

GAVILAN COLLEGE
INSTRUCTIONAL PROGRAM SELF-STUDY
Computer Graphics & Design

I. Executive Summary

Gavilan's Computer Graphics & Design Program (CGD) mission to prepare students for success in transfer to four-year-universities and/or careers where expertise in computer graphics and design technologies is expected evolved since being approved by the state in 1965. It originally provided students specialized manual drafting technology skills and knowledge. Ongoing technological innovations and shifts in workforce demands require CGD to periodically update its Student Learning Outcomes (SLOs) and tools used to support such to ensure CGD students are prepared to meet the expectations of those who employ and recruit them. This was first demonstrated in 1973 when CGD's long-time tenured instructor was first hired. He began and over next few decades continued to update CGD to address technology shifts resulting from increased productivity of Computer Aided Drafting and Design (CAD) becoming affordable and manual drafters being replaced by CAD technicians. He retooled CGD's drafting technology program by replacing objectives that were appropriate for using drafting boards and equipment to generate manual drawings with ones required for effectively using personal computers with CAD and/or other software as graphic design tools.

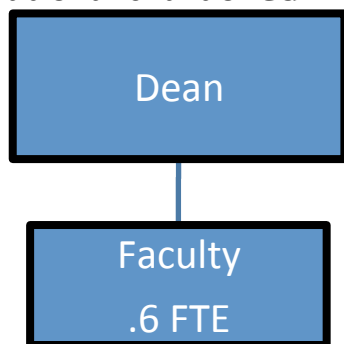
By the time the full-time instructor retired in 2007, CGD's program was in need of revisions to address the latest technological shift apparent in university engineering/design courses and employers increasingly replacing CAD with "smart" parametric 3D modeling. Resulting efficiencies increased expectations of drafting professionals to possess complementary skills and knowledge. Delays in updating CGD's SLOs coincided with declines in CGD enrollments and might explain why Gavilan's engineering program also become inactive due to low enrollments. Following the full-time instructor's retirement, interim part-time CGD instructors increased CGD enrollments by replacing CAD with 3D surface modeling software. This change addressed student demand for video animation courses. However reliance upon rendering and animating software instead of using software as a technical drafting tool to design products and did not support CGD drafting technology SLOs nor did the associated instructional focus on teaching students to use specific software prepare them to meet evolving technical drafting trends. CGD's mission is tasked to tackle.

To address the above disparity and the overdue updating of CGD's program, in 2008, a new part-time instructor with expertise in drafting technology and environmental design was hired to revitalize CGD. She updated its SLOs, and selected software consistent with current practices in drafting technology fields to support them. SLOs were designed to better prepare students for today's highly competitive job market. Updated SLOs require students to demonstrate higher, more complex levels of learning by integrating knowledge, skills, and attitudes to exhibit mastery of multifaceted competencies including: 1) using parametric software as a design tool to creatively solve problems, 2) communicating effectively to plan, design, engineer, manufacture and market products in collaboration with diverse disciplines while 3) assessing and using constructive feedback to make revisions when needed. These skills enable CGD graduates to design products during any of the aforementioned stages of development. CGD's updated program required coordination with CGD one part-time staff and 1) university personnel to articulate courses, 2) industry representatives to ensure SLOs adequately prepare students for employment, 3) media to inform potential students, employers, and universities about ways CGD's program supports their needs, 4) related Gavilan departments/programs to better conserve limited resources and 5) community members to make sure their unique needs are met.

Current short term goals seek to improve CGD by focusing upon a noticeable need for strengthening connections between CGD and relevant Gavilan departments include: 1) adding CGD courses as options to support students in the newly restored engineering department, 2) integrating technology CGD's program provides with Gavilan's Science, Technology, Engineering and Mathematics (STEM) programs and 3) collaborating with STEM departments to develop a team of shared professional advisors.

II. PROGRAM REVIEW

A. Organizational chart of CGD



B. Program Data

1. Description of Program

Gavilan's Computer Graphics and Design (CGD) Program has evolved much since it was first approved by California's Community Colleges Chancellor's Office in 1965 when it primarily instructed students in manual drafting skills. CGD's program monitors evolving trends and makes necessary modifications to ensure students acquire up to date skills and knowledge. This responsibility was evident within a decade after CGD was established when affordability and efficiencies of computer aided drafting and design (CAD) reduced the demand for manual drafters. Changes resulting from these emerging technological innovations were addressed by recruiting an instructor with specialized training and experience in 1973 to oversee replacement drafting boards and blue print machines with personal computers and CAD software and update student learning outcomes (SLOs) to help students gain skills and knowledge required to compete for positions associated with this latest technology. This full-time tenured instructor spent the next three decades updating CGD's program to provide CGD students with essential drafting and design skills to effectively use CAD. By the time he retired in 2007, design and engineering firms increasingly were replacing their CAD systems with "smart" parametric 3D modeling programs and replacing-specialized CAD operators with highly-skilled designer/drafters. At the same time, Gavilan's engineering department became inactive due to a significant decline in enrollment. Necessary updates to CGD's drafting technologies were further circumvented when interim part-time instructors who were attempting to update CGD instead addressed a noticeable demand for video animation courses by replacing CAD with 3D surface modeling software tools. This change attracted a number of new students, but without any revisions in SLOs, these changes were inconsistent with existing CGD SLOs. The surface modeling software was better suited as a design tool to support two DM courses in video animation that were taught by one of the part-time instructors. In 2008, administration addressed concerns about the resulting gap between CGD's new course content and its approved drafting technology SLOs by

recruiting a part-time instructor with advanced degrees and work experience in industrial technology and environmental design. In 2009, DM's video animation courses, which were not part of any approved program, were dropped due to budget constraints, while CGD continued to update SLOs via data from research, similar drafting programs, feeder universities and professionals in the field to update tools and revised SLOs. As of 2010, seven CGD courses and CGD labs have been updated and approved by Gavilan's Curriculum Committee and Board of Trustees and submitted to the State Chancellors' Office for approval. CGD's updated SLOs require students to demonstrate mastery of multidisciplinary knowledge necessary to collaborate with a team of professionals while using software as a tool to create aesthetically-pleasing products in response to consumer demands in an environmentally-sound manner while applying constructive feedback as needed to produce necessary improvements for manufacturing and marketing financially viable products. All CGD degrees and certificates have been revised to address these changes.

Status of Updated CGD Courses and Articulation with SJSU's Courses

- Actions in support of articulation over time (past five years)

Academic Yrs	06/07	07/08	08/09	09/10	10/11
CGD 2	No Classes were Submitted or Approved for Articulation			Updated	SJSU ME 019 – Accepted
CGD 4				Updated	SJSU ME 020 – Denied – working with Chair to resubmit
CGD 6				Updated	Not Submitted – plan to submit in 2011/12
CGD 8/9				Updated	SJSU ME/IT 040 – Not being offered
CGD 30				Updated	SJSU DSIT/TECH 027 Accepted
CGD 160				Updated	Not Submitted – plan to submit in 2011/12

The above table reveals progress by one part-time CGD instructor updating courses to better articulate with university courses to help students obtain transfer credit for CGD courses in related majors. The one part-time instructor researched articulation agreements approved for other community college programs with CSU and UCs, developed detailed matrices for further analysis, discussed programs with county ROP staff, high school CTE teachers and met with three department chairs and four instructors from SJSU's Mechanical Engineering, Art and Design to ensure courses articulated with Gavilan's nearest public university and was related to programs preparing high school students or adults for CGD courses. She also met with Gavilan's articulation officer. These efforts resulted in the articulation of two CGD courses with SJSU courses. Current efforts involve efforts to have CGD 4 articulates with CE/ME/IT 020, a more advanced graphic design course required for degrees and civil, environmental and mechanical engineering and technology majors. Having a cohesive organizational approach such as creating an Occupational Career Program Institute would help support CGD's need for improved connections between the college and employers.

a. Enrollment and FTES

- Enrollment by top code and course over time (4 years)

Academic Year	06/07	07/08	08/09	09/10
Computer Graphics and Design	52	66	54	76
College Overall	36,319	40,208	43,902	51,559

The

Enrollment decline in /09 proceeded a year of CGD courses being inconsistent with their stated SLOs. The decline also coincides with the large number of students who wanted to gain video animation skills enrolling in CGD then leaving the program when CGD began

reviving its technical-drafting courses to reflect SLOs associated with their approved top code. Following the drop, CGD began attracting a greater numbers of students interested in careers requiring technical drafting skills. . Enrolment trends over the last four years reveals more than a 46% increase in enrollment in CGD, exceeding the 41% increase in Gavilan’s overall enrollment during the same time period. This increase is consistent with CGD’s unit plan to hire a full-time faculty member in Computer Graphics when enrollment exists to support it. See Student Survey Data to review specific changes in CGD students’ stated career goals.

- FTES by top code over time (4 years)

Academic Year	06/07	07/08	08/09	09/10
Computer Graphics and Design	14.15	9.08	5.98	8.57
College Overall	4,442.20	4,397.42	5,748.23	5775.65

- Current enrollment by term (Fall 10) at first census

Academic Year	First Census
Computer Graphics and Design	9
College Overall	16,799

Student Survey Data

- CGD Student Career Goals on Pre-Course Surveys (percentages)

Academic Year	06/07	07/08	08/09	09/10
Engineering	No Available Data		12	18.5
Environmental Design			21	20.5
Graphic/Digital Design			26	29
Video Animation			32	16
Other Goals			9	16

Survey data provided by entering CGD students reveal that the greatest number of students enrolled in CGD courses during academic year 08/09 planned on entering careers in video animation. A number of these students expressed frustration when CGD shifted from courses that primarily provided instruction focused on using specific surface modeling software to one that required students to demonstrate knowledge associated with technical drafting. A 50% decline in CGD students preparing for video animation careers the proceeding academic year coincides with the temporary decline in CGD’s enrollments that same year (see CGD enrollments, above) While it is acknowledged animation is a growing field and would be of value, the SLOs associated with CGD’s approved TOP code are not consistent. CGD’s title and mission to prepare students for careers associated with computer graphics and design, supports a long-term goal of collaborating with other programs to add such courses under a more appropriate TOP code in the future. Until enrollments increase to double the current amount, CGD is only being offered during two time slots and until enrollments allow a full schedule of offerings each semester, CGD will continue to combine its advanced CGD courses into a

single time slot each semester to enable students seeking CGD certificates/degrees to complete their program within a two-year time frame.

b. Student Outcomes

- Success rate by top code and course and year (4 years).

Academic Year	06/07	07/08	08/09	09/10
Success				
Computer Graphics and Design	73.91%	80.70%	64.81%	75.00%
College Overall	69.49%	69.93%	68.86%	65.90%

The above table reveals that other than academic year 07/08 when CGD transitioned to a more structured, technical program, success rates of CGD students are better than the College Overall success rates, including the past year by 13%.

- Retention rate by top code and course and year (4 years).

Academic Year	06/07	07/08	08/09	09/10
Retention				
Computer Graphics and Design	84.78%	89.47%	79.63%	85.50%
College Overall	84.72%	85.07	76.64%	87.05%

The above table demonstrates that CGD retains students, on average, close to the College Overall. The ongoing increased connections to transfer colleges and industry are expected to help increase this rate.

- Number of majors by year (4 years).

Academic Year	06/07*	07/08*	08/09	09/10
Drafting technology			6	5
Total			6	5

* Pre-banner years are unavailable.

The above table indicates that counts of CGD majors is fairly small and has decreased by 18% the past academic year. This measure will continue to be monitored to see if ongoing improvements in the program help increase the number of majors. It is believed that proposed plans for CGD to provide more interdisciplinary participation with students from other majors—such as engineering—will make enrollment rates a far more accurate measure of the value of CGD to Gavilan students than the number of majors. Thus, while the above measure will continue to be monitored, it is noted the goal of CGD is to provide high a quality technology program and support STEM disciplines. This dual goal requires creation of another measure to report the number of students who gain technology skills necessary for transfer to four year universities and benefit from CGD’s technology skills to enter high paid technical careers. Additionally, another measure needs to be developed to track how linking CGD to STEM programs reduces redundant investment in costly software and computers.

- Number of degrees and certificates by top code and year (4 years).

Academic Year	06/07	07/08	08/09	09/10
Computer Graphics and Digital Imagery (A.A.)	0	0	1	1
Computer Graphics and Digital Imagery (Certificate)	0	0	0	1
Total	0	0	1	2

The above table reveals updates to CGD are associated with a noticeable, increase in number of degrees/certificates awarded. Increasing CGD enrollments indicate this trend will continue.

c. Staffing Data

- Faculty Headcount (by contract and hourly) (past 4 years)

Academic Year		06/07*	07/08*	08/09	09/10
Computer Graphics and Design	Contract	*	*	0	0
	Hourly	*	*	2	1
Total		*	*	2	1

* Pre-Banner years are not available.

The above table illustrates a reduction in CGD staff when the part-time instructor who supported video animation courses was lost due to budget cuts academic year 08/09 and reveals only one part-time instructor has been available to make the many changes described in this review.

- Faculty productivity (WSCH/FTEF) (past 4 years)

Academic Year		06/07*	07/08*	08/09	09/10
Computer Graphics and Design	WSCH			220.8	257.1
	FTEF			7.4	1.2
	Productivity			60.6	219.74
Total Division	WSCH			174858.3	173269.5
	FTEF			572	498.63
	Productivity			305.7	347.49

* Pre-Banner years are not available.

The above table indicates an improvement in productivity and reflects constraints due to limited workstations and work space for CGD courses.

C. Program Progress

1. Recent actions taken to update CGD to reflect changes in drafting technology are described in above sections.
2. Notable results from the above actions include: 1) all active CGD courses and their SLOs have been revised, 2) all CGD degrees/certificates have been updated, 3) CGD has articulated 2 courses with SJSU, 4) CGD’s enrollments increased by 41%. CGD actions were guided by Gavilan’s Strategic Plan, specifically the following three Strategies & four Goals(which are identified and described below):
 - 1) **Strategy #1 Goal #2:** Optimize enrollment, course offerings and services to reflect community needs and growth by strengthening career programs through a cohesive organizational approach such as creating an Occupational Career Program Institute;

- 2) **Strategy #2 Goals #2&3** Improve student services and enhance curriculum and programs in order to help students meet their educational, career, and personal goals. Support professional development for faculty in order to improve quality of teaching and curriculum for basic skills, Career Technical, and transfer courses. Foster and recognize instructional innovation and excellence; 3) **Strategy # 4 Goal #2** Recruit and develop staff to foster success for our diverse students in their attainment of educational goals, As budget permits, continue to implement the Five-Year Full Time Faculty Hiring Plan to ensure that 60% to 62% of credit courses are taught by full-time faculty.
3. Methods the program uses to maintain integrity of academic standards and achieve consistency within the discipline include: 1) creation of measureable SLOs that correlate with requirements of work force as described by BLS. 2) Ongoing assessment of student outcomes, 3) coordination with four year universities to ensure courses articulate.
 4. Program's methods for evaluating and modifying the contents of course offerings, were delineated above.
 5. Staff development includes active participation in professional organizations, including attending events of the American Institute of Architecture Santa Clara Valley Chapter, Institute of Electrical and Electronics Engineers, serving on the Board of the California Institute of Technology Educators Association, supporting U.S. Green Building Council - Northern California Chapter events and attending Gavilan College workshops.
 6. The program has coordinated its courses with the local ROP courses offered at feeder high schools and continues working to articulate more courses with SJSU.
 7. The program satisfies requirements for CTE programs and has recruited five representatives from industry for input to best develop its program.
 8. CGD participates in once a year annual advisory meetings with other CTE departments to obtain feedback on its program. The part-time CGD instructor has recruited at least two professionals for the last two years from careers related to CGD for each of the meetings and high school instructors will note that input helps develop career appropriate curriculum as well as select software to support this curriculum.

D. Issues and Trends Facing CGD

1. CGD's strengths and weaknesses are apparent in above sections describing actions CGD has taken to update its program, include updated SLOs for all active CGD courses to ensure students are prepared for transfer and access to employment in engineering, technical design. Environmental design and other careers associated with CGD. Data presented above reveal one part-time instructor's efforts to update CGD have coincided with increased enrollments, increased degree/certificates attained, and articulation with four year universities. Other strengths are due to the ways CGD supports students. Associated improvements in instruction to support new SLOs includes CGD students being accepted to competitive programs including, Pratt Institute and SJSU's Graphic Design Department, another CGD student completing a summer internship supported by Gavilan's STEM grant, and CGD students earning over a dozen awards for their projects in Technology Education from the California State Fair, including one student receiving Best in Show, their highest award in 2010. CGD's greatest weaknesses include its limited offerings each semester, its exceptionally limited integration into Gavilan STEM programs— an acronym that specifically includes Technology (T). The 3D models provided by CGD supports visual learners and would benefit more students if CGD were integrated into science, engineering and mathematics programs. Additionally, CGD part-time staff has personally discussed these concerns with Math and Engineering chairs but has yet to be informed they plan to include CGD courses to satisfy any requirements for various certificates/degrees requirements associated with science, math and engineering. The part-time faculty also continues working with SJSU chairs to articulate CGD 4 with SJSU for ME 020 (AKA CE 020 and IT 20)-a course required for a BS in Civil/Environmental or Mechanical Engineering and Industrial Technology. Further, BLS's Employment Projections: 2008-2018 Summary highlights this need for technology, "Three of the 10 detailed industries projected to have the most employment growth are in professional and business services: management, scientific, and technical consulting; computer systems design; and employment services. Altogether, these 3 industries are expected to add 2.1 million jobs." (See <http://www.bls.gov/news.release/ecopro.nr0.htm>). Skills for many of these jobs include knowledge of parametric 3D modeling software, such as SolidWorks and Revit is apparent in a job searches for 50 mile radius of Gavilan College using the key words SolidWorks, Revit were identified in over 800 jobs <http://www.indeed.com/jobs?q=solidworks&l=95020&radius=50> that were estimated salary of at least \$50K a year. Instruction provided by revised programs produced by one part-time instructor have resulted in student outcomes itemized in the tables in this report and the student projects associated with these outcomes are attributed to the success of CGD students that includes professional awards etc. Challenges include reliance upon a part-time faculty who works but is not paid full-time to provide these benefits]. More support is needed to better integrate with other STEM programs, having its courses, such as those required for degrees in civil, mechanical engineering and environmental design being required or offered as electives for degrees obtained by students planning to transfer to these programs at four year universities and the loss of animation courses in DM that were supported by CGD expertise.
2. CGD's past program plans highlight the need to have its program supported by a full-time instructor to address the weaknesses listed above.

E. Program/Student Learning Outcomes

1. Below is a matrix summarizing the Chancellor's approved CGD Degree/Certificate:

Institutional Outcome	Program/Student Learning Outcomes	Assessment / Measurement	Result	Use of Results
Communication 1.5 Students will write in an understandable and organized fashion to explain their ideas, express their feelings, or support a conclusion.	Use written communication to succinctly explain content of portfolio in an organized and understandable manner	Summaries within portfolio explain how designed objects demonstrate CGD knowledge and skills	76% of students mastered this assessment in 2010	Provide additional practice in future courses to improve communication skills
Cognition 2.3 Students will think logically and critically in solving problems; explaining their conclusions; and evaluating, supporting, or critiquing the thinking of others.	Demonstrate problem solving using a systematic process to propose a product that meets need associated with career goals	Student created problem solving matrix presented within students' final portfolio	65% of students mastered this assessment in 2010	Provide more practice in future courses to improve problem solving skills
Technological Competency 3.3. Students will use technological applications to find, organize, and present information effectively.	Apply industry standard dimensioning practices within working drawing	Fully dimensioned working drawing of student designed product	82% of 2010 students mastered competency	Provide more practice in future courses to improve tech. competency
Aesthetic Responsiveness 5.1 Students will produce or respond to artistic and creative expression.	Identify application of principles and elements of design	Critique student presentations using design terminology and criteria	68% of 2010 students mastered competency	Include this aspect in peer review to improve tech. aesthetic

2. CGD assesses 100% of course-level student outcomes every semester. This is achieved by incorporating SLOs into exam and portfolio rubrics for evaluating student achievement.

F. Program Plan/Budget Requests

1. CGD's overarching goal is to prepare Gavilan students to successfully apply multifaceted computer graphics and design skills and knowledge in their selected career path—skills required to successfully compete for transfer and/or enter careers in today's highly competitive environment. Objectives necessary to achieve this goal include: 1) guide students' research efforts in their career analysis reports that are supported by class lecture/exercises and evaluated using a rubric that includes quality of sources cited using MLA format so they may determine then report career interests and itemize requirements necessary to achieve desired career goal, 2) help students gain skills and knowledge necessary to use parametric software to develop solutions resulting from systematic problem solving to propose, design, develop, render, animate and market aesthetically-pleasing, environmentally-sound, ergonomically-correct, fiscally feasible products that fulfill a genuine human need related to each students' career goal in a and 3) support development of design portfolios that communicate students' specialized CGD

knowledge and skills related to their career goal while demonstrating knowledge of typography, color theory, principles and elements of design.

2. The current Program Plan for achieving the above goals and objectives over the next three years requires funding for equipment, software, supplies, personnel and training. These are necessary to provide students access to industry-standard software and equipment and supporting qualified instructors who constantly update technical skills and develop connections with industry, relevant university programs and community while developing real world field experiences and internships. Finally this program needs to become accessible for all students whose career objectives require CGD technology skills and knowledge should receive general education or major credit for their CGD courses, There is a noticeable lack of institutional integration of technology provided by CGD with other STEM programs, Students who would benefit from CGD skills are usually unable to fit CGD courses in their schedules. Yet, CGD is required for a number of transfer degrees in engineering and other STEM fields and its 3D models could help visual learners comprehend abstract math and science and engineering phenomena using technologies taught in CGD. Instead of being an elective, CGD courses need to be included as part of degree/certificate requirements in other STEM departments and ensure Gavilan's degrees/certificates support students' career goals. Because the part-time instructor who teaches all CGD courses is also developing curriculum while gaining skills required to support the program is working full time doing these is no time for needed coordination.

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