

El Camino Community College

PROGRAM REVIEW 2022-23

COMPUTER AIDED DESIGN & DRAFTING



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SECTION 1

Program Overview

A) Provide an abstract of what your program does, who you serve, your previous successes, and where your program is moving in the next four years. Highlight the most interesting, compelling aspects of your program – your recent achievements and needs.

The Computer Aided Design and Drafting (CADD) program at El Camino College provides students with occupational training for entering a broad range of relevant fields such as manufacturing, electronics, product design, architecture, automotive engineering, aeronautics, aerospace, naval engineering, civil disciplines, and many other industries and professions where mechanical design and drafting skills are essential and required.

The course offerings of the CADD program place a heavy emphasis on lab work, engaging students in hands-on experiences that incorporate individual and team-based project development and solutions alike. The program uses the current releases of AutoCAD (2D and 3D) applications, as well as parametric design and modeling tools such as Autodesk Inventor, SolidWorks, and CATIA software, which are considered industry-leading tools by a large number of manufacturing firms in the State of California, the U.S., and around the world.

By completing either degree or certificate courses of study, students gain proficiency in sketching, mechanical drawing, CAD fundamentals, modeling design processes, geometric dimensioning and tolerances (GD&T) skills, and three-dimensional design (3D).

To empower students' successful entry into the workplace, the program offers software operation know-how that fulfills essential workforce-strength qualifiers in various industries. Typically, industry needs in software use are defined by what a company does and what the scope of its projects and products are. For example, Solidworks is one of the most preferred and feasible software for facilitating the design and modeling of everyday objects, consumer products, gears, snaps, jigs, and fixtures. Solidworks comes with a wide range of intuitive rendering options for photo-realistic visualizations, fluid simulations, and electrical design solutions. The common and wide-range of use, affordability, and easy operation are qualities that designate the Solidworks software the "key preference" tool at many workplaces and real-world personal projects alike.

We accommodate our students' learning needs based on two types of academic objectives they may have. We serve:

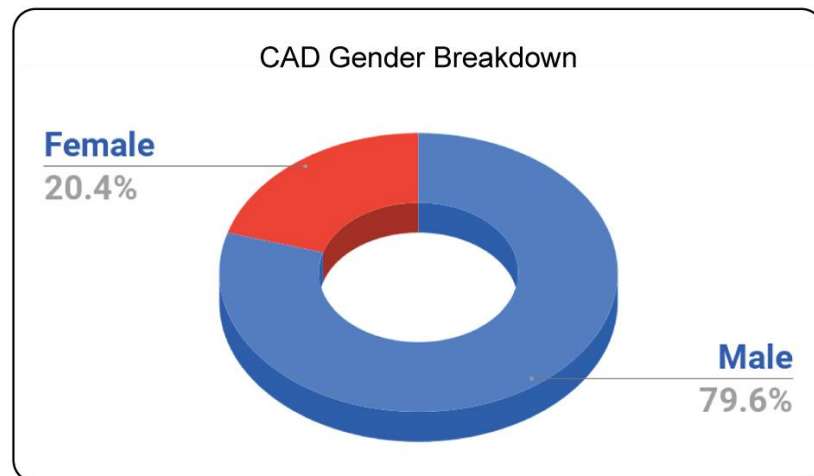
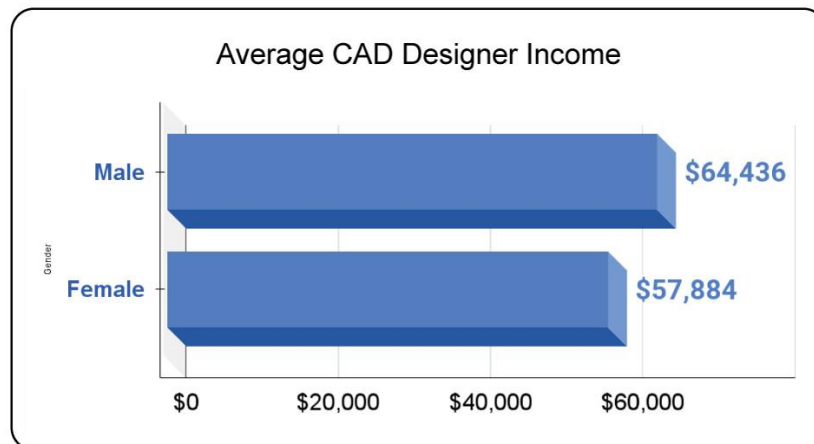
1. Traditional degree- or certificate-seeking students whether they intend to transfer to other academic institutions or not; and
2. Non-traditional, non-degree-seeking students that come to our college for a consistent upskilling in their industry. Their intention often is to learn new technologies and processes for recertification purposes.

Our approach to course offerings has been helpful in creating a diverse, spirited, and competitive student body that represents the best of our community. Our goal in the CADD department is to engage students in highly technological skills-building activities needed to unlock professionally, financially, and personally satisfying employment opportunities.

CADD Industry Labor Data

South Bay, a major region of Los Angeles County, is home to one of the largest manufacturing bases in Southern California. Part of a thriving economic engine, the various companies here are set to make a positive impact on the local economy by employing well-trained and highly-qualified technology personnel. The El Camino College CADD department and our industry partners work closely together to ensure that our students' education and job-preparedness are aligned with the ever-changing technological requirements of the workplace. Industry status data shows that...

- Over **55,888** computer aided design (CAD) professionals are currently employed in the United States.
- The global demand for computer aided design (CAD) professionals between 2022-2032 is projected to increase by **5.2%**.



B) Highlight your recent achievements and needs.

The CADD department at El Camino College is recognized as the “go-to” source for well-trained and highly-qualified technology personnel in fields of mechanical drafting and 3D modeling.

The CADD department effectively collaborates with the Machine Tool Technology, Architecture, Art, and Information Technology departments to engage students in shareable skill-building processes. To ensure student progress and success, we provide access to state-of-the-art software and hardware resources. This includes cutting-edge technologies such as 3D printing and rapid prototyping, enabling students to use advanced tools and techniques in tangible, industry-sensitive, and professionally dynamic ways.

One of the notable strengths of our CADD program lies in the exceptional expertise of our faculty members. We are proud to have a team of highly experienced instructors who bring a wealth of practical knowledge to the classroom. Many of our instructors have extensive work backgrounds with reputable organizations such as Hewlett-Packard, Boeing, Northrop Grumman, and The City of Los Angeles - Bureau of Engineering. Their direct industry experience ensures that students receive instruction that is current, relevant, and aligned with real-world practices. By leveraging the insights gained from these professional associations, our faculty members operate in regularly and consistently maintained labs equipped with software and hardware, with which to enhance their own skills and prepare students for success in their future careers.

Upon completion of the CADD program, students are prepared for entry-level positions as CADD technicians and are able to communicate and transform design instructions and specifications into complete and precise drawings using hand drawings, Computer Aided Drafting, and Parametric design. Graduates of the program have been successfully placed in areas of Machine Tools, Computerized Manufacturing & Machining, Architectural and Civil disciplines, and many have advanced to project management positions. Some notable local companies that have hired El Camino Students are: Honeywell Aerospace, Boeing, and Northrop Grumman.

C) Describe the degrees and/or certificates offered by the program. Consider addressing what makes your program unique to the college and region.

Our program offers students the opportunity to earn an *A.S. Degree in Computer Aided Design and Drafting*. Currently the CADD department offers students the opportunity to earn 3 degrees and certificates.

1. ASSOCIATE IN SCIENCE DEGREE

El Camino College Major Requirements: At least 50% of the major requirements for the Associate in Science Degree must be completed at El Camino College.

Required Courses:

Computer Aided Design/Drafting CADD-5, 7, 28, 31, 32, 33, 37, 43, 45

Choose One Course From:

- Electronics and Computer Hardware Technology 11, 22
- Machine Tool Technology 16, 46, 101
- Welding 15
- Art 141, 144
- Computer Information Systems 13

Total Units: 26.5-27.5

2. CERTIFICATE OF ACHIEVEMENT

At least 50% of the courses required for the Certificate of Achievement must be completed at El Camino College.

Required Courses:

Computer Aided Design/Drafting CADD-5, 7, 28, 31, 32, 33, 37, 43, 45

Choose One Course From:

- Electronics and Computer Hardware Technology 11, 22
- Machine Tool Technology 16, 46, 101
- Welding 15
- Art 141, 144
- Computer Information Systems 13

Total Units: 26.5-27.5

3. CERTIFICATE OF ACCOMPLISHMENT**AutoCAD Mechanical Drafting Trainee:****Required Courses:**

Computer Aided Design/Drafting CADD-5, 7

Total Units: 6

D) Explain how the program fulfills the college's mission. Address the work your program is doing to help the college fulfill its stated mission.

The mission of El Camino College is to make a positive difference in people's lives by providing comprehensive educational programs and services that promote student learning and success in collaboration with our diverse communities.

The faculty of CADD is dedicated to preparing our students to enter the workforce with the skills and professional portfolio needed to obtain meaningful employment in entry-level computer aided design positions at a variety of local and nationwide technology companies.

Especially in aerospace, automotive, and product design, the local economy relies heavily on technology. The CADD faculty's ability to have a pulse on the industry is both a significant feature and the consistent goal of our program. Our faculty members are professionals who impart valuable industry experiences to students, offering firsthand insights into the specific qualities and skills that employers seek in candidates. Additionally, our teaching body possesses a deep and often nuanced understanding of the evolving software requirements within the field of computer-aided design.

We, the instructors at the CADD department, share the belief that our curriculum must reflect the current needs of employers at all times. Since the relevant software in the industry constantly and rapidly changes, our challenge is to keep up with and even to get ahead of the curve by being consistent in adjusting our program offerings according to technological improvements.

After successfully completing our program, students are equipped to enter the thriving technology industry that prevails in the Los Angeles region. With our faculty members' astute understanding of industry trends, students receive valuable support and guidance in their job search and career placement pursuits. We consider these necessary services to students among the great responsibilities of our department.

E) Discuss the status of recommendations from your previous program review. In the "Notes/Comments" section, please discuss the known impact of a completed recommendation or the rationale for recommendations that are on active, on hold, and/or abandoned.

If more than ten recommendations were presented in the previous program review, expand the enumerated list below as needed.

1. **Recommendation:** The previous program review recommended hiring a full-time faculty member to replace retired Professor Richard Hughes.
Status: Completed
Notes/Comments: Vince Phamdo was hired in August 2022 as the new lead for the CADD department. His first semester teaching at El Camino commenced in the Fall 2022 Semester.

2. **Recommendation:** The previous program review recommended upgrading software and equipment on an ongoing basis as needed. The CADD department must be able to consistently provide training using the proper tools that our advisory committee and industry recommends.

Status: Active and On-Going

Notes/Comments: This recommendation is ongoing and active to provide fresh and current tools for continued education that the CADD industry requires. The computer software industry is highly competitive. New features are added by companies on a daily basis while old ones are retired. In addition, entirely new computer applications are introduced at an accelerating rate.

Our computing hardware and dedicated instructors must be fully prepared at all times to confront these evolving changes. While we do not currently offer instruction on Autodesk: FUSION 360 at El Camino College, we recognize its growing significance in the industry. It is worth noting that this software has been gaining traction and, its market share exceeded last year that of Solidworks, which is considered the leading CADD program. We remain committed to staying abreast of emerging technologies and will consider including Autodesk: FUSION 360 in our course offerings in the future to meet the demands of the evolving professional landscape.

3. **Recommendation:** 1) Open ITEC CADD labs Monday - Friday 8am-10pm.
2) Employ student assistants and tutors to manage the labs.

Status: Active and On-Going

Notes/Comments: Meeting this recommendation poses significant challenges due to scheduling conflicts arising from overlapping requests for reserved, assigned, and spontaneous use of the CADD department labs.

The basement of the ITEC building houses shared CADD rooms, utilized by multiple departments including CADD, Arts, Electronics, Machine Tooling, Manufacturing Technology, and others. Numerous students from various majors, including CADD, rely on using campus computers every day to fulfill their coursework requirements. Some of these needs can't be met outside the CADD department, but some can. This is where we see a key to the solution.

The CADD rooms stand apart from other labs on campus as they are equipped with advanced computers capable of running specialized applications. However, an issue arises wherein CADD-running computers are used by classes/students that don't require access to them for their coursework of other nature. (For example, writing a term paper with a WORD app does not require occupying a CADD computer.)

Meanwhile, CADD students that need to use CADD software are restricted to using CADD department computers. But they can't use them if they are not available. The substantial demands and interests expressed by other departments and individual students significantly limit the opportunities for CADD students to engage in essential practice outside of their scheduled class time.

In light of this challenge, our forthcoming recommendation will seek a more comprehensive consideration of making all campus computers available for students based on whether they must have access to CADD software or not. Naturally, we aim to serve every El Camino student's computer needs effectively while at the same time, we also aim to secure dedicated lab spaces, lab assistants, and tutors exclusively for CADD students. By achieving a smarter use of the CADD labs, it will be far more feasible to establish an open lab environment that caters specifically to the needs of CADD students while contributing to meeting the need-specific computer usage of all students.

SECTION 2

Program Assessment

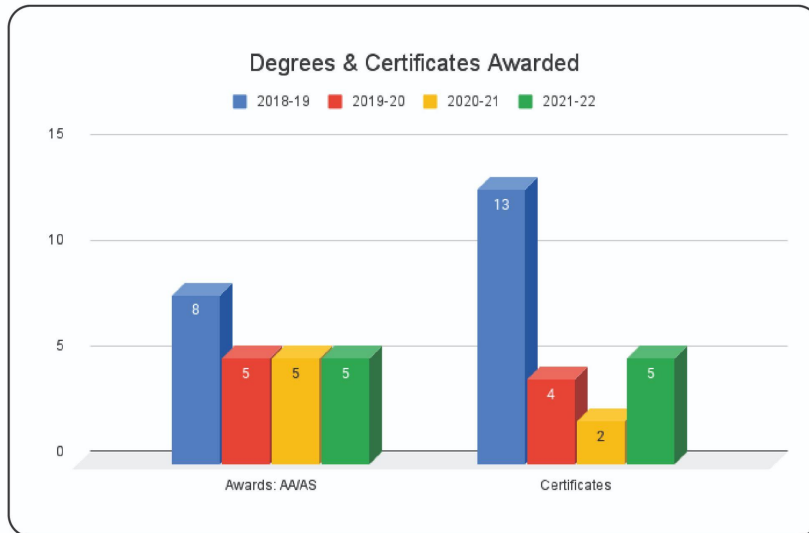
Program Contribution to Student Success and Equity

For the program under review, examine the following data for the last four years by:

- o Disaggregating by race/ethnicity, gender, and age where possible.**
 - o Discussing internal and external factors contributing to constant, increasing or decreasing trends.**
 - o Discussing any known barriers to student success in your program.**
 - o Highlighting equity gaps found among different groups of students.**
 - o Presenting and discussing possible action plans about what could be done to address equity and achievement/opportunity gaps.**
- ❖ *If the program under review is a Career Education Program, please examine a) through k) from the list below.*
- ❖ *If students taking courses from the program under review end with a degree or certificate issued by the program, please examine a) through h) from the list below.*
- ❖ *If students taking courses from the program under review do not end with a degree or certificate issued by the program, please examine d) through g) from the list below.*

a) Degree Completion: Number/percent of students earning a program degree

The decrease in degree earnings observed during 2019-2020 is likely a result of the COVID-19 pandemic, which led to a substantial decline in overall student enrollment on campus. However, it is anticipated that students who were unable to attend college at all during that period will return in the upcoming semesters. With the availability of all courses on-campus in-person now, we predict that the rise in student enrollment will positively impact degree completion rates. This trend is expected to persist in the future, as we have observed similar patterns in other departments.



	2018-19	2019-20	2020-21	2021-22
Awards: AA/AS	8	5	5	5
Certificates	13	4	2	5
Average Units Earned (AS/AS)	100	61	69	58
Average Units Earned (Cert)	73	100	61	58
Average GPA (AA/AS)	2.9	3.17	2.57	3.44
Average GPA (Cert)	2.89	3.23	2.7	3.41

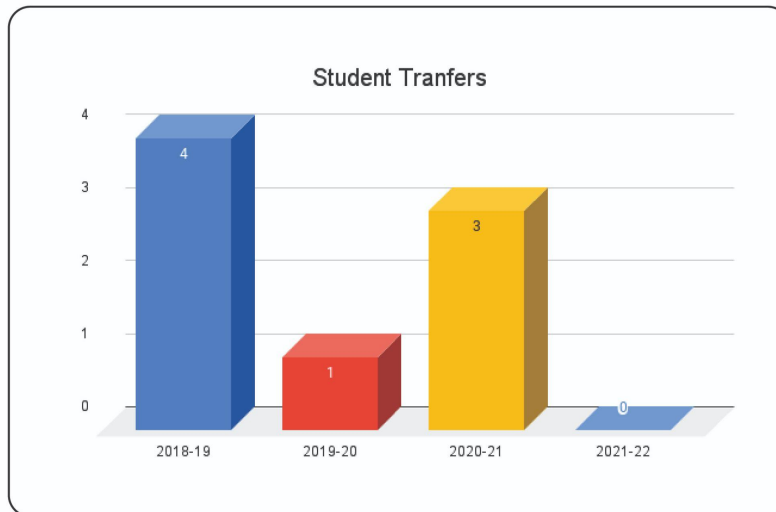
b) Certificate Completion: Number/percent of students earning a program certificate

Please refer to the chart above in Section a).

The decrease in certificate earnings observed during 2019-2020 is highly likely to be a result of the COVID-19 pandemic, which led to a significant decline in overall student enrollment on campus. However, it is anticipated that students who were unable to attend college during that

period will return in the upcoming semesters, with a notable increase in the Fall of 2022. As all courses are now offered in-person, we predict that the positive trend of increasing student enrollment and certificate program enrollments will continue.

c) Transfer to a four-year institution: Number/percent of students transferring to a four-year institution



	2018-19	2019-20	2020-21	2021-22
Student Transfers	4	1	3	0

From the CADD department, the majority of students tend to choose to transfer to the California State University - Dominguez Hills. This makes sense regarding the chosen location because that school is only seven miles from El Camino College. Other transfer destinations include Cal State Pomona, CSU - Fullerton, CSU - Long Beach, and CSU - Los Angeles.

In 2020-2021, three of our students transferred to universities, but there were zero transfers in the following school year, in 2021-2022. With the up-trend of enrollments, we anticipate a higher number of transfers in the future.

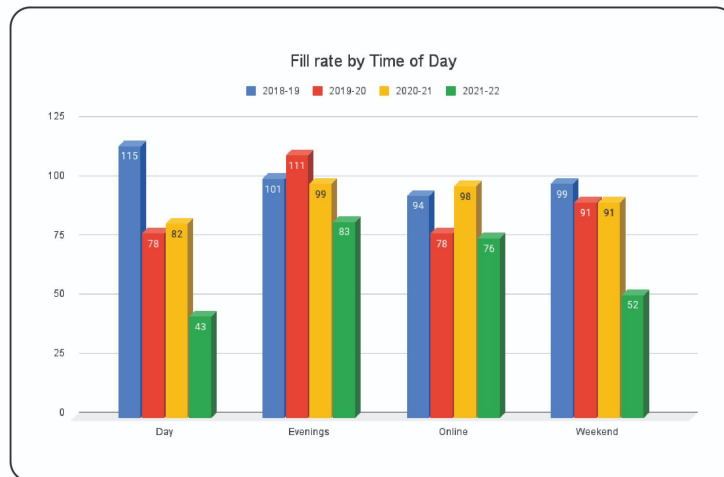
The faculty of the CADD department was fortunate to have been in a relatively advantageous position to provide online courses to students compared to instructors from other departments during the pandemic. Given our focus on teaching primarily computer software programs, the transition to online course delivery came naturally for our faculty, albeit still presenting some challenges during the unprecedented time.

d) Scheduling of courses: Percentage of students enrolled in day/evening courses, on campus/online/hybrid courses, days of the week

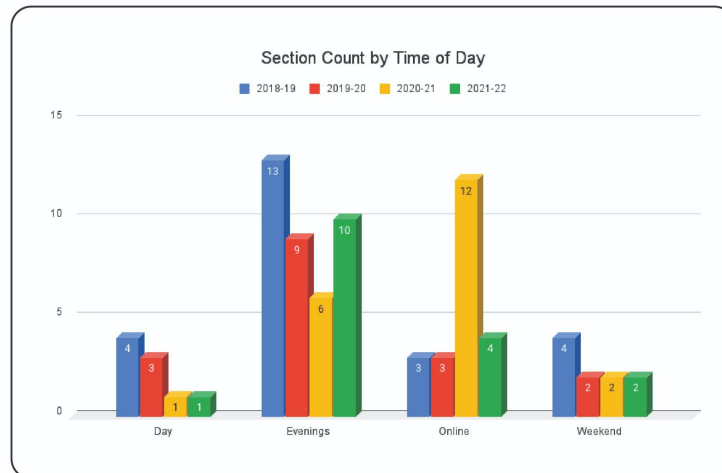
The CADD department maintains a tradition of serving students that have full-time jobs, many of whom already work in CADD-related fields. They return to college to complete additional training, refresh their skills, or gain access to higher-paying jobs. To ensure that full-time working students can earn a degree in CADD, our department offers multiple course scheduling options. We offer day and evening courses for such popular courses as CADD-5, 7, and 28. To better serve full-time-employed students, we currently offer senior courses in the evenings.

According to recent data, there has been a decline in daytime enrollment. One reason for this might be that the department lacked a full-time faculty member available to teach during the day. Following the retirement of Professor Douglas Glenn, the majority of courses have been offered in the evenings, due to the busy schedules of the adjunct faculty.

With the recent hiring of a new full-time faculty lead, Vince Phamdo, the CADD department is able to offer more courses during the day. Based on this broadening range of available courses, we anticipate an increase in daytime enrollment.



	2018-19	2019-20	2020-21	2021-22
Day	115	78	82	43
Evenings	101	111	99	83
Online	94	78	98	76
Weekend	99	91	91	52

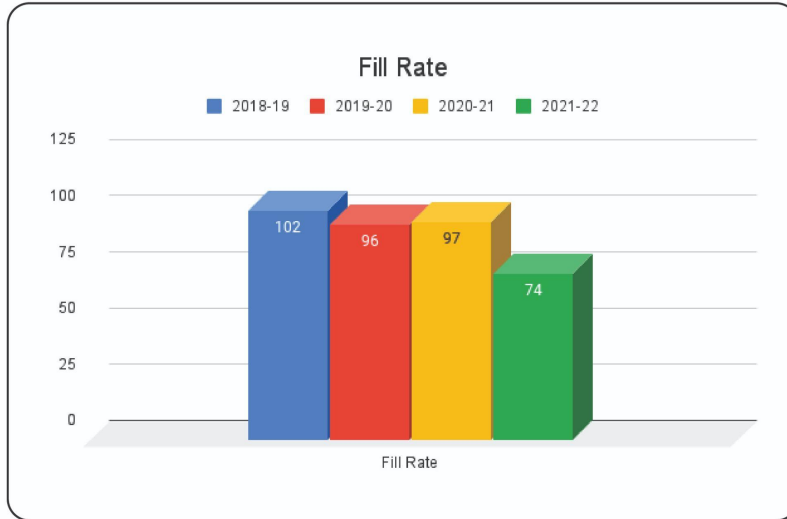


	2018-19	2019-20	2020-21	2021-22
Day	4	3	1	1
Evenings	13	9	6	10
Online	3	3	12	4
Weekend	4	2	2	2

e) Fill rate: Percentage of actual students enrolled in a term in relation to total seats offered

Based on the available data, it is evident that course fill rates have experienced a decline since 2019. This decline can be attributed to the substantial impact of COVID-19 on education delivery modalities and student enrollment. The implementation of travel restrictions, lockdown measures, and social distancing protocols disrupted normal operations, including our established enrollment process. The transition from traditional education to online learning presented challenges for many students, and some may have chosen to defer their pursuit of formal education and explore alternative options.

Additionally, fill rates can also be influenced by economic factors. The prevailing economic challenges, such as job market instability and financial constraints, may have discouraged potential students from pursuing higher education during this period. The uncertainties surrounding the economic landscape may have led individuals to prioritize immediate financial needs over educational pursuits, contributing to the observed decrease in fill rates.



	2018-19	2019-20	2020-21	2021-22
Fill Rate	102	96	97	74

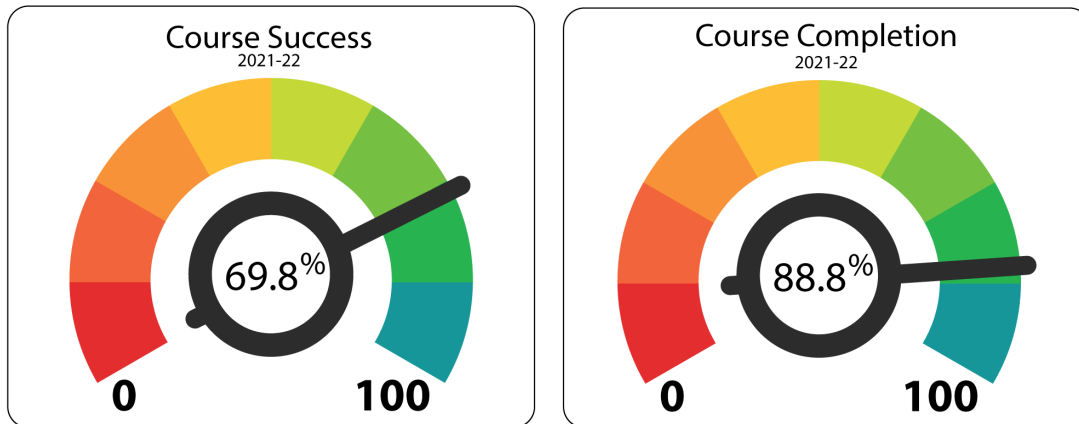
f) *Grade Distribution:* Percentage of students in a course receiving each of the possible grades that can be awarded

Over the years, CADD has maintained a consistent distribution of grades. We achieved 75% success in 2018, 75% in 2019, 72% in 2020, 72% in 2021, and 74% in 2022.

For the academic year of 2019-2020, El Camino College has an Institutional-Set Standard of 65% and an Institutional Effectiveness Outcome goal of 74%. Although we currently meet the school's minimal goals, we would like to aim higher. This topic is addressed in the **Vision and Planning** section of this program review.

Grade Distribution

	Course	Term	Instructional Method	A	B	C	D	F	W	Total	Course Success	Course Completion
2018	CADD-28	2018/FA	On Campus	16	3	1	0	2	2	24	83.30%	91.70%
	CADD-31	2018/FA	On Campus	26	3	2	0	0	5	36	86.10%	86.10%
	CADD-31	2018/FA	Online	4	0	0	0	3	11	18	22.20%	38.90%
	CADD-32	2018/FA	On Campus	18	1	1	0	5	1	26	76.90%	96.20%
	CADD-33	2018/FA	On Campus	20	2	0	0	0	1	23	95.70%	95.70%
	CADD-37	2018/FA	On Campus	12	1	1	0	1	1	16	87.50%	93.80%
	CADD-45	2018/FA	On Campus	11	7	5	0	3	3	29	79.30%	89.70%
	CADD-5	2018/FA	On Campus	18	9	3	4	6	10	50	60.00%	80.00%
	CADD-7	2018/FA	On Campus	18	0	0	1	1	0	20	90.00%	100.00%
	CADD-7	2018/FA	Online	10	4	2	0	5	3	24	66.70%	87.50%
CADD-5	2018/SU	On Campus	19	0	0	0	2	2	23	82.60%	91.30%	
										75.48%	86.45%	
2019	CADD-28	2019/FA	On Campus	18	3	3	0	3	1	28	85.70%	96.40%
	CADD-31	2019/FA	On Campus	27	2	0	0	3	6	38	76.30%	84.20%
	CADD-31	2019/FA	Online	4	1	1	0	2	10	18	33.30%	44.40%
	CADD-32	2019/FA	On Campus	11	1	0	0	7	1	20	60.00%	95.00%
	CADD-33	2019/FA	On Campus	24	4	1	0	0	4	33	87.90%	87.90%
	CADD-37	2019/FA	On Campus	19	0	0	0	2	1	22	86.40%	95.50%
	CADD-45	2019/FA	On Campus	6	2	3	1	5	6	23	47.80%	73.90%
	CADD-5	2019/FA	On Campus	27	13	9	2	5	5	61	80.30%	91.80%
	CADD-7	2019/FA	On Campus	16	3	2	0	1	1	23	91.30%	95.70%
	CADD-7	2019/FA	Online	5	3	1	0	4	7	20	45.00%	65.00%
	CADD-28	2019/SP	On Campus	16	3	1	0	0	0	20	100.00%	100.00%
	CADD-31	2019/SP	On Campus	32	1	0	0	2	10	45	73.30%	77.80%
	CADD-31	2019/SP	Online	8	3	0	0	4	6	21	52.40%	71.40%
	CADD-32	2019/SP	On Campus	20	2	0	0	1	2	25	88.00%	92.00%
	CADD-37	2019/SP	On Campus	15	1	2	0	0	0	18	100.00%	100.00%
CADD-43	2019/SP	On Campus	6	14	2	0	1	3	26	84.60%	88.50%	
CADD-5	2019/SP	On Campus	25	12	3	0	9	3	52	76.90%	94.20%	
CADD-7	2019/SP	On Campus	34	3	1	2	1	2	43	88.40%	95.30%	
										75.42%	86.06%	
2020	CADD-28	2020/FA	Online	7	0	0	0	1	4	12	58.30%	66.70%
	CADD-31	2020/FA	Online	19	4	2	0	7	10	42	59.50%	76.20%
	CADD-32	2020/FA	On Campus	5	1	0	0	0	4	10	60.00%	60.00%
	CADD-5	2020/FA	Online	6	1	1	0	0	7	15	53.30%	53.30%
	CADD-45	2020/FA	Online	10	5	2	0	4	4	25	68.00%	84.00%
	CADD-7	2020/FA	Online	18	2	2	2	0	7	31	71.00%	77.40%
	CADD-28	2020/SP	On Campus	3	9	0	0	0	1	13	92.30%	92.30%
	CADD-43	2020/SP	On Campus	15	1	2	0	0	0	18	100.00%	100.00%
	CADD-7	2020/SP	On Campus	6	8	0	0	0	0	14	100.00%	100.00%
	CADD-5	2020/SU	Online	12	1	0	0	5	5	23	56.50%	78.30%
										71.89%	78.82%	
2021	CADD-31	2021/FA	Online	8	4	1	0	4	1	18	72.20%	94.40%
	CADD-28	2021/FA	On Campus	9	0	0	0	2	0	11	81.80%	100.00%
	CADD-32	2021/FA	On Campus	4	1	1	0	3	1	10	60.00%	90.00%
	CADD-33	2021/FA	On Campus	7	1	1	1	1	0	11	81.80%	100.00%
	CADD-37	2021/FA	On Campus	4	1	1	1	2	2	11	54.50%	81.80%
	CADD-45	2021/FA	On Campus	4	4	2	0	5	3	18	55.60%	83.30%
	CADD-5	2021/FA	On Campus	7	1	0	0	8	1	17	47.10%	94.10%
	CADD-7	2021/FA	On Campus	9	0	0	0	1	1	11	81.80%	90.90%
	CADD-7	2021/FA	Online	13	2	2	0	1	6	24	70.80%	75.00%
	CADD-28	2021/SP	On Campus	13	0	0	0	0	0	13	100.00%	100.00%
	CADD-31	2021/SP	Online	12	4	4	0	12	7	39	51.30%	82.10%
	CADD-32	2021/SP	Online	11	4	0	1	3	1	20	75.00%	95.00%
	CADD-37	2021/SP	On Campus	6	1	0	0	0	1	8	87.50%	87.50%
	CADD-43	2021/SP	Online	12	3	1	1	2	4	23	69.60%	82.60%
	CADD-5	2021/SP	On Campus	8	1	1	0	0	2	12	83.30%	83.30%
CADD-7	2021/SP	On Campus	15	0	0	0	1	0	16	93.80%	100.00%	
CADD-5	2021/SU	On Campus	8	0	0	0	3	4	15	53.30%	73.30%	
										71.73%	89.02%	
2022	CADD-7	2022/SP	Online	8	2	0	0	5	1	16	62.50%	93.80%
	CADD-28	2022/SP	On Campus	12	2	2	0	0	0	16	100.00%	100.00%
	CADD-31	2022/SP	On Campus	4	1	1	0	1	0	7	85.70%	100.00%
	CADD-31	2022/SP	Online	2	3	1	0	3	2	11	54.50%	81.80%
	CADD-32	2022/SP	On Campus	4	0	0	0	3	1	8	50.00%	87.50%
	CADD-43	2022/SP	On Campus	8	5	0	1	0	2	16	81.30%	87.50%
	CADD-5	2022/SP	On Campus	15	3	1	0	1	2	22	86.40%	90.90%
										74.34%	91.64%	
			Total	789	176	72	17	156	191	1401	Avg: 73.76%	Avg: 86.32%
			Percentage	56%	13%	5%	1%	11%	14%			



g) Course Success: Percentage of students enrolled at census who complete the course with a grade of A, B, C, or P

Please refer to the previous chart in Section f).

The percentage of A grades earned is a positive indicator that we are meeting our program's Student Learning Outcomes. Most of our students earn letter grades of A and B. Across four years of data, 56% of enrolled students earned letter grade A and 13% earned letter grade B. In addition, 74% of enrolled students earn a passing grade.

h) Unit Accumulation: Number of units accumulated by students working towards a program degree/certificate. Discuss whether students who take units beyond the requirements for their educational goals serve educational purposes or not. Focus on general trends, not on particular courses within the program.

Based on the data provided below, it is evident that students are currently accumulating fewer units compared to previous trends. Their focus appears to be primarily on fulfilling degree or certificate requirements without pursuing additional coursework. Students face multifaceted challenges in balancing their limited time and available resources.

The decision to pursue additional units beyond one's primary educational goals is influenced by several factors, including personal aspirations, topics of interest, financial circumstances, career objectives, and whether the acquired knowledge needs to be certified by an accredited institution or not.

In terms of time constraints, taking on extra units adds to the workload, increasing responsibilities and potentially elevating stress levels. Additionally, juggling numerous additional units may hinder students' ability to develop specialized knowledge in their chosen field. This sense of having only superficial knowledge or mere cursory ideas in certain areas could be discouraging, especially in uncertain socio-financial times.

Moreover, the financial aspect plays a significant role in the decline of unit accumulation. Pursuing additional units incurs additional educational costs, including tuition fees, textbooks, and related expenses. Limited access to financial aid or scholarships can pose challenges for students who wish to undertake additional units due to financial constraints.

These various factors collectively contribute to the observed decrease in unit accumulation among students, emphasizing the importance of understanding the multifaceted considerations that shape students' academic decisions.

	2018-19	2019-20	2020-21	2021-22
Awards: AA/AS	8	5	5	5
Certificates	13	4	2	5
Average Units Earned (AS/AS)	100	61	69	58
Average Units Earned (Cert)	73	100	61	58
Average GPA (AA/AS)	2.9	3.17	2.57	3.44
Average GPA (Cert)	2.89	3.23	2.7	3.41

i) Annual earnings: Median annual income of alumni who attended the program under review (or the closest related sector)

In the current job market, CAD designers earn an average annual salary of \$52,268 at \$25.13 per hour. A starting salary of \$41,500 is typical for entry-level designers. The average salary for senior designers is \$72,500 per year for comparison. An alumni's potential salary range depends on various factors, including skill level, professional experience, portfolio quality, and job location.

j) Living Wage Attainment: Percent of alumni who attended the program under review (or the closest related sector) and earn living wages

Presently, the CADD department lacks a comprehensive tracking system to collect and analyze the attainment of a living wage by its alumni.

k) Job in Field of Study: Percent of alumni who pursued a career education path with a job related to their field of study.

Assessing this metric seems to be a challenge. The department does not have a robust tracking system sophisticated enough to effectively monitor the many careers our alumni may pursue. Every year, more companies turn to the use of professional software programs that we teach. Consequently, tracking related professions our students may enter in the future will remain challenging.

Program Success and Equity Analysis:

Gender

The most recent data on gender percentages is available for the academic year 2021-2022. There were approximately 27% female students and 73% male students enrolled. The percentage of female enrollment has increased from 20% since the last conducted program review. Our current percentage is very close to what is reflected in the industry at large. Women make up 25.8% of computer-aided drafters in the U.S. while men make up 74.2%. In comparison with other majors at ECC, we have a higher percentage of men enrolled. However, female enrollment is on the rise in our department. This upward trend is likely due to factors such as increased marketing to female students and better outreach conducted by high school counselors.

Enrollment by Ethnicity

Demographics in the CADD department are very similar to those of El Camino's general student population. In total, 55% of enrolled students are Hispanic, 11.7% Asian, 12.5% White, 8.9% African American, and 7.7% fall into other categories. Furthermore, the data shows consistency that matches the local areas that ECC serves. In 2020, the most common ethnicity of computer aided designers have been White (66.5%), followed by Hispanic (17.7%), Asian (7.9%) and Zimbabwean (5.8%).

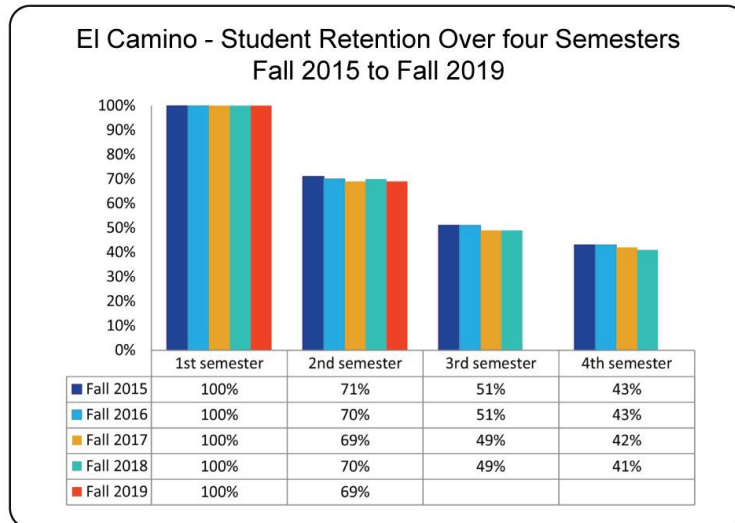
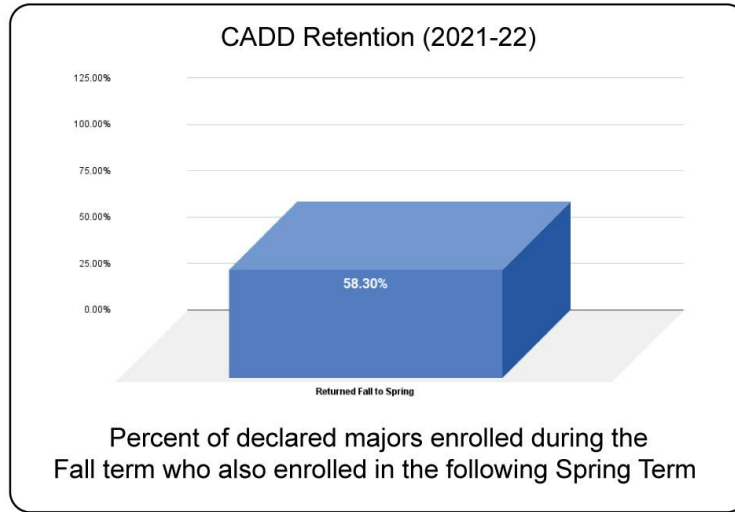
Enrollment by Age/Age Group

Among students enrolled in our program, 43.5% are between ages of 20 and 24. The next largest demographic, 25.4% of students is between ages 25 and 29. As the demand for digital designers increases, more students are enrolling in 3D modeling programs. Students exposed to computers and technology at an early age are picking up on this trend. Increasingly, professionals are considering careers that allow remote work, which opens up more job opportunities.

Academic Level

72% of CADD students have graduated from high school and 29% have graduated from college. A third of all students enrolled have had college educations. This trend is indicating that there is a growing number of students who are returning to school to further their education. Current industry trends are characterized by the retirement of obsolete software and the replacement of it with newer programs. More and more employees are returning to school, so they can refresh their skills, keep up with the latest technology, and become more desirable candidates for jobs.

Retention Rate



In 2021-2022, the retention rate was 58%. The CADD retention rate in this time period is about the same as El Camino's overall average.

Several factors can influence the retention rate of CADD courses, including changes in teaching methods and advancements in software. The COVID-19 pandemic has significantly elevated the prominence of online learning and expedited the integration of online and hybrid courses within higher education. However, in order for students to thrive in online learning environments, the flexibility and accessibility offered by online courses must be met with sustained interest in a subject matter, self-discipline and self-motivation.

To uphold high retention rates, faculty members play a crucial role, not only by monitoring student progress but also by providing consistent engagement support and intervention. This involves actively engaging with students, offering assistance and guidance, and implementing effective strategies to promote student success throughout the course. By fostering a supportive

and interactive learning environment, faculty can contribute to the overall retention and achievement of students in CADD courses.

Recent advancements in CAD software have greatly enhanced its user-friendliness and intuitiveness through features like drag-and-drop interfaces and automation. These improvements have a positive impact on students' ability to learn and utilize the software effectively, ultimately leading to a higher retention rate. As software trends constantly evolve, it is imperative for instructors to remain up-to-date and ensure that their courses incorporate accessible software options. By staying abreast of these trends and providing students with the necessary tools and resources, instructors can foster an optimal learning experience that aligns with the current software landscape.

Barriers and Equity Gaps:

Student success and equity are both impacted by several barriers in the CADD department.

Access to technology is by far the biggest barrier. Lack of access to technology and hardware can prevent students from completing assignments and gaining hands-on experience with CAD software. Many students cannot afford to purchase CAD software, hardware, or training, all of which are creating equity issues.

It is possible that students enter their college courses without having adequate prior training and experience in fundamental computer and software use know-how such as launching a computer program, creating new files, and saving work files. This creates confusion, intimidation, and frustration, hindering their success in the program.

Student Digital Divide: Lack of reliable internet access, computer access, or necessary software for CADD programs can be a major barrier to success.

Learning Disabilities: Students with learning disabilities may struggle to keep up with the pace of the class or have difficulty navigating the software, which can lead to lower success rates.

It is important to note that the existence of racial, gender, and a lack of socioeconomic diversity in college classes likely affect students' success and sense of belonging.

In order to address these barriers and improve student success and equity, our department can provide affordable technology, comprehensive training and support, create a welcoming and inclusive environment, and partner with community organizations to bridge the digital divide.

Solutions and Action Plans:

The following action plans are to address equity and achievement/opportunity gaps in the CADD department:

Provide Classroom Computers and Equipment: Make sure that all students have equal access to technology and hardware in the form of computer stations: computers and software.

Increase On-Campus Resources: El Camino College already has a laptop loaning program where students in need can acquire college-property laptops for a semester. Unfortunately, the available laptops are gone on the first day of the semester, leaving many students without this opportunity. To remedy the situation, the CADD department is actively working on preparing a Perkins loan application. Upon approval and the subsequent granting of the loan, with the authorization by the Dean, we intend to allocate these funds towards the procurement of high-performance laptops. These laptops will be made available to CADD students to borrow, ensuring that they have access to the necessary technology required for their coursework.

Professional Development and Support: Develop and provide professional development and support for faculty to improve the quality of instruction and increase equity, including culturally responsive teaching practices.

Diversify Curriculum: Diversify the curriculum to include a range of perspectives and experiences, and to ensure that all students have the opportunity to see themselves reflected in the course material. El Camino College could benefit from a new course that highlights the history of minorities in engineering and computer-aided design. It could explore the experiences, contributions, and challenges faced by underrepresented minorities in engineering and computer-aided design.

Diversify Student Support Services: Assist students in overcoming challenges and achieving their full potential by providing a broad range of tutoring, mentoring, and counseling services. Currently, we offer these services, but we can always improve accessibility locations and hours.

The library offers one CADD-dedicated tutor. Presently, the working hours of this tutor are limited to approximately 5-8 hours per week. However, efforts are underway to expand the tutor's weekly availability and potentially add another student tutor to further support CADD students' needs. These initiatives aim to enhance the availability of tutoring services and provide additional assistance to students in the CADD program.

Increase Partnerships with Industry: Develop partnerships with industry professionals to provide students with real-world job experiences, work-based learning, and community opportunities to apply their skills. Currently, we are working on two internship opportunities for students: One with NASA and one with Northrop Grumman. In addition, our department is actively seeking partnerships with manufacturing companies in the Torrance area.

Broaden the opportunities for individual and collective Hands-on Experiences in the

Classroom: Offer hands-on learning of CAD software and technology, including project-based learning, workshops, and lab time. These are to give students the opportunity to develop actionable skills, professionalism, performance confidence, and exposure to real-world-like practice.

Curriculum and Outcomes Assessment

a) Examine the program curriculum using an equity lens by responding to the following questions: To what extent does the curriculum:

o Prepare students to actively engage in a diverse society?

Each year, CAD-using companies become more racially diverse regarding the composition of their workforce. This change is very similar in the college classrooms as well. Our classroom atmosphere and diverse student body prepare students for the real world workplace.

Computer-aided design careers expand into many industries, and companies that traditionally were not digitally savvy start to develop their computer modeling strength. For example the Fashion industry now utilizes 3D modeling software and expertise for concept design and manufacturing both in creating branded display environments and actual clothing.

It is important to expose students to different team structures. Oftentimes in industry, CADD designers are working with a broad range of specialists such as CNC operators, product designers, manufacturers, and even marketing team. Students will encounter different leadership styles and work with people from different cultural backgrounds.

To foster collaboration among diverse teams, our plan involves establishing partnerships with other ITEC departments. Several departments, including architecture and machine tooling, share common subject areas with computer-aided design and heavily rely on computer programs within their disciplines. With this in mind, our objective is to develop inter-departmental projects and assignments that promote deep and meaningful collaboration among students from various fields and areas of expertise. Through these initiatives, we aim to provide opportunities for interdisciplinary learning and engagement, encouraging students to work together and leverage their diverse skill sets for mutual growth and success. We are already working on a joint 3D printing project with the Architecture Department.

o Include multicultural content?

Including multicultural content in any college course can help students develop a deeper understanding and appreciation of diverse perspectives and experiences. At the moment, this is an area where we can make a lot of improvements. A primary objective of the program is for students to learn how to use professional modeling programs, both 2D and 3D. In our current curriculum, multicultural content is neither explicitly nor implicitly included. Here are a few

things that does exist and some others that could use some much needed attention and development:

1. Our courses are not reading focused, but even so, we may incorporate diverse readings and materials: Include readings, textbooks, and other course materials that showcase the experiences and contributions of people from different cultures and backgrounds. In spite of the CADD focus, this can include literature, history, social science, and more.
2. Invite guest speakers: Inviting guest speakers from diverse backgrounds and industries to speak to the class about their CADD experiences and perspectives tend to inspire students to do better and achieve more. Guest sessions can include people from different racial, ethnic, religious, or national backgrounds.
3. Introduce students to case studies: Incorporating case studies into lectures and demonstrations can showcase the experiences of people from different cultures and backgrounds. This can help students better understand how cultural factors can shape people's experiences and perspectives.
4. Encourage discussions: Creating a classroom environment where students feel comfortable discussing topics related to multiculturalism seems to be helpful component of any curriculum. Encouraging respectful dialogue and debate, and providing opportunities for students to share their own experiences and perspectives would help to create more inclusive classroom environments.
5. Emphasize global perspectives: Incorporating a global perspective into the course content would give students the opportunity to locate themselves in local and global professional fields alike. This can include examining global issues such as immigration, climate change, and human rights.
6. Explore cultural differences: Providing opportunities for students to explore cultural differences in a respectful and non-judgmental way would support the development of multiculturalism. This can include examining different communication styles, customs, and traditions.
7. Research and showcase examples of multicultural designs from different cultures and time periods. Design examples can include graphic design, architecture, and fashion design.
8. Explore and teach the different design principles that are unique to different cultures, such as color meanings, icons, or symbols.
9. Assign multicultural design challenges that require students to incorporate cultural elements into their designs. They could, for example, design a product that incorporates elements of both contemporary and traditional Hispanic cultures.

By incorporating some of these approaches in some forms into our students' CADD studies would provide students with a more comprehensive understanding of diverse perspectives and experiences.

o Respond to diverse students' learning needs?

While today we no longer equate "diverse student needs" with the debunked concept of "learning styles," it is still important for educators to identify and respond to their students' diverse learning needs. Diverse students may have diverse learning needs based on cultural differences, different levels of prior knowledge, different paces of learning, emotional and mental health conditions, various attention spans and abilities to focus, different access to technology and transportation, different access to resources, different abilities to develop personal time management and learning strategies. Cultural differences: Students from different cultural backgrounds may have different expectations and norms for learning, and may require adjustments to the instructional approach to accommodate their needs.

1. Different levels of prior knowledge: Students may come to a course with different levels of prior knowledge and understanding, and may require additional support, tutoring, or challenge to meet their individual needs.
2. Different paces of learning: Students may learn at different rates and may require additional support or extended time to accommodate their pace of learning.
3. Emotional and mental health needs: Students may be experiencing emotional or mental health challenges that impact their ability to learn, and may require additional support or accommodations to access the curriculum.
4. Attention and focus: Students may have different levels of attention span and focus, and may require strategies such as frequent breaks or alternate activities to maintain engagement in learning.
5. Access to technology and resources: Students may have varying levels of access to technology and resources, and may require support in order to participate in online learning activities or access course materials.
6. Learning strategies: Students may have no learning strategies or require assistance with developing more effective learning strategies than what they are used to.

It is important for educators to recognize and respond to the diverse learning needs of their students in order to create an inclusive and supportive learning environment. This can be achieved by using a variety of instructional and presentation methods, materials, and technologies that cater to different levels of student preparedness, financial circumstances, and cognitive abilities.

Learning and cognition are multifaceted processes that involve many factors, including motivation, attention, memory, and metacognition. All of these in themselves can use cultivation, and instructors can support students in all these areas by modulating and diversifying their methods of content delivery. For example, a daily lesson may be built from

motivational examples along with opportunities to engage students in collectively performed repetitive tasks that ultimately add up to essential professional performance that must be committed to memory. The emphasis this way is not on dreadful memorization, but on the collective spirit.

We encounter a variety of learning needs in our classes since El Camino College is so culturally diverse. Some students learn better in an actual classroom where the instructor is directly accessible. Next to teaching in person, we also teach Online. Interestingly, students' learning needs and engagement levels appear to be similar when the instructors are available. Once a student managed to align with the technical requirements of an Online course, offering motivational and engaging content becomes essential.

Engaging with the courses fully is an ongoing challenge for our students. To encourage engagement, we would like to incorporate teaching/learning strategies such as the use of visual aids (ex. 3D printing & analog drawings), hands-on activities, group projects, in order to effectively engage with the course material.

- o **Encourage instructors and students to investigate their own views, biases and values and discuss multiple perspectives different from their own?**

Our objective is to formulate our curricula to encourage instructors and students to investigate their own views, biases, and values, and discuss multiple perspectives different from their own. These things are essential toward promoting critical thinking, empathy, and understanding of diverse viewpoints. Our faculty members at El Camino College care to establish safe and respectful classroom environments. We create ground rules for discussions that encourage respect for each other and discourage personal attacks or disrespectful language. Throughout class critiques, we provide opportunities for reflection about one's own work and the works of others. Class critique sessions encourage students to reflect on their own beliefs and experiences, and help them consider how personal beliefs and experiences may shape their approaches to problem solving. We encourage open-mindedness and opportunities to express unlike viewpoints and share diverse opinions. We facilitate discussions and encourage students to actively listen to their peers' comments. We provide feedback and guidance in hope that we can recognize and address biases and misplaced assumptions. We intend to create a more inclusive and empathetic learning environment in our classrooms that promotes critical thinking and understanding of diverse viewpoints.

In addition, we try to use diverse learning materials and change the nature of the projects from course to course. Our faculty members at El Camino College have access to a variety of professional development resources, both online and in person. Each academic year, instructors are required to attend a minimum of four hours of equity training. During these training sessions, topics like diversity and inclusion are discussed. ECC offers many cultural events throughout the year that we encourage our faculty and students to attend.

o Use critical/equity-oriented pedagogy?

The ongoing goal of the CADD department is to emphasize the importance of creating a learning environment that is inclusive and empowering for all students, regardless of their cultural or socio-economic backgrounds. One such method that has been successful in our program is the extensive use of our Learning Management System, Canvas. We encourage our faculty to use Canvas to organize course materials, assignments, and quizzes, and to provide students with a platform for communication and collaboration through the discussion board. We use the Immersive Reader feature of Canvas to offer students conversational audio-based interaction with the material even when they are away from the class. Additionally, ELCO offers a variety of outreach programs and cultural support programs designed specifically for students. Programs like Extended Opportunity Programs & Services (EOPS) and CARE are two effective programs that provide students with guidance and extra resources, depending on individual cases. Because instructors are positioned to recognize challenges students may face, we can direct them to specific support and programs to initiate the first handshake.

o Ensure creating an empowering classroom environment?

Creating an empowering classroom environment is one of the keys to promoting equity in the CADD program. Building strong relationships with students is one method we use to achieve this. Faculty must not only meet students where they are, but also get to know them as individuals. We should be open to learning about students' interests, strengths, and challenges as well as their goals, fears, and trepidations. The faculty is able to build a sense of trust and respect in the classroom by better understanding each student. There is, however, a lot of work to be done, and it will take a significant amount of time to truly become effective in creating empowering classroom environments. In the future, we plan to provide instructors with the resources and training they need to build better relationships with students.

o Use multiple evaluation techniques sensitive to the diverse ways students can demonstrate understanding?

Exams, oral presentations, essays, class critiques, and demonstrations have traditionally been used by the CADD department to assess students' understanding of the material. To better evaluate our diverse student body, the CADD department will implement a few upcoming techniques. New to the department will be the implementation of an Online Digital Portfolio. In addition to showcasing student work for their future employment, it allows them to visualize the progress they've made throughout the program. These portfolios will continue evolving and improve as students progress through the program.

Another method not customarily implemented in the CADD department is collaboration with other departments and areas of study. We would like to encourage interaction with a diverse student body from other majors. Developing collaborations with the arts, architecture,

engineering, electronics, robotics, and the engineering departments would certainly enhance the understanding of the purpose and core curriculum of our major.

- b) **Summarize SLO and PLO assessment results over the past four years for key/gateway courses. Gateway courses are determined by your department & division – contact your Dean. For your gateway courses, present the raw data (number of students who participated in each assessment, number of students who met the standard in each assessment, what success rate for each SLO was for each assessment). This data is in Nuventive. Contact your Division Facilitator and/or Campus SLO Coordinator for assistance.**

SLO Assessments

Course	SLO	Date Assessed	% of Success for SLO
CADD-28	SLO #1 - Multi-view Drawing - 3D Solid Model Given a fully dimensioned multi-view engineering drawing of a machined part, the student will be able to utilize the appropriate functions within the Inventor software to construct a 3D solid model of the part.	3/13/21	93%
CADD-31	SLO #1 - Creating CATIA V5 Simple 3D Solid Models - Given a fully dimensioned multi-view engineering drawing of a machined part, the student will be able to utilize the appropriate functions within the CATIA V5 software to construct a 3D solid model of the part.	9/22/20	87%
CADD-31	SLO #2 - Creating CATIA V5 Simple Engineering Drawings Given a 3D solid model of a simple machined part, the student will be able to utilize the appropriate functions within the CATIA software to create a fully dimensioned multi-view engineering drawing of the part.	10/22/22	67%
CADD-32	SLO #1 - 3D Model and Engineering Drawing 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, and engineering drawing of the product containing this component.	3/13/21	92%
CADD-43	SLO #2 - Product Definition Packages Given sufficient design requirement definition, the student will be able to plan, sketch and create complete two dimensional engineering drawing packages of sample products.	10/22/22	93%
CADD-45	SLO #1 - Detecting Errors and Omissions Given sample engineering drawing whose dimensioning and tolerancing is done with Geometric Dimensioning and Tolerancing, the student will be able to point out errors and omissions in the application of dimensions and tolerances.	3/13/21	95%
CADD-7	SLO #2 - Modifying Simple Machined Part-3D Solid Model Given a 3D solid model of a simple machined part and a dimensioned drawing defining necessary changes, the student will be able to utilize the AutoCad software to modify the 3D solid model to conform to the new requirements.	10/23/22	67%

Over the span of 4 years, the CADD department has had the opportunity to assess six student learning outcomes. Performance metrics make up the majority of assessment methods.

Four of the six assessed SLOs have met their institutional success rate of 85%. In examining CADD-31 and CADD-7, as well as the faculty's action plans, we can conclude that Online delivery

could have something to do with the success rate. Both courses were taught during the Covid-19 pandemic. There may have been a considerable impact on the SLO success rate given the rush toward providing Online instruction and new methods of delivery to students. In order to increase student engagement, we recommend reexamining the curriculum. Additional course content and interactive activities should be incorporated into future online CADD courses to enhance engagement and motivation.

Additionally, we may encourage the use of other assessment methods to increase SLO success. Even though performance is a standard and common method of evaluation, we will encourage faculty to use other approaches such as portfolios, projects, journals, and presentation skill demonstrations.

Program Learning Outcomes (PLOs) Assessment:

The last assessment of the CADD PLOs was in 2019. In the past few years, there has not been a full-time faculty present to complete assessments for the program. The future PLOs can now be assessed since there is a new full-time faculty to oversee this important initiative. The PLO results indicate that the program is meeting excellent standards and targets for student success. In this program review cycle, no changes are recommended to the PLOs.

CADD - PLO #1 Creating and Interpreting Engineering Drawings

Upon completion of the Computer Aided/Design Drafting program, the student will be able to utilize CADD software to create and interpret engineering drawings at an industry entry skill level.

- Assessed date: 09/07/2017
- Assessment method: Performance
- Standard met: yes

CADD - PLO #2 Creating and Interpreting 3D CADD Models

Upon completion of the Computer Aided/Design Drafting program, the student will be able to utilize CADD software to create 3D CADD models of detailed parts and assemblies of various manufactured products and their components at an industry entry-skill level.

- Assessed date: 02/22/2018
- Assessment method: Performance
- Standard met: Yes

CADD - PLO #3 Product Development

Upon Completion of the Computer Aided/Design Drafting program, the student will be able to function as a member of a product development team.

- Assessed date: 10/24/2019
- Assessment method: Performance
- Standard met: Yes

All 3 PLOs correspond to **ILO 1: Critical Thinking** - Students apply critical, creative, and analytical skills to identify and solve problems, analyze information, synthesize and evaluate ideas, and transform existing ideas into new forms.

- c) Discuss programmatic factors contributing to constant, increasing or decreasing trends in the results for SLO and PLO assessment within the previously examined courses. What do you see that is contributing to increasing, decreasing, or stable success in each SLO analyzed?**

In spite of the fact that most of our SLOs have been successful and our PLOs meet institutional standards, there is still much to be done to improve.

Several programmatic factors can affect SLO and PLO results. To achieve positive results, it's essential to provide students with high-quality engaging curriculum and use appropriate assessment methods.

A curriculum's design can drastically affect the results of SLO and PLO assessments. It is possible to achieve positive outcomes by designing a curriculum which aligns with program learning outcomes and provides students with the necessary skills and knowledge to succeed.

Assessment/Evaluation Methods: Assessment and evaluation methods can also impact SLO and PLO assessment results. Using appropriate assessments that reflect real-life scenarios, for instance, can help provide a better "picture" of student learning than traditional tests/exams.

The level of student engagement can also impact the results of SLO and PLO assessments. Students who are highly engaged in the program and actively participate in the classroom are more likely to succeed.

In the CADD program, student resources are one of the biggest influences on outcomes. Having adequate resources, such as funding, technology, and facilities, can support the success of a program and improve SLO and PLO results.

- d) Highlight equity gaps found in SLO and PLO assessment results among different groups of students.**

As of now, there is no advanced tracking system that allows us to collect data on student performance according to their SLO assessments. For a better evaluation and action plan, it would be ideal to gain critical insight into how factors such as race, age, academic level, and socioeconomic background affect academic performance.

Future SLO tracking initiatives will be seamlessly integrated into the Canvas platform. By utilizing this system, we will gain the ability to analyze collected data at a detailed and granular level. Our program's introductory course, CADD-5 - Introduction to AutoCAD, is an ideal candidate for gathering SLO data through Canvas Outcomes. With this implementation, we can effectively track and assess student learning outcomes, ensuring a comprehensive understanding of their progress and achievements in the course.

SECTION 3

Program Vision and Future Planning

Program Vision

A) Describe the vision of the program for the next four years considering the assessment reported in the previous section, student groups that are underrepresented in the program's field, and any relevant changes within the program field/industry. A vision statement describes the desired future state of the program.

Throughout the next four years, we will continue to evolve and adapt our computer-aided design program to meet the needs of our students and the rapidly changing landscape of the design and manufacturing industry. Our program aims to equip students with the necessary skills and expertise to pursue successful careers as highly skilled professionals capable of effectively utilizing technology to address intricate design challenges.

To accomplish this objective, our focus will encompass several crucial aspects. The initial stride we will take involves maintaining a relevant and cutting-edge curriculum. This entails consistently evaluating and enhancing our course content to align with the most current software advancements and trends within the realm of computer-aided design.

Our next goal is to provide students with ample opportunities for hands-on learning through multifaceted projects, internships, collaborations, and other forms of experiential learning. Technology such as 3D printing, virtual reality, and prototyping will be incorporated into this program. As a result, students can build their portfolios and develop the practical skills that employers are looking for.

Last but not least, we will continue to promote diversity, equity, and inclusion in our program, striving to ensure that every student feels welcomed and supported. With a focus on these critical areas, our computer-aided design and drafting program will produce individuals that are well-positioned to succeed in a rapidly changing design environment.

Comparison of Solidworks and Catia

Solidworks is becoming more prevalent in the current industry. We should emphasize Solidworks as a program focus while still offering CATIA. This will be a major change in our program. In order to accomplish this, new courses will need to be created. Solidworks and CATIA

are both made by the same company, and both are outstanding design software. Here are a few factors of comparison of the two, and reasoning about why we need Solidworks in our program.

Solidworks is a powerful computer-aided design (CAD) software used in engineering and design. It is known for its user-friendly interface, robust modeling capabilities, affordability, and extensive suite of design tools. Some of the main characteristics of Solidworks include:

1. **Parametric design:** Solidworks allows users to create 3D models using parametric design principles, which means that changes made to one aspect of the design will automatically update other related parts of the model. This feature is particularly useful in design projects where multiple changes are required throughout the design process.
2. **Versatility:** Solidworks can be used for a variety of design and engineering applications, including mechanical, electrical, and structural design.
3. **Extensive library of features:** Solidworks offers a wide range of design tools and features, including 2D and 3D sketching, surface modeling, sheet metal design, and assembly modeling.
4. **Simulation capabilities:** Solidworks includes advanced simulation tools that enable users to test and optimize designs before they are built, allowing for more efficient and cost-effective product development.
5. **Collaboration tools:** Solidworks has a range of collaboration tools that allow teams to work together on a design project, including version control, commenting, and sharing features.
6. **Integration with other software:** Solidworks can be easily integrated with other software programs, such as CAM software for computer-aided manufacturing, and product data management (PDM) software for managing product design data.
7. **Industry focus:** Solidworks is used in a remarkably broad range of industries, including consumer products, machinery, and medical devices. This makes it more sought-after than CATIA, which is primarily used in the aerospace, automotive, and industrial design industries.

If Solidworks is on one end of the spectrum of our course offerings, CATIA is on the other end. CATIA is a Product Lifecycle Management (PLM) software that can track and document every activity in large-scale project cycles. This is an essential action in the case of complex products that require a large number of people to collaborate. The field of aviation and the automotive industries are great examples here. CATIA is a powerful application that serves the needs of giant companies such as Boeing. However, we also must recognize that the influx into such companies as mechanical drafters or modelers tends to happen at a much smaller rate than what Solidworks-based companies require.

Overall, both CATIA and SolidWorks offer the highest precision in product design, and they both are excellent software for their engineering purposes. In the real-world workplace, choosing

one over the other depends on the nature and purpose of the final products. CATIA and Solidworks together cover a broad spectrum of engineering purposes, some of which overlap in the middle of the spectrum.

Future Planning

A) Based on the assessment reported in the previous section, develop program goals to be completed during the next four years in relation to:

- o **Adjusting the curriculum for coherence and alignment with students' workforce needs**
- o **Advancing towards a more equitable program to close equity gaps among groups of students**
- o **Clarifying students' paths to completion, further education and employment**
- o **Helping students explore options and build foundation skills**
- o **Helping students stay on the path**
- o **Integrating applied learning experiences**

4 year Program Goals:

1. **Update Degree and Certificates:** It's imperative that our curricula reflect the needs of the industry. Evaluate enrollment and fill rates and consider local demands to determine whether to retire or create a course.
 1. Expand the Solidworks Course offerings to reflect industry market share
 2. Offer Certifications for Solidworks (CSWA & CSWP)
 3. Consider creating a course for Fusion 360 and Blender for rendering
2. **Hands On Experience:** In order to better serve our students' learning and potential career paths, the CADD department must offer more hands-on learning through physical projects. Employees are looking for well-rounded designers who know how to work in both the physical and the computer world. Introducing new technologies that previously were not used in this program is essential.
 1. 3D printing will become a significant part of our program.
 1. It is no longer a luxury but a requirement for future CADD designers.
 2. Funding for 3D printers have already been applied for next year's budget.
 2. Virtual reality will also be a hallmark feature of our program.
 1. The CADD industry is already adopting this technology in their workflow. Incorporating VR is a natural path for our program.
 3. Additional hands-on emphasis include: Sheet metal, mold making, and some machining techniques.
3. **Portfolio Diven Curriculum:** To best serve our students and connect them with relevant industry, it is crucial to switch to a curriculum that encourages a portfolio at the conclusion of our program. Based on newer employment data, entry into the CADD industry is highly competitive. Online portfolios are known to have a number of

advantages. They are becoming more commonplace, and we predict it will be the norm in the future.

4. **Inclusive Student Environment:** The establishment of a dedicated Computer Aided Design Lab stands as a top priority for our department. This initiative aims to foster an environment where our students feel secure, adequately supported in their studies, and appreciated by student colleagues with shared professional aspirations. By implementing a dedicated computer lab, we can ensure that all students, regardless of disabilities or limited resources, have equitable access to technology. It may be necessary to equip the lab with specialized hardware and software, such as screen readers, adaptive keyboards, or assistive technologies, to cater to the unique needs of students who are “differently able.” We will address this matter during our upcoming advisory meeting to further explore the necessary steps towards achieving this goal.

B) What projects will the program complete to achieve the desired goals? Please specify at least two for each goal.

Internships have long been recognized as valuable opportunities for students to secure employment while still in school. However, the CADD department currently lacks a robust system to facilitate meaningful internships for our students. To address this issue, we are actively working on establishing an advisory board that will connect us with industry leaders and local business owners. This collaboration will streamline the internship application process and provide students with access to a wider range of opportunities. By forging strong partnerships between industry experts and our CADD faculty, we aim to identify the industries that are most suitable for our students and nurture those relationships.

Furthermore, we are dedicated to strengthening our relationship with the ELCO Career Development Center and leveraging the resources available on campus. Our ultimate goal is to create an effective college environment that supports students in their quest of meaningful internships and paves the way for their successful transition into gainful employment upon completing their studies at El Camino College.

C) When the next program review is due, how will the program determine if the goals have been met? Please specify at least one quantitative target or qualitative accomplishment for each goal.

Enrollment and fill rates may be the best indicators of whether our program has met its goals. At El Camino College, enrollment was down across the board for many programs during the pandemic. In the CADD department, however, enrollment was already on the decline prior to the pandemic. There were fewer students enrolled in our senior courses, and fill rates hovered around 70%. As part of our next program review, we hope to increase enrollment by at least 20%. Our program will undergo many changes, so this is a realistic and perhaps even conservative goal.

Program Resources

In the following areas, what are the resources needed by the program to meet the goals for the next four years? Include any recommendations from the previous Program Review that are still active or on hold.

List resources in order of priority. Prioritize them within each category and/or develop an overall prioritized list of resources. Explain how these resources contribute to the College's equity goals.

Recommendations in order of Priority:

1) Facilities and Equipment:

Recommendation #1:

Purchase of 3D printers, Virtual Reality headsets, 3D scanners and CO2 Laser cutter.

To fulfill our future planning goals and to provide a student curriculum that best represents the industry, we must purchase a number of equipment relevant to the CADD industry. Planning and budgeting for this will be applied to the 2024 academic school year.

2) Technology/Software

Recommendation #1:

Upgrade 3D Modeling Software. This is an ongoing priority for the CADD department and will continue to be as such in the future. In order to provide effective instruction on advanced computer modeling software, it is imperative for us to stay abreast of the latest industry trends and regularly question the relevance of our software selection and course materials. By doing so, we ensure that our students receive the most applicable and up-to-date education in the rapidly evolving technological fields that make it critical to use these software with dependable skills and expertise acquired at El Camino College.

One of our department's primary objectives is to expand our Solidworks program. In pursuit of this goal, it would be prudent to establish contact with Solidworks to obtain valuable insights on becoming their certificate-granting partner. Dassault, the parent company of Solidworks, is renowned for providing resources to organizations dedicated to fostering a professional reputation and prestige. These resources may include guidelines, practice exams, tutorials, and study materials that can further support our efforts in cultivating a robust Solidworks program.

3) Contracts/Services

Recommendation #1

To maintain alignment with industry standards, it is essential that all instructors in the CADD program undergo continuous computer training. As the curriculum expands to incorporate new technologies, faculty members will also need to develop fresh instructional material. Furthermore, for those faculty members who are capable of delivering online courses,

supplementary formal training should be made available to enhance their proficiency in this mode of instruction.

APPENDIX A CAREER EDUCATION (CE) SUPPLEMENTAL QUESTIONS

CE programs must conduct a full program review every 4 years. The comprehensive program review includes responses to the CE supplemental questions below. Every two years (once between full program reviews) these supplemental questions must be answered and submitted to Academic Affairs for posting on the College website.

Use labor market data, advisory committee input/feedback, and institutional and program-level data to respond to the following questions:

- 1. How strong is the occupational demand for the program?** In your response, describe any changes in demand over the past 5 years and discuss the occupational outlook for next five (5) years. Provide applicable labor market data (e.g., US Bureau of Labor Statistics, Employment Development Department) that address state and local needs.

Computer-aided design and drafting are expected to have a very positive outlook in the next five years. With the increasing demand for more efficient and effective design processes, CAD software is becoming an indispensable tool for a variety of industries, including architecture, engineering, construction, manufacturing, and product design.

Some of the factors contributing to the positive outlook for the CAD industry include:

1. Growth in construction and manufacturing industries: As the construction and manufacturing industries continue to grow, there will be a corresponding increase in demand for CAD services and software.
2. Advancements in technology: Advances in technology, including artificial intelligence and virtual reality, are expected to further enhance the capabilities of CAD software and create new opportunities for the industry.
3. Growing demand for sustainability and energy efficiency: As more attention is focused on sustainability and energy efficiency in construction and manufacturing, CAD software that helps design and analyze energy-efficient systems will become increasingly valuable.

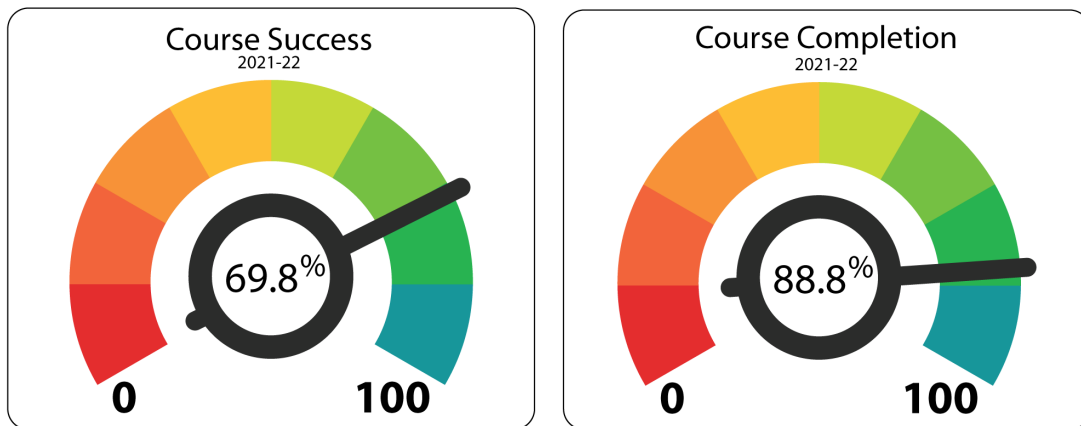
Overall, the CAD industry is poised for significant growth in the next 5 years, driven by advancements in technology, in particular regards to 3D printing and virtual reality.

- 2. How does the program address needs that are not met by similar programs in the region?** In your response, identify any distinctive components of the program (e.g., curriculum, facilities, resources) and/or describe any unique contributions the program or its students/graduates make to the community served.

El Camino College is strategically located near major aerospace, automotive, and engineering companies, making it a valuable resource for entry-level drafters and designers. Our CADD program has a strong reputation for producing motivated designers who are sought after by local companies. What sets us apart from other schools is the range of software programs we offer. Unlike other campuses in the region, we provide instruction in four industry-leading computer programs: AutoCAD, Inventor Pro, Solidworks, and CATIA. This unique offering not only distinguishes us professionally from other educational institutions, but it is also a reason for promotion of quality and prestige in the community.

- 3. What are the completion, success, and employment rates for students in the program?** In your response, identify the standards set by the program and discuss any factors that may impact completion, success, and employment rates among students in the program. Describe the status of any action plans for maintaining/improving rates relative to such benchmarks.

Current CADD Success Rates



Employment rates for computer-aided design 3D modeling professionals can differ based on factors such as location, industry type, and level of experience. According to the *U.S. Bureau of Labor Statistics*, engineering occupations, including CAD 3D modeling, are projected to grow by 5 percent from 2020 to 2030. This growth can be attributed to the increasing complexity of building and product designs, as well as infrastructure projects.

The increasing adoption of 3D printing and advanced manufacturing technologies has created a growing demand for CAD 3D modeling professionals who can effectively transform designs into tangible products. This surge in demand has opened up employment opportunities across various sectors, including manufacturing, healthcare, and even the entertainment industry.

- 4. List any licensure/certification exam(s) required for entry into the workforce in the field of study and report the most recent pass rate(s) among program graduates.** In your response, identify any applicable performance benchmarks set by regulatory agencies and

describe the status of any action plans for maintaining/improving pass rates relative to such benchmarks.

It is not technically required to hold a professional license or program certification to enter the field as an entry-level designer in the CADD industry. There are many desirable certifications that EL Camino College does not participate in. In the near term, our department plans to offer Solidworks certification (CSWA and CSWP).

- 5. Are the students satisfied with their preparation for employment? Are the employers in the field satisfied with the level of preparation of program graduates?** Use data from student surveys, employer surveys, and other sources of employment feedback to justify your response.

Not applicable. Surveys of employers and students are not accessible.

- 6. Is the advisory committee satisfied with the level of preparation of program graduates? How has advisory committee input and feedback been used in the past two years to ensure employer needs are met by the program?** Describe the status and impact of any advisory committee recommendations.

California Education Code 78016 requires that the review process for CE programs includes the review and comments of a program's advisory committee. **Provide the following information:**

- a. Advisory committee membership list and credentials.
- b. Meeting minutes or other documentation to demonstrate that the CE program review process has met the above Education Code requirement.

On May 25th, 2023, we conducted our first advisory meeting since 2016, which proved to be highly productive and instrumental in advancing our program and supporting our students. During the meeting, we addressed the current state of the program, identified past shortcomings, and strategized on ways to enhance it in order to better align with industry needs.

Before delving into curriculum changes, it was crucial to assess the relevance of the professional CAD software used in the industry and the market share of the software we currently teach at EL Camino College. We sought to determine whether the programs we offer are still pertinent, should there be additional programs introduced, and which programs must be emphasized or phased out.

Our discussions led to a consensus on expanding the Solidworks program to better reflect the market share of professional design companies that rely on it. Currently, we offer a single 2.0-unit course in Solidworks, which is non-transferable. Recognizing the significance of Solidworks, we decided to develop a three-course, 3.0-unit per course program that prepares students for the CSWA and CSWP certifications, both highly valued in the industry. Additionally,

we approved the creation of a *Certificate of Accomplishment in Solidworks* to recognize students' proficiency in the software.

Another area of focus was the motion to redesign our CATIA courses in order to streamline our academic offerings while eliminating confusions about the unit numbering inconsistencies. Currently, we offer four 2.0-unit CATIA courses. To better serve our students, we proposed transferring these four courses' materials into two courses, each worth 3.0 units. Furthermore, we proposed and unanimously approved the establishment of a *Certificate of Accomplishment in CATIA*, aimed at highlighting the real-world industry significance of the two newly redesigned courses. This certificate will serve as a testament to students' mastery of CATIA gained at ECC and showcase their specialized skills within a career path distinctively offered at El Camino College. These curriculum changes received unanimous approval.

Furthermore, we explored the potential inclusion of *Fusion 360* application as the embodiment of a future course, considering its significant growth and its market share, which has recently surpassed Solidworks in certain metrics. As a growing number of professionals embrace *Fusion 360*, its consideration for inclusion in our curriculum should be carefully weighed.

Last but not least, we discussed the necessity of establishing a dedicated CADD lab that would provide students with an on-campus space to work with these powerful programs and gain valuable hands-on experience within and outside their regularly scheduled class time.

Overall, the advisory meeting served as a pivotal platform for making informed decisions, leading to curriculum enhancements, potential software additions, and the exploration of a dedicated CADD room, all geared toward optimizing our program for the benefit of our students.

Future Objective: Incorporate more hands-on experiences into the curriculum via 3D printing, laser cutting, and CNC.

Purpose/Reason: To more effectively link students' digital skills with real-world workplace requirements.

Equipment Request:

- Additional 3D printers
- Laser cutter
- Desktop CNC
- VR Headsets
- 3D Scanners

The motion to approve the proposed CADD lab and equipment was unanimously approved.



2023 Advisory Board Meeting

Computer Aided Design & Drafting

Minutes of the Advisory Committee Meeting

DATE: May 25th, 2023

TIME: 6:00 p.m. – 8:30 p.m.

LOCATION: El Camino College - ITEC Building - Room 111

ATTENDEES: 2023 Committee Members

Vince Phamdo	Faculty Professor / Meeting Chair
David Gonzales	Dean ITEC
Daniel Anttila	Professor
Daniel Valladares	Professor
Allen Bakalyar	Professor
Mason Rinehart	Jansy Packaging
Shaun Dunn	ACCO Engineered Systems
James Anos	CADD Student

1. Call to Order

- Start time of the meeting: 6:01 p.m.
- Identification of the person who called the meeting to order:
Vince Phamdo

2. Welcome & Introductions

Vince Phamdo welcomed the attendees and facilitated introductions between the faculty members and the advisory committee members. He requested all participants to sign in and update their contact information on the provided roster. Each committee member then introduced themselves and shared the company they represent.

3. CADD Presentation - Vince Phamdo

Discussion Topics:

- Industry Labor Data
- ELCO Student Performance Metrics
- Industry Trends
 - Software Market Share
 - Current Software Costs and projections
- Local College CAD Curriculum Comparisons
- Current ELCO Course Offerings
- Proposed Curriculum Changes
 - Solidworks Program Focus
 - CATIA Curriculum Redesign
- Proposed Certificate Changes
 - Solidworks Certificate (CSWA & CSWP)
 - CATIA - Certificate
- Proposed Future Software
 - Fusion 360
- Proposed CAD Hands on Experience
 - Dedicated CAD lab
- Open Topic Discussion

4. Motion to Approve

1) Motion to approve the proposed program change to focus on Solidworks course offering

Unanimously approved

2) Motion to approve the proposed CATIA course redesigns to make them complementary with transfer requirements

Unanimously approved

3) Motion to approve the proposed update to certification

Unanimously approved

4) Motion to approve the proposed creation of two new Certificates of Accomplishments

Unanimously approved

5) Motion to approve the establishment of a dedicated CADD lab and new equipment

Unanimously approved

5. Adjournment

- The end time of the meeting: **8:30pm**
- The name of the person officially adjourning the meeting: **Vince Phamdo**

6. Signature and Date

- Signature



The person responsible for preparing the minutes

- Minutes finalization date: **May 25th, 2023**