceptual and require many details for implementation. This proposal comes in a short time span and due diligence has been done to ensure a possible pathway exists for each new course or proposed change. As part of this effort, discussion meetings have taken place with several departments including CMET/ENGR, MCH, MTH, DE, Career Pathways and former students for information sharing and consensus. As a result of these meetings, input was integrated into these recommendations.

It is hoped that a re-innovation of the CADD program will build on its legacy and provide for student success and employer needs for many years to come.



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**Appendix A:** Labor Market Information Employment Trends from Burning Glass

**Appendix B:** Course Renumbering Chart

**Appendix C:** Core Outcomes Mapping Matrix

**Appendix D:** CADD Dual Credit Map

**Appendix E:** Demographic Graph for CADD Student Population

**Appendix F:** Advisory Committee Minutes for last three meetings

**Appendix G:** Raw Data from Enrollment Patterns

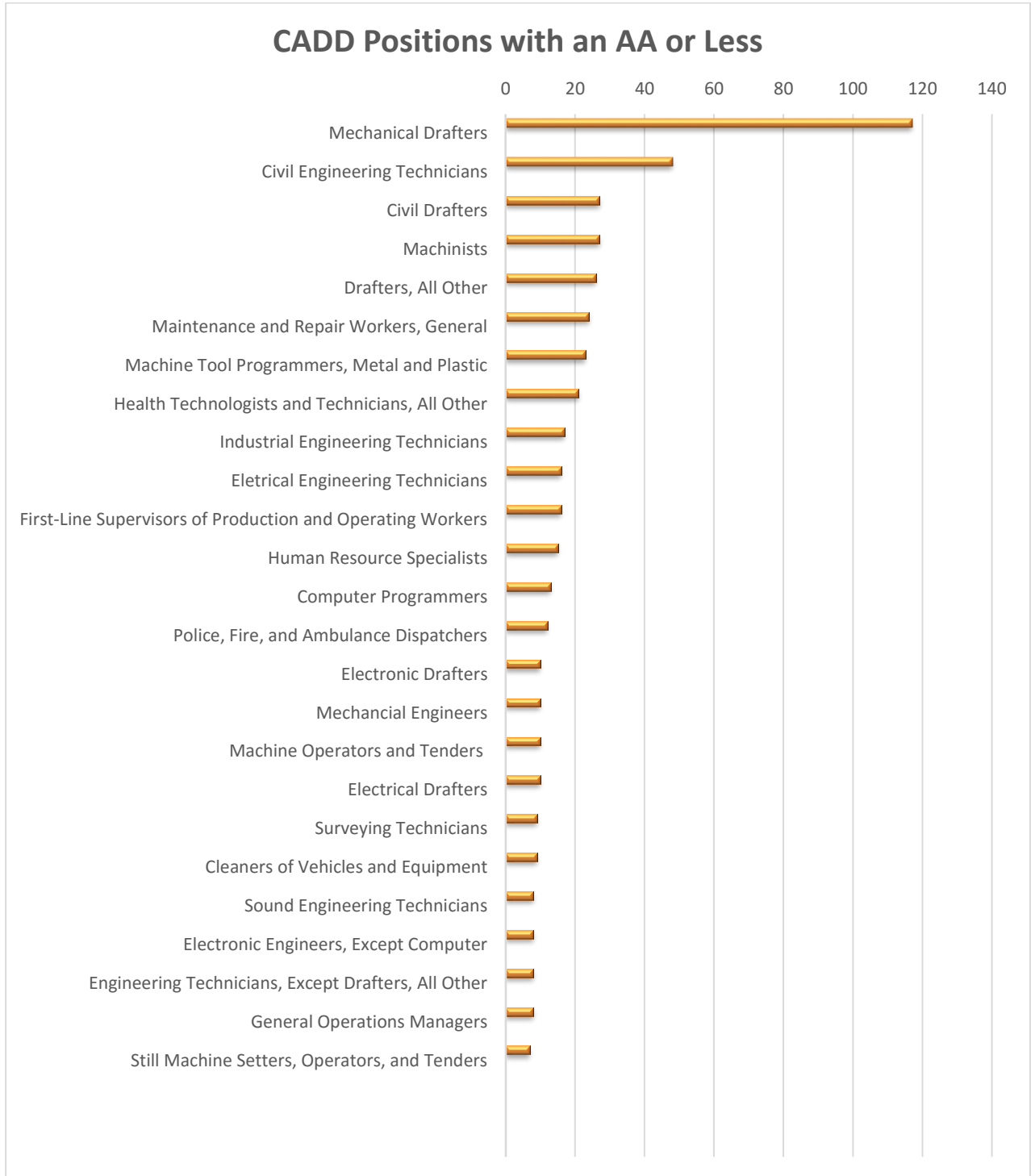
**Appendix H:** New Course Descriptions

**Appendix I:** Modified Course Descriptions

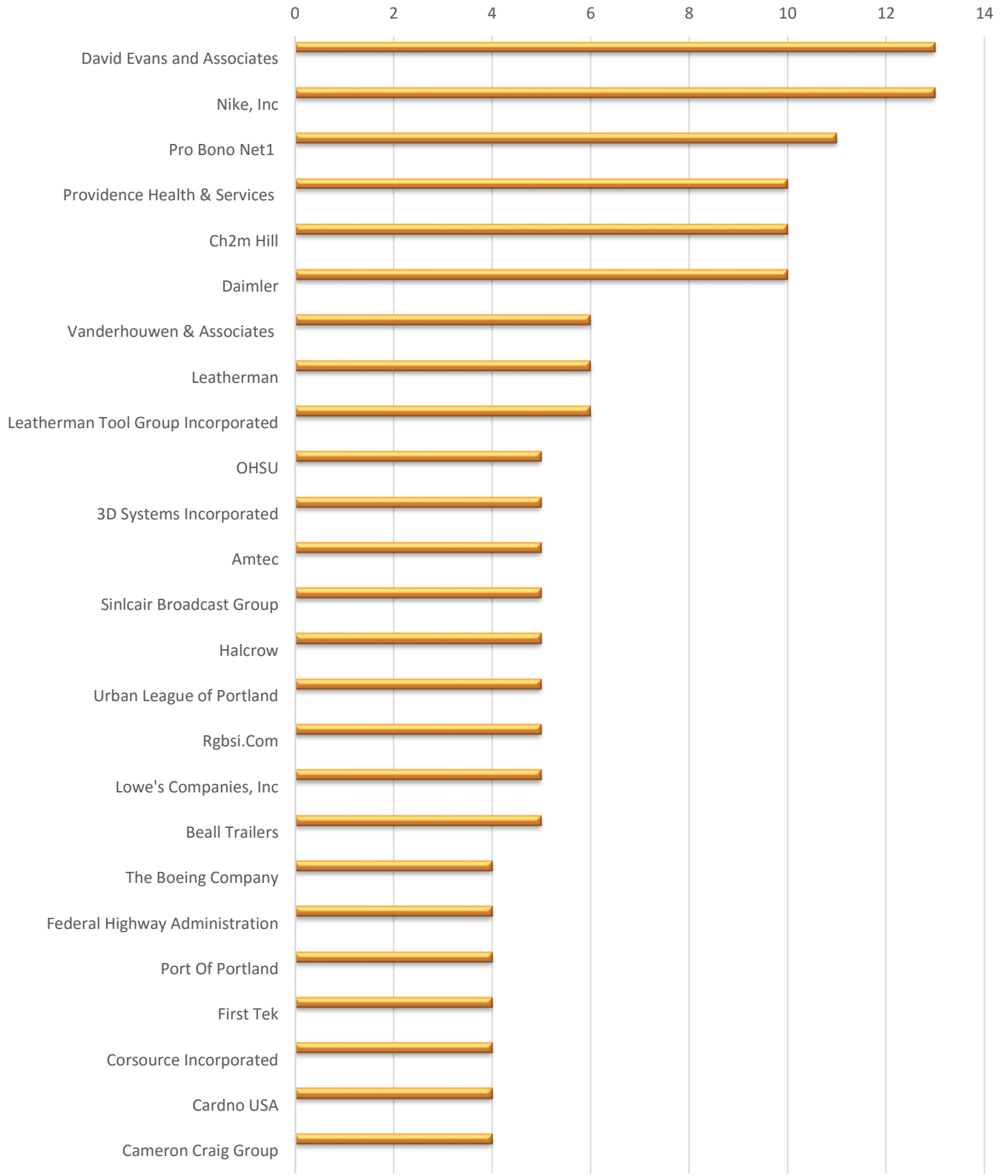
**Appendix J:** Potential Career Pathway Offerings

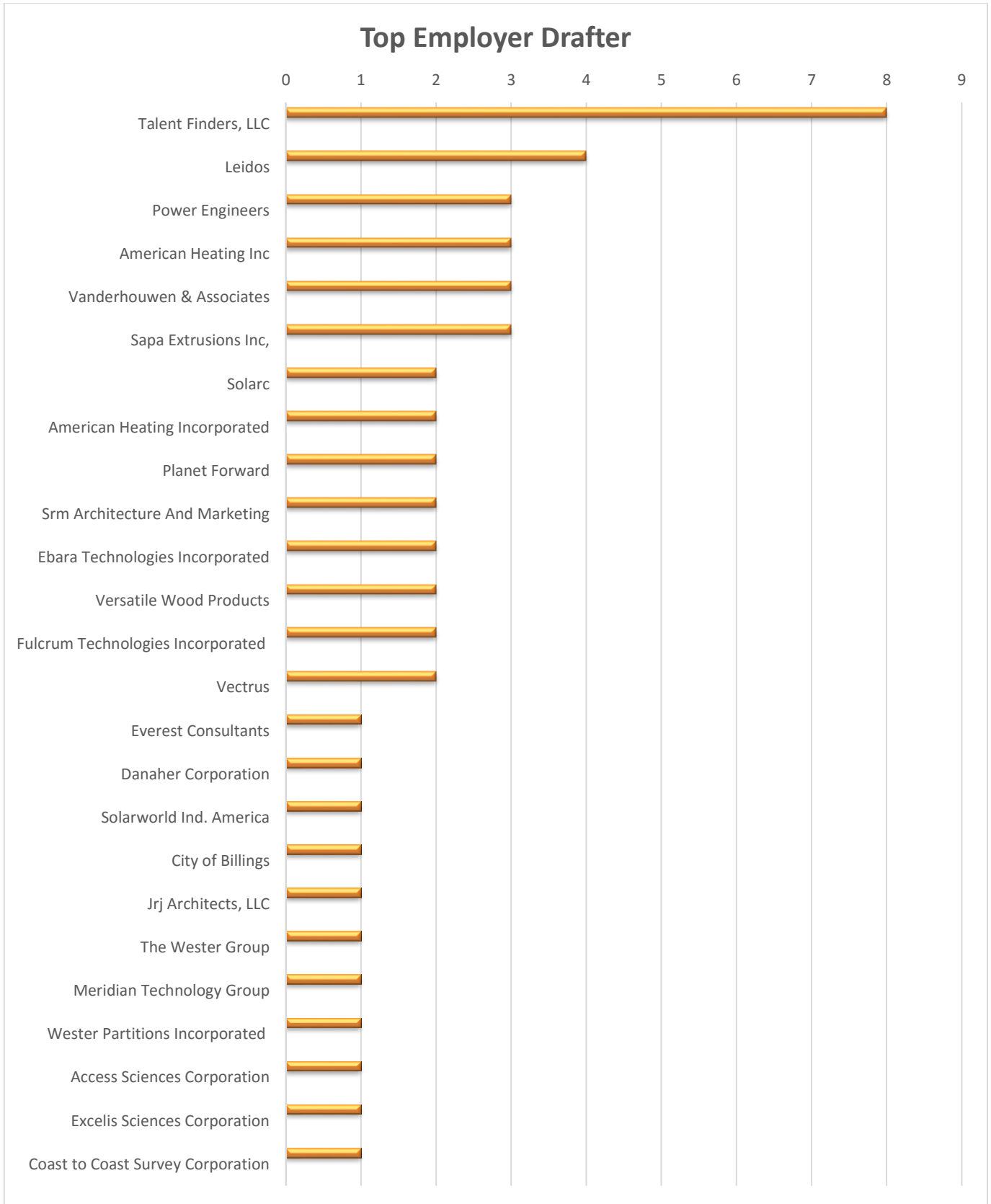


## Appendix A: Labor Market Information Employment Trends from Burning Glass

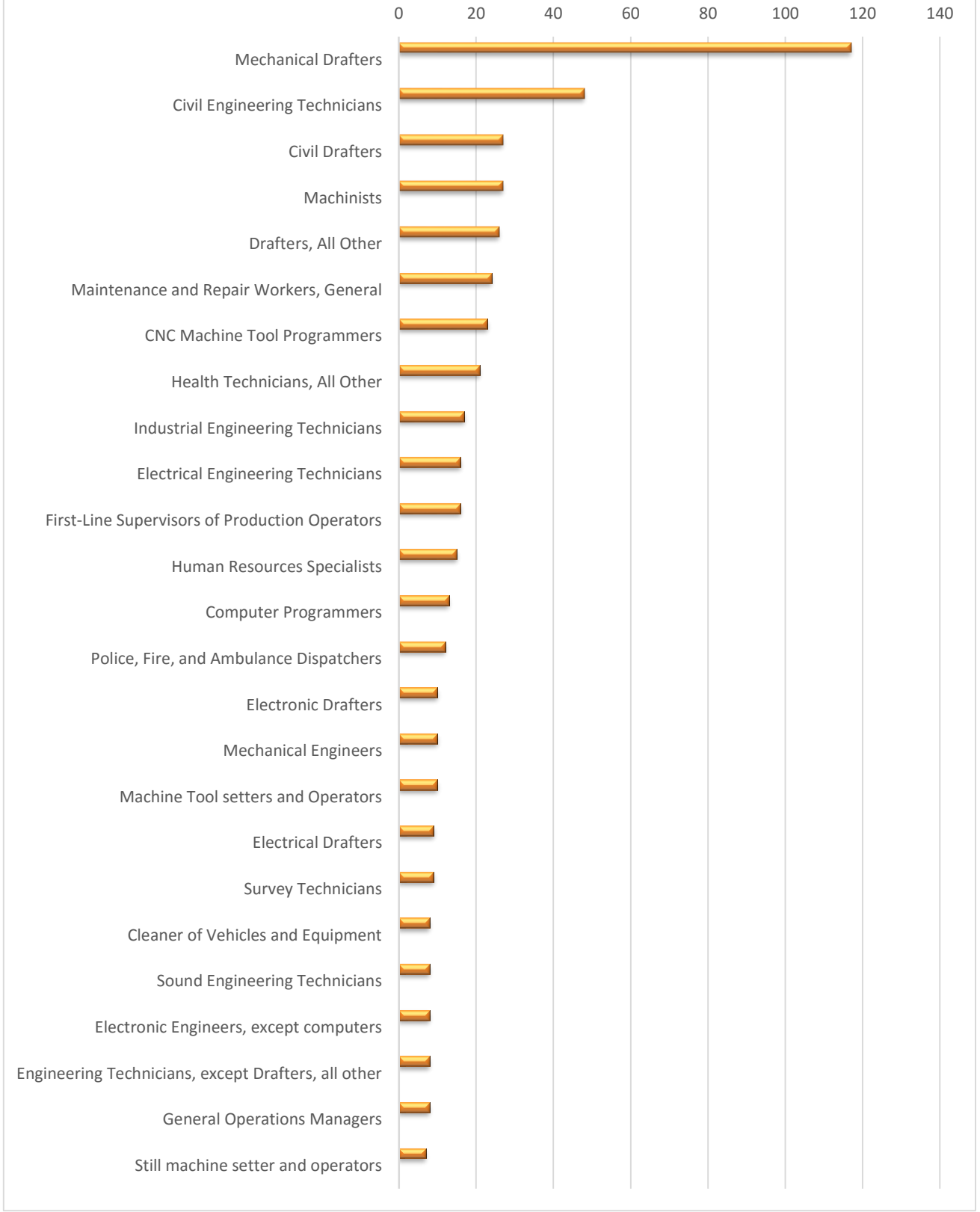


### Employers with the Most Job Openings





### Top Detailed Occupations



Occupation Title	Number of Job Postings	Number Employed	% Change in Employment t, 2013-2014	Projected Statewide Change in Employment t, 2012-2022	Mean Advertised Salary	Mean Salary	% Requiring high school	% Requiring Post-Secondary or Associate's Degree*	% Requiring Bachelor's Degree*	% Requiring Graduate or Professional Degree*	% with Unspecified Education	% with high school diploma or less	% with Some College or an Associate's	% with a Bachelor's or higher
Mechanical Drafters	200	590	22%	4.5%	\$43,212	\$55,660	19%	71%	17%	0%	71%	16%	56%	27%
Drafters, All Other	74	300	-11%	19.7%	\$40,355	\$60,000	29%	67%	29%	0%	72%	16%	56%	27%
Cleaners of Vehicles and Equipment	14	2,410	-1%	12.2%	N/A	\$26,050	7%	93%	7%	0%	0%	74%	23%	3%
Electrical and Electronics Drafters	7	270	28%	14.1%	N/A	\$53,460	N/A	N/A	N/A	N/A	14%	16%	56%	27%
Surveyors	2	330	6%	10.4%	N/A	\$71,030	N/A	N/A	N/A	N/A	50%	0%	24%	76%
Civil Engineering Technicians	2	580	-7%	7.3%	N/A	\$59,870	N/A	N/A	N/A	N/A	50%	27%	56%	17%
Construction Laborers	1	6,280	22%	28.7%	N/A	\$38,630	N/A	N/A	N/A	N/A	100%	74%	21%	4%



## Appendix B: Course Renumbering Chart

### FALL TERM – CURRENTLY

DRF 100 Drafting Orientation

DRF 117 Drafting Fundamentals

DRF 126 Introduction to AutoCAD

DRF 136 Intermediate AutoCAD

### WINTER TERM – CURRENTLY

DRF 133 Intermediate Drafting

DRF 185 Inventor Fundamentals

DRF 246 AutoCAD 3D – Solid Modeling

DRF 270 SolidWorks Fundamentals

### SPRING TERM – CURRENTLY

DRF 135 Advanced Drafting

DRF 251 Kinematics Drafting

DRF 256 Advanced AutoCAD

DRF 271 Advanced SolidWorks

DRF 285 Advanced Inventor

### FALL TERM – RE-NUMBERED

CADD 100 Drafting Orientation

CADD 160 Drafting Fundamentals

CADD 126 Introduction to AutoCAD

CADD 136 Intermediate AutoCAD

### WINTER TERM – RE-NUMBERED

CADD 165 Intermediate Drafting

CADD 185 Inventor Fundamentals

CADD 246 AutoCAD 3D Solid Modeling

CADD 175 SolidWorks Fundamentals

### SPRING TERM – RE-NUMBERED

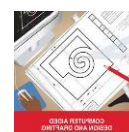
CADD 265 Advanced Drafting

CADD 255 Kinematics Drafting

CADD 256 Advanced AutoCAD

CADD 275 Advanced SolidWorks

CADD 285 Advanced Inventor



## Appendix C: Core Outcomes Mapping

### Mapping Level Indicators:

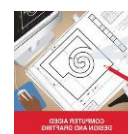
- 0: Not Applicable.
- 1: Limited demonstration or application of knowledge and skills.
- 2: Basic demonstration and application of knowledge and skills.
- 3: Demonstrated comprehension and is able to apply essential knowledge and skills.
- 4: Demonstrates thorough, effective and/or sophisticated application of knowledge and skills.

### SAC - CADD: Computer Aided Design and Drafting

#### Core Outcomes:

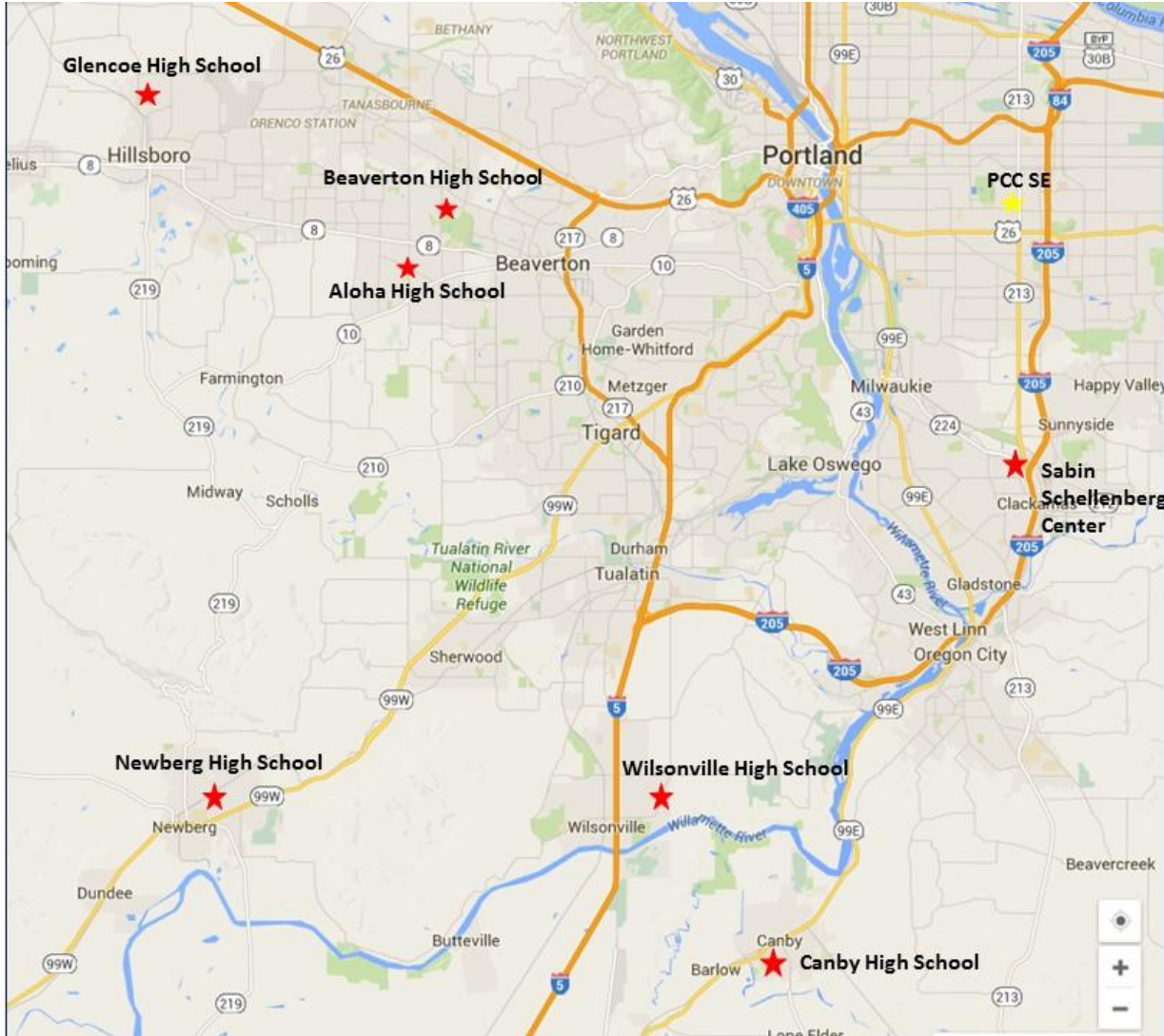
1. Communication.
2. Community and Environmental Responsibility.
3. Critical Thinking and Problem Solving.
4. Cultural Awareness.
5. Professional Competence.
6. Self-Reflection.

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
CADD 100	Drafting Orientation	1	2	1	0	1	1
CADD 160	Drafting Fundamentals	1	0	1	0	1	2
CADD 126	Introduction to AutoCAD	2	0	1	0	2	1
CADD 136	Intermediate AutoCAD	2	0	1	0	2	2
CADD 165	Intermediate Drafting	3	0	2	0	2	2
CADD 175	SolidWorks Fundamentals	2	0	1	0	2	1
CADD 185	Inventor Fundamentals	2	0	1	0	2	1
CADD 246	AutoCAD 3-D and Solid Modeling	2	0	2	0	3	1
CADD 255	Kinematics Drafting	3	0	4	0	4	3
CADD 256	Advanced AutoCAD	2	0	3	0	2	1
CADD 265	Advanced Drafting	3	0	2	0	2	2
CADD 275	SolidWorks Advanced	2	0	2	0	3	1
CADD 285	Advanced Inventor	2	0	2	0	3	1



Content copied from old DRF page and reviewed for accuracy in April 2015

## Appendix D: CADD Dual Credit Map



CADD Dual Credit Offerings at local High Schools:

**Aloha High School**

- CADD 126
- CADD 160
- CADD 165

**Beaverton High School**

- CADD 126
- CADD 160

**Canby High School**

- CADD 126

**Glencoe High School**

- CADD 126

**Newberg High School**

- CADD 185



Sabin-Schellenberg Center

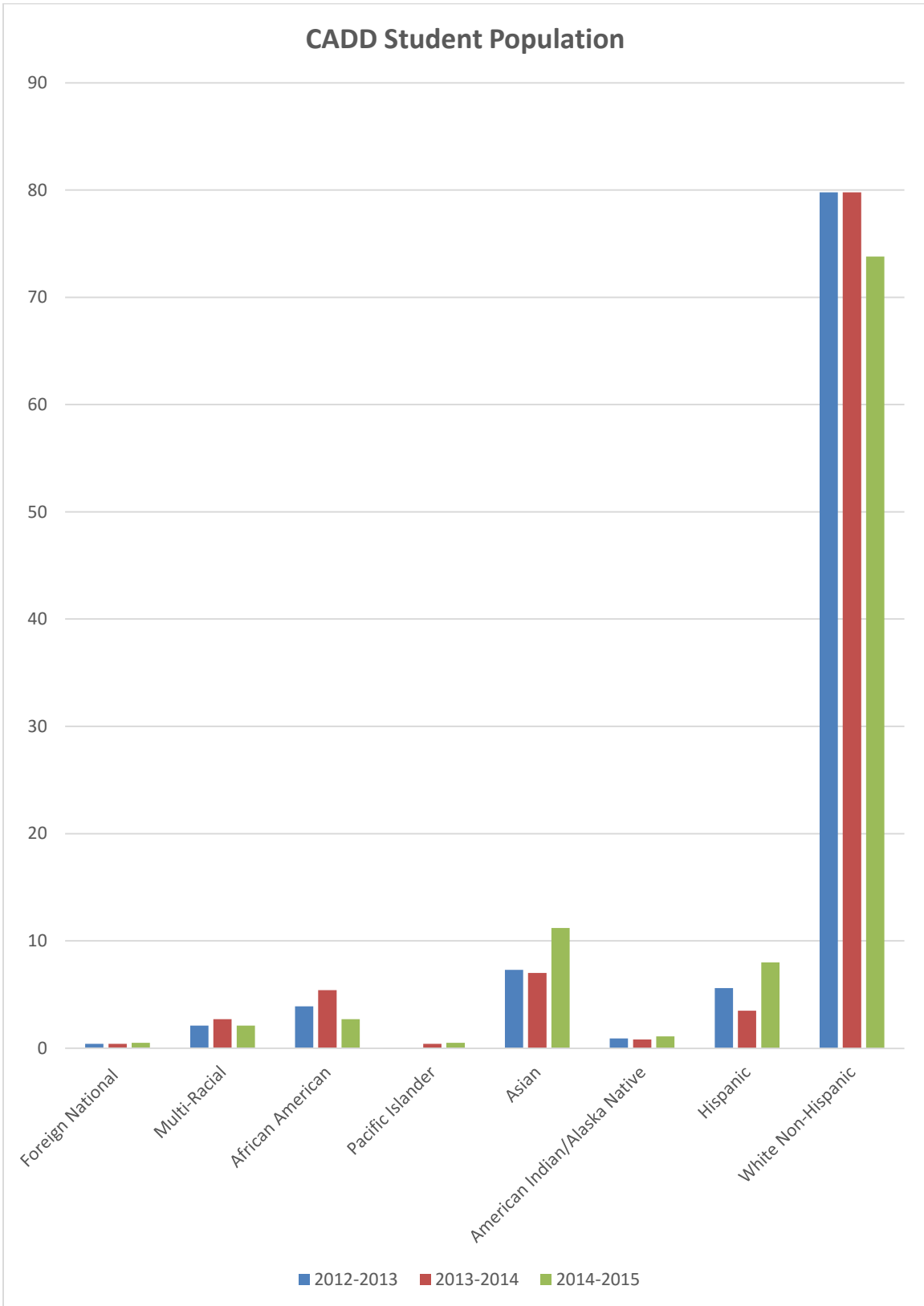
- CADD 126

Wilsonville High School

- CADD 126



## Appendix E: Demographic Graph of Student Population



## Appendix F: Advisory Committee Minutes for Last Three Meetings

CADD Advisory Meeting  
November 9, 2015  
7:15-9:15am

Attendees: Phil Eichmiller, Dudley Keen, Barrett Faneuf, Brian Branche, Justin Mortensen, Gary Payton, Craig Kolins, Alfred McQuarters, Chris Weber, Kate Kinger, Angela Meyer (notes)

Introductions were made. New instructor introduction: Justin Mortensen, new FT CADD instructor introduced himself and talked about the program review

Enrollment report for Fall term: Enrollment is very strong Fall term resulting in classes being split. CADD is hottest job market and can't fill jobs quick enough. Inventor and Solidworks the top software being taught and used. Phil has more returning students and/or companies returning then in the past. No classes canceled for Fall term. Does the Advisory Committee think we are going in the right direction as far as classes are concerned?

3D Printing class: Possible offering 3D printing class, need to keep in mind what the printer is capable of, its limitations. Would need to develop a project with standard parameters, learn the tools to make the part, maybe have students print out parts to make a new printer for the next class to use. Students could print out a plaque with their name on it of who made the printer. Could we justify needing 3D printers? 2D still has its place but times are changing. How much still needs to be done by hand?

Report on High School Dual Credit Assessments: Glen Truman and Mark Hagen did an audit of highschoools and what they offer in the CADD area.

Linkedin: Search Linkedin on who is working in a company after taking CADD training. Would be interesting to see where graduates are working. Possibly having graduates come in. Brian Branche, attending the meeting today, is a graduate that now works/owns a solar company.



Program Review: We can imbed a lot of current curriculum in the program review. Need continuity in classes, would like a team or class project? Could assign same project, same component and work together more than individually. No one in industry works alone, always in teams. Should be taught that way. Should be mindful of the process the entire way through instead of doing one part and passing it along. How do you/your class handle the hand off process?

If the CADD department started from scratch, how would it look? Manufacturing design, DFM (design for manufacturing)/DFA (design for assembly) course, product development process, start from the problem or customer request instead of starting from a drawing. "I want something shaped like this...." Start backwards to get the product. Encourage intuitive thinking, critical thinking.

Career Pathways Certificate: CADD would like to integrate in Career Pathways. In order to do so, they would have to integrate general education, it would change the current certificate and add slight increase in credit hours. Will need to consider the implications and impact to the department.

Is important to teach the tools but also need to teach the design. Possible certificate in just design portion, teaching design and how to use design philosophy more important than tools.

Possibly subbing the current certificate with the full year certificate, would make it more credible to future employers. Human Relations, Communication and Computation would need to be added. What level of documentation would be needed for the soft skills? Would need to target highschool students with dual credit. Tools are important but design and skills are more important. You don't get a degree in "hammer".

Next Meeting: Electronic review process is needed for committee to assess the Program Review. An email will go out to the committee by December so any changes/concerns can be addressed in time for the January presentation.

In person meeting scheduled for Monday, April 11.

Meeting adjourned



COMPUTER AIDED DESIGN AND DRAFTING  
ADVISORY COMMITTEE MINUTES  
NOVEMBER 18, 2014

Peter Douglas  
Chris Webber  
Kate Kinder  
Al McQuarters  
Craig Kolins  
Phil Eichmiller

Charlie Rose  
Mark Hagen  
Dudley Keen  
Adam Scheible  
Erica Hand  
Glen Truman

- Approval of previous meeting minutes.
  - Dudley approved the minutes and Mark seconded
- Introductions of new division dean.
- Current enrollment.
  - Glen and Mark reported that enrollment started strong.
  - Glen and Mark asked Craig if they could get some more computers for the SCOM 206 lab. Craig will look to see what he can do.
  - More and more companies are inquiring about recent program grads.
- Course offerings in the future.
  - Has Advanced AutoCAD run its course?
    - i. Mark wants to offer schematic drafting
    - ii. Should there be online course offering?
    - iii. CE/CU classes on the science behind the software
    - iv. Offer a 2 hour STEM event much like the CADD Summit—make sure there is food and swag to get people to attend
    - v. 3D printing course
    - vi. Start working with local high schools to get the word out on our program and expose them to the appealing courses such as 3D printing



- vii. Franklin High School is building a new school with a CADD Lab. Students can take the beginning courses there and then come to PCC to finish their certificate.
    1. Glen and Mark will look at instructor qualification and talk to the staff to help make it a streamline transition.
- Internships.
    - Kate is willing to help create a CADD Career Pathway Program to help people build on the skills they already have.
  - Miscellaneous items.
    - Program recruitment ideas:
      - i. Go into PCC Math courses
      - ii. Set up videos and demos in Great Hall
        1. Talk to PCC Production Team about creating a video. Videos can run during the STEM Challenges.
    - CADD Facebook Page (Erica will manage) to promote program and events.
    - Simulation is really big right now. We need to draw from other program to capture students.
    - Be a part of the Light Bulb Lecture Series
  - Next meeting date.
    - April—Glen will send out an email with possible dates
  - Adjournment.
  - Tour of the library if interested.



**Computer Aided Design and Drafting  
Advisory Committee Minutes  
May 7, 2015  
SCOM 227**

Peter Douglas, Mark Hagen, Erica Hand, Dudley Keen, Kate Kinder,  
Craig Kolins, Al McQuarters, Charlie Rose, Glen Truman

- 1. Approval of previous meeting minutes.**
  - Previous meeting approved by the committee
- 2. Introductions of guests and committee members.**
- 3. Update on Mark's retirement and search for an instructor.**
  - Position has been posted
  - Glen hopes to keep Mark on as a part time instructor
- 4. Career Pathway Certificate presentation.**
  - See attached handouts
- 5. Program review.**
  - Will be happening April 2016
- 6. Proposed curriculum revision.**
  - See handout
  - Should we add a 4<sup>th</sup> term?
  - Is Advanced AutoCAD still relevant?
  - Add Cast Molding class
  - Add 3D Printing class
- 7. Update on High School Dual Credit Assessments.**
  - Needs to be completed by June 2015
  - Glen or Mark physically go to the school to check content and textbooks to see if class qualifies for PCC credit.
  - Canby, Sherwood, Newberg, Aloha, St Helens, Wilsonville, Glencoe, and Beaverton all participate
- 8. Review of High School preview day.**
  - 35-40 students saw the lab and left with 3D parts
  - Biggest turn out we have had for Preview Day
- 9. 3D printing projects.**
  - Glen showed the committee the new 3D printer cart



**10. CADD Video—only a rough basic idea**

- Glen showed us his “exciting” video!!

**11. Miscellaneous items****Update Webpage(s) for CADD—FAQ**

- Mark is working with the Web Team to update the site
- We have a Facebook Page! [www.facebook.com/PCCCADD](http://www.facebook.com/PCCCADD)

**CADD Summit for 2015-2016**

- Starting thinking about what we want to do. Maybe it should become a yearly event?

**12. Election of new Advisory Committee Chair**

- Glen will see if Chris Webber is interested in becoming Chair. Charlie will continue being Chair if Chris is not interested.

**13. Set the next meeting date**

- Mid-October due to Program Review. Glen will schedule and Erica will send out a Google Invite.

**14. Adjournment**

## Appendix G: Raw Data from Enrollment Patterns

<b>Enrollment Data</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
CADD 100	31	31	32
CADD 160	30	40	33
CADD 126	124	125	97
CADD 136	76	77	83
CADD 165	24	27	27
CADD 185	50	61	40
CADD 246	29	27	29
CADD 175	117	124	76
CADD 265	20	27	26
CADD 255	18	26	25
CADD 256	27	32	31
CADD 275	59	56	53
CADD 285	27	34	36

<b>Enrollment Data</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
CADD 100			31	31	32
Certificates Awarded	13	21	19	18	30



## Appendix H: New Course Descriptions

### Technical Mathematics (4 CH)

Solving linear equations; cartesian coordinate system; quadratic functions, polynomials, solving systems of equations; measurement systems; dimensional analysis, selected geometry fundamentals; trigonometric functions; selected descriptive geometry topics. Prerequisites, completion of MTH060. Meets MTH065 credit requirements.

### Statics and Strength of Materials Design Concepts (3 CH)

Elementary and practical approach to the principles and physical concepts of the study of forces and their effects on solid bodies in equilibrium. Define stress and strain as it relates to designs. Selected material strength topics including, but not limited to: Yield Strength, Ultimate Strength, Young's modulus, and Poisson's ratio. Prerequisites: completion of MTH060.

### Materials and Design for Manufacturing Processes (4 CH)

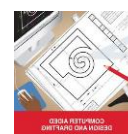
Identify and learn capabilities and application of various materials and manufacturing processes available for the technical designer. Students learn design for manufacturing and assembly topics (DFM/DFMA), practical design knowledge for specific processes including plastics molding, extrusions, sheet metal, machining, die casting, etc. Prerequisites, CADD160, concurrent registration in CADD 177.

### Product Design and Development Fundamentals (3 CH)

Students will learn and understand the product development process and associated tools. Students will work with industry sponsors and partners on approved hands-on design projects. Work may take place on site or at the college. Students take on project responsibility and deliver a final design that meets internal or external customer requirements. The team will proceed through each phase of the product development process (PDP) by meeting metrics and deliverables. Specific tools and techniques will be introduced at each phase: Concept Phase, Requirements Phase, Design Phase, Prototype Phase, Validation Phase and Production Phase. Teams will learn to effectively interact and work at a high level of proficiency in meeting deliverables. Meets human relations GE requirements. Prerequisites, CADD 105, 136, 177

### Exploring STEM with CADD (3 CH)

Exploring STEM with CADD gives students the opportunity to understand STEM and participate in creative efforts. Explores how design, materials and STEM are used to make products. Students will work with "Digital Design and Fabrication" (DDF) technologies, including 3D printers, desktop CNC machines and laser cutting machines to "make" their designs. Suggested for new students evaluating a CADD or STEM career and associated opportunities. Prerequisites, none.



**Approved Technical Elective (3+CH)**

Students will have the option to take an applicable course from CMET, EET, MCH, DDF or other approved programs. Examples may include MCH 115, CMET 111, ARCH 110, EET 101, credits should be transferable to respective AAS programs. Prerequisites based on course selected.



## Appendix I: Modified Courses and Descriptions

### **Orientation and Technical Communications (3 CH)**

First term orientation for CADD students. Introduces product lines and manufacturing operations through visual media or facility tours, to become familiar with working conditions, with a possibility to converse with employees. Covers fundamentals of technical report writing, memos, resume development, interviewing skills, internet research of technical products related to drafting and design, American National Standards Institute drafting practices and terminology. Prerequisites, none. Meets communications GE requirements.

### **Computing Fundamentals with AutoCAD (3 CH) (Was CADD 126)**

Covers basic microcomputer operation, use and OS functions as relates to CADD. Introduces AutoCAD software as a design tool. Includes instruction in the operation of both CPU hard drive and USB drive data storage, and plotting. Covers creation, retrieval and modification of drawings that meet industry standards using basic AutoCAD commands. Audit available.

### **Drafting Fundamentals with CAD (4 CH) (CADD 160)**

Introduces skills needed to produce 2-D mechanical drawings using hand sketching techniques on grid paper. Includes orthographic projection, lettering, auxiliary views, sections and pictorial drawings. Covers dimensioning basics. Students will create hand drawings and be introduced to computer aided design and drafting as a tool for producing mechanical drawings. Audit available.

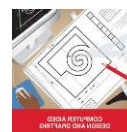
### **Advanced Drafting with CAD (CADD 165) (4 CH) (Merges CADD 165 and 265 content)**

Continues material presented in CADD 160. Introduces geometric construction, fasteners, keys keyseats and keyways, surface finish, and tolerances.

Introduces working drawings, including assemblies and details, weldments, drawing numbering systems and revisions. Uses Computer aided design and drafting as a tool for producing mechanical drawings. Prerequisites: CADD 160. Audit available.

### **Introduction to 3D Computer Aided Design Tools (4 CH) (Was CADD 175 and 185)**

Introduces CADD software as a 3-D design tool. Covers creation, retrieval and modification of 3-D and layout drawings using basic commands. Includes skills needed to create parametric models of parts and assemblies; generate dimensioned layouts; and Bill of Materials of those parts and assemblies. Audit Available. Students will be introduced to the concepts via two different CAD software packages taught in consecutive modules.



**Mechanisms, Kinematics Design & Drafting (3 CH)**

Introduces design of mechanisms that translate motion and force, including cams, gears, belts/pulleys and chains/sprockets. Introduces components such as pawls ratchets, linkages and levers. Includes drawings of stock (shelf) items and custom designs.

**Advanced 3D Computer Aided Design Tools (4 CH)**

Covers advanced editing and modeling options, configurations of assemblies, sheet metal, and topdown assembly modeling. Students will be introduced to the concepts via two different CADD software packages taught in consecutive modules.

Prerequisites: (Introduction to 3D Computer Aided Design Tools). Audit available.



## Appendix J: Potential Career Pathways Offerings

Potential Drafting Career Pathway 2018 Offerings

### **Exploring STEM with CADD**

Computing Fundamentals with AutoCAD

Drafting Fundamentals with CAD

Advanced Drafting with CAD

Total of 12 credit hours

\*Leads to ADA Apprentice Drafter Certificate

### **3D CAD Modeling**

Career Pathway 2018 Offering

Exploring STEM with CADD

Materials and Design For Manufacturing Processes

Introduction to 3D Computer Aided Design Tools

Advanced 3D Computer Aided Design Tools

Total of 15 credit hours

\*Leads to a Certified Solidworks Sustainable Design Associate certificate.

### **Technical Designer**

Career Pathway 2018 Offering

Exploring STEM with CADD

Materials and Design for Manufacturing Processes

Statics and Strength of Materials Design Concepts

Introduction to 3D Computer Aided Design Tools

Mechanisms, Kinematics Design and Drafting

Product Design and Development Fundamentals

Total of 20 credit hours

\*Leads to a Certified Solidworks Associate Certificate

### **STEM Career Pathway 2018 Offering**

Exploring STEM with CADD

ENGR 100 (1 credit)

CG 150 (3 credits)



CAS 170 (1 to 3 credits)  
Math and/or computer class

Total of 13-15 credit hours

