

| Program Overview | |
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| PR Area | Academic Affairs |
| PR Division | Industry & Technology |
| PR Program | Computer Aided Design/Drafting |
| Review Type | Academic Affairs |
| Year | 2012 |
| Program Overview Narrative | |
| <p>The Computer Aided Design/Drafting (CADD) program prepares students for employment in career fields utilizing computer aided drafting processes, and provides upgrade opportunities for currently employed personnel. By completing the degree or certificate requirements, the student will gain proficiency in sketching, manual and CADD fundamentals, three dimensional design and modeling, and geometric dimensioning and tolerancing. Competencies will be assessed regularly by student performance using industry standard computer hardware and software. Students completing the program may expect to enter industry as CADD drafters or modelers in mechanical design, aerospace, automotive, or other related fields. Particular strengths of the program include its highly experienced faculty and its focus on the use of CATIA (a world-class, fully integrated computer-aided design, manufacturing and engineering (CAD/CAM/CAE) software package that is widely used in industry) and on Geometric Dimensioning and Tolerancing (GD&T). The program serves an annual enrollment of approximately five hundred (average 511 for the last four years; 2008-2009 thru 2011-2012) with success rates of seventy to seventy five percent.</p> | |
| Status of all active Recommendations | |
| <p>Recommendations from 2007 Program Review:</p> <ol style="list-style-type: none"> 1. Upgrading equipment and software is an ongoing need. The CADD program must be able to consistently provide training using the proper tools that our advisory committee and industry recommends. <p>Status: This need is ongoing and will always be an issue with this program.</p> <ol style="list-style-type: none"> 2. Hire additional part-time faculty to support the program as needed. An additional full-time faculty member is projected in the 1-2 year time-frame. <p>Status: This need is also ongoing but particularly urgent at this time due to the impending retirement of our senior full-time faculty member (leaving only one full-time instructor) and the increasing age of our few remaining part-timers.</p> <ol style="list-style-type: none"> 3. Ongoing computer training for all instructors in the CADD program is necessary to keep up with industry. Also, as curriculum expands to cover new technology, faculty will need to develop curriculum in multiple formats to match industry demand. Additional formal training should be offered to compose and direct more courses online. | |

Status: This, too, remains an ongoing need and has taken on a new urgency due to looming major changes to our software (CATIA V6 and possible inclusion of Solidworks courses in the program).

4. Open Technical Arts Building labs Monday - Friday 8am- 10pm, and employ student assistants to manage the labs.

Status: This is still desirable. It would provide our students with much-needed opportunities for additional practice and skill building.

Part 1: Review of the past four years

| Research Data Analysis |
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| Research Data Analysis Narrative |
| <p>Summary:</p> <p>The CADD program's student population is older, whiter, and more male than the overall campus population. Historically, the majority of our students were part-time due to their employment in local industry. With the recent decline in industry and high unemployment this is less true than it used to be. Most are seeking to maintain currency with software tools and changing industry standards or to upgrade their skills rather than to obtain degrees or certificates.</p> <p>Gender:</p> <p>Over 80% of students who enroll in CADD courses are male.</p> <p>Ethnicity:</p> <p>One third of students in CADD courses are Latino followed by White (23%) and Asian (20%)</p> <p>Age Group:</p> <p>Approximately 60% of CADD students in the last four years were working adults (ages 25-50).</p> <p>Time of Class:</p> <p>Trend has changed during this review period with day time students now outnumbering night students. In Fall 2007, 63% were evening students but currently 53% are daytime students.</p> <p>Academic Level:</p> <p>65% of CADD students are high school graduates and 28% have earned a college degree.</p> |

Educational Goal:

Intent to transfer is most prevalent at 23% (discounting the statistics for unknown/undecided) followed by retraining/recertification at 16%

We receive undecided students from other departments in I&T, and other community colleges and universities seeking Catia training due to its widespread use in the aerospace and automotive industries.

We will continue to encourage students to seek a certificate of achievement or AS degree.

Certificates Earned:

Year 2011/2012 – 5

Year 2010/2011 – 4

Year 2009/2010 – 3

Year 2008/2009 – 1

Year 2007/2008 – 4

Degrees Earned:

Year 2011-2012 – 6

Year 2010/2011 – 2

Year 2009/2010 – 5

Year 2008/2009 - 0

Year 2007/2008 – 5

Please see attached Chancellors office and ECC Institutional Research documents for detailed statistics and analysis.

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| Curriculum |
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| Curriculum Narrative |
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During this time period curriculum changes were driven by two issues:

1. As CADD software has evolved and matured it has become more user-friendly and accessible. This has reached the point where some prerequisites are no longer necessary. This has resulted in changing the prerequisite of CADD 31 on several CADD courses

(CADD 32, CADD 33, and CADD 37) to a Recommended Preparation) of CADD 31 and the removal of the prerequisite from CADD 28.

2. These same issues with the software allowed two three unit classes (CADD 47 and CADD 49) to be combined into a single 4.5 unit course (CADD 43). This necessitated the inactivation of the CADD 47 and CADD 49 courses and changing the degree and certificate requirements to reflect these changes.

Our course review is current. CADD 10 will be the next course to be reviewed in 2015-2016.

2011-2012

CADD 28abcd - removed prerequisite

CADD 32abcd - to recommended preparation

CADD 33abcd - to recommended preparation

CADD 37abcd - to recommended preparation

2010 – 2011

AS Degree - addition of CADD 43

Certificate of Achievement - addition of CADD 43

CADD 10abcd - Distance Education version added

CADD 43 - new course - combining CADD 47 / CADD 49

CADD 47 - inactivated

CADD 49 - inactivated

All courses at the present time are consistent with current practice in industry. As the industry changes so should curriculum. With the advice of the advisory committee the CADD program curriculum will change in the future. Distance learning classes will certainly be required with advancements in Internet based tools.

CADD 6 Year Timeline (see attached)

| Assessments of Student Learning (SLO) |
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| Assessment of Student Learning Narrative |
| PROGRAM SLO - COURSE SLO's - SLO ASSESSMENTS |
| PROGRAM SLO |
| <p>Upon Completion of this discipline's course of study, the student will be able to utilize CADD software to create and interpret engineering drawings at an industry entry skill level.</p> |
| COURSE SLO's |
| CADD 5 – Introduction to Mechanical Drafting |
| <p>Given sufficient product definition information of a simple machined part, the student will be able to utilize the AutoCad software to produce a dimensioned orthographic drawing of the item.</p> |
| CADD 10abcd – Wireframe With Surfaces, Solid Modeling and Assemblies |
| <p>Given sufficient product definition information of a simple machined part, the student will be able to utilize the AutoCad software to produce a 3D solid model of the item.</p> |
| CADD 28abcd – Advanced Parametric Solid Modeling and Assemblies |
| <p>Given a fully dimensioned multi-view engineering drawing of a machined part, the student shall be able to utilize the appropriate functions within the Inventor software to construct a 3D solid model of the part.</p> |
| CADD 31abcd – Orientation to CATIA |
| <p>Given a fully dimensioned multi-view engineering drawing of a machined part, utilize the appropriate functions within the CATIA V5 software to construct a 3D solid model of the part.</p> |
| CADD 32abcd – Product Modeling with CATIA |
| <p>Given a fully dimensioned multi-view engineering drawing of a complex machined part, utilize the appropriate functions within the CATIA V5 software to construct a 3D solid model of the part.</p> |
| CADD 33abcd – Analyses and Simulations with CATIA |
| <p>Given sufficient product definition information, the student shall be able to demonstrate the Knowledgware, Sheet Metal, Kinematics and Stress Analysis functions within the CATIA V5 software.</p> |

CADD 37abcd – Advanced CATIA Functions

Given a fully dimensioned multi-view engineering drawing of a complex molded part, the student shall be able to utilize the appropriate functions within the CATIA V5 software to construct a 3D surface model of the part.

CADD 43 – Design Process and Concepts

Given sufficient design requirement definition, the student shall be able to plan, sketch and create complete engineering drawing packages of sample products.

Given sufficient design requirement definition, the student shall be able to function effectively as a member of a design team to produce complete engineering design documentation packages of sample products.

CADD 45 - Geometrical Dimensioning and Tolerancing

Given an incomplete sample engineering drawing, the student shall be able to revise the drawing to completely specify desired geometry and permissible variation of geometric characteristics.

SLO ASSESSMENTS

CADD 5 - completed - Spring, 2012 – Students performed as required; no changes to the course were indicated.

CADD 10abcd - in progress - Fall, 2012 - Students performed as required; no changes to the course were indicated.

4 Year SLO Time Line (see attached)**ACCJC Rubric****Proficiency**

Describe how well the assessment process works within your program and justify the rating you gave the assessment work in your program.

Based on the rubric for Student Learning Outcomes, the CADD program is at the continuous quality improvement stage. The program has linked the learning outcomes to the program reviews.

Facilities and Equipment**Facilities and Equipment Narrative**

We currently are in a much better situation than indicated in the previous Program Review. We have decent lab space and computer equipment. We also have an “open and shared” lab relationship with several departments in the Technical Arts building. This maximizes lab

efficiency, increases student satisfaction, and keeps overall costs low.

We are thoroughly dependent on continuing the upgrading our technology (maintaining current software and computers suitable for running it) to keep up with local industry specifications.

The survey indicates that students are currently satisfied with our facilities and equipment. Also, ECC Support Services maintains our computers and software to the best of their ability.

Technology and Software

Technology and Software Narrative

The CADD department utilizes CATIA software as an advanced 3D modeling platform, and AutoCAD software as the basic 2D CAD learning platform, These softwares are the leaders in their respective classes worldwide, and have been employed at ECC for the last 20 years.

The CADD program has a consistent pattern of upgrading software every 2-3 years to keep up with industry standards. Hardware is upgraded when funds are available.

The combined yearly cost for the (2) academic versions of the software is 10-12 thousand dollars.

Staffing

Staffing Narrative

CURRENT FACULTY:

Full-Time

Richard Hughes

Douglas Glenn

Part-Time

Dan Valladares

Charlie Hamilton

Frank Weeks

See Recommendations section for immediate and long term Staffing needs.

Career and Technology Education (CTE)

How strong is the current occupational demand for the program?

According to the attached CADD Analyst Report EMSI statistics, the occupational demand for the program has been steady over the last five years (2007-2012) and is expected to continue along this line for the next five years. Statistics and projections are partially skewed during this program review period due to the following:

The steep decline experienced worldwide during the “Great Recession” (2008 - 2012)

Educational Program "naming conventions" seem to shift from year to year: ex: CADD Drafting and Design Technology vs. Drafting and Design Technology vs. Architectural Drafting, etc (p.5)

Locally, demand is flat due partially to the current economic downturn in California and nationwide, and the consolidation of major aerospace companies and the effect on contractors and suppliers that compose the majority of our local job market (South Bay).

The next 5 years will be crucial to the training of drafters/designers to step into the technical positions opening up in the local aerospace, automotive, and construction industries, when an economic rebound happens locally and nationally and the economy returns to a statistically normal condition.

Please see attached documents for complete data and details.

What is the district's current need for the program?

The CADD department reflects the best intentions of the Industry and Technology Division and El Camino College, in that it supports local **INDUSTRY** and trains students using cutting edge **TECHNOLOGY**.

CADD is used to design, engineer, test, and manufacture everything that is man-made: Automotive, Aerospace, Product Design; and also crosses-over most technology boundaries (Art, Architecture, Manufacturing, IT, etc.)

The El Camino CADD program utilizes Catia software; the Industry-wide gold-standard in advanced 3D technology. This technology is prominently used by local Aerospace and Automotive companies and their suppliers. Twenty five years ago, El Camino was selected as 1 of 6 schools nationwide to train utilizing Catia software; and is still an academic leader in the dissemination of this technology according to Engineering.com. We also train using Autodesk Products; recognized as the leading 2D design software in the US.

The CADD department predominantly serves the South Bay which encompasses a population of almost one million residents. Local communities, employers, and academic institutions expect trained and qualified technology personnel to make a positively impact on the economy.

We accomplish this by focusing on (2) main types of students:

- 1) Non-traditional students from Industry learning new technology (retraining/recertification)
- 2) Traditional students earning a degree, certificate or transferring to other academic institutions.

Ultimately, all of our students are immersed in the development of the high tech skills needed for success in higher education and eventual employment opportunities.

What is the state's current need for the program?

When the current recessionary environment fades; companies are anticipated to be hiring in all engineering disciplines. Traditionally, aerospace companies are our largest market; which covers OEM's (Boeing, Northrop) down to local contractors and suppliers. These companies have historically been important employers for California. The CADD department will be ready to train future generations of designers, engineers, and other technical personnel.

We are continually updating our technology and curriculum to keep abreast of the new California and national requirements for industry, and transfer requirements to institutions of higher education.

How does the program address needs that are not met by other similar programs in the area?

Increasingly, students, and employers are turning to ECC and the CADD department to pick up the fall-off in local technology, and aerospace related training. As previously discussed in the "district" section of CTE; the department has a long history and reputation for excellence in Catia training which is highly valued in the aerospace and automotive industries.

In addition, local University engineering programs at Long Beach, Dominguez, and Los Angeles offer limited or no CADD classes for students. Many CSU students are advised to supplement their education with CADD classes, particularly Catia, at El Camino. We have made it a priority that our CADD classes transfer to CSU and/or UC schools.

The CADD program is fortunate to have a great reputation with local employers and Universities, and we expect that interest in technology based programs in general, and CADD in particular, will continue to remain steady for the foreseeable future.

Are the students satisfied with their preparation for employment? Are the employers in the field satisfied with the level of preparation of our graduates?

Our students do not require a degree or certificate to obtain or advance in their employment. We focus our attention on teaching the advanced technological tools and processes students need in the current work environment.

No employer satisfaction data is available from the ECC research & development office, and no procedure to obtain this data is in place at ECC or the Chancellors office at this time.

What are the completion success and employment rates for the students?

The average CADD Success and Retention Rates for the years 2007-2010 on average meet or exceed the overall College average. Please refer to ECC Institutional Research and Chancellors Office Data Mart attachment for complete statistics.

No specific ECC CADD student employment rates is available from the ECC research and development office, and no procedure to obtain this data is in place at this time.

What impact does the advisory board have on the program?

Our Advisory committee plays an important role in continuing to shape the CADD program. The committee is used to exchange and gather information, and many of the questions posed result in new innovation that responds to academic and employer needs. Our current committee is made up of representatives from CSU, Boeing, and Northrop Grumman. Through our committee we are able to identify trends in Industry and higher education, and decide what would be best for our program and students moving forward. The feedback is invaluable to our program as the world of technology and the processes in use change much faster than in other academic disciplines.

Part 2: Future Direction**Direction and Vision****Direction and Vision Narrative**

All instructors in the program understand the challenges of the current political and economic environment, and have a clear idea of where we would like to head in the future. Many changes to the program will come by way of the advisory committee and the Engineering/CADD Industry recommendations. In order for our program to adapt and continue to be successful, we need to keep up with technological demands and adhere to the needs of local industry.

At present the data supplied to make decisions, is sufficient for our program. The advisory committee plays an important role in supplying the program Industry specific and academic information regarding any possible future changes in the department.

We see an increase in flexible course delivery including “online” and “as needed” text, information and presentation. We also see an increase in giving students flexibility to access this technology via smart devices and the “cloud”. Increase in an open lab environment would also be helpful. All of these changes will be brought on by increases in technology, demographics, and student expectations.

ECC as a whole will need to address these issues; make funding available for this type of learning environment; and reduce the time needed to “green light” new classes, methods, and technologies.

These instructional innovations would increase student access, thereby allowing more practice to solidify skills.

Recommendations

Justification for Prioritization

1. Upgrading equipment and software is an ongoing need. The CADD program must be able to consistently provide training using the proper tools that our advisory committee and industry recommends.

Priority:

This need is ongoing and will always be an issue with this program.

Cost:

Software - \$12-15 k / year

Hardware - Market Price

2. Hire additional part-time faculty to support the program as needed. An additional full-time faculty member is projected in the 1-2 year time-frame.

Priority:

This need is also ongoing but particularly urgent at this time due to the impending retirement of our senior full-time faculty member (leaving only one full-time instructor) and the increasing age of our few remaining part-timers.

Cost:

Full time - \$70-100 k / year

Part time - variable

3. Ongoing computer training for all instructors in the CADD program is necessary to keep up with industry. Also, as curriculum expands to cover new technology, faculty will need to develop curriculum in multiple formats to match industry demand. Additional formal training should be to compose and direct more courses online.

Priority

This, too, remains an ongoing need and has taken on a new urgency due to looming major changes to our software (CATIA V6 and possible inclusion of Solidworks

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| <p>courses in the program).</p> <p>Cost:</p> <p>Training - \$1500- \$2000/40hrs</p> <p>Course development - variable</p> <p>4. Open Technical Arts Building labs Monday - Friday 8am- 10pm, and employ student assistants to manage the labs.</p> <p>Status:</p> <p>This is still desirable. It would provide our students with much-needed opportunities for additional practice and skill building.</p> <p>Cost:</p> <p>Part time - variable</p> |
| No Recommendations |

| Attached Files |
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| CADD Course Review - 6 Year Cycle |
| ProgramAwardsSumm_CO |
| ECC Institutional Research |
| CADD - SLO 4 Year Time Line - 2012 |
| CADD - Electrical Drafters - EMSI |
| CADD Analyst Report EMSI |
| CADD - Mechanical Drafters - EMSI |
| CADD - Civil Drafters - EMSI |

* Attachments can be obtained from links in CurricUNET.