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Page 1: I. Program Overview and Update

Q1 Department(s) Reviewed:

Engineering

Q2 Lead Author and Participants: Please list any person who participated in the preparation of this report.

Keenan Murray, Miriam Simpson, Misha Kutzman, Donna Olsen, Duncan McGehee

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Q3 Dean/Manager:

Pam Kersey

Q4 Program Update: Please summarize the changes, additions, and achievements that have occurred in your program since your last program review was submitted. To access your 2019 program review, visit the Program Review webpage.

The Most Comprehensive Engineering Transfer Program in the County Continues to Grow
Cuyamaca College is home to the most comprehensive transfer Engineering program in San Diego County Community colleges. Transfer classes are offered on a regular cycle designed to allow students to complete their program in approximately 2-3 years depending upon their background at entry. The engineering program has continued to grow dramatically, with a 61% increase in enrollment in the last five years.

Growth Requires Resources
Although we have new faculty, our enrollment growth has far outpaced our resources. We have tripled our enrollment over the last decade, contributing to enrollment increase across the college, but we have seen no parallel increase in our space, our budgets, or our staff. We have more than quadrupled our lab offerings, but our lab budget still doesn't cover the costs of Engineering 100 supplies and we share a lab technician with three other disciplines that are not even in the same building. Although this technician has long worked extra hours and does an exceptional job, they do not know how our equipment works or how to maintain it, let alone have the skills to help students and new faculty to use it properly. We would like for our new full-time instructors to have the time and support to really run this program at its full potential.

Equity by Design
New faculty means new course design, and our new faculty are dedicated to achieving better equity in engineering by promoting active, project-based courses that utilize modern pedagogy known to have better outcomes for traditionally underrepresented groups. Through the design of courses, spaces, and opportunities in the program, we hope to create a physical and mental space where students of all backgrounds can thrive.

STEAM-y New Frontiers
Engineering is about designing and creating, at the core of which is solving problems. We want to use this core value to work as a cross-disciplinary entity that serves the campus and community at large. The most obvious place to start is with Art and Design, and we are already having exciting conversations, but do not plan to stop there. Anybody need something 3D printed?

Page 2: II. Assessment and Student Achievement

Q5 1. Do you have a course Student Learning Outcome (SLO) assessment plan on file with the Student Learning Outcome and Assessment Committee (SLOAC)?If you have not already done so, you can submit your program's assessment plan to SLO Coordinator, Tania Jabour, at tania.jabour@gcccd.edu.

Yes

Q6 OPTIONAL: You may upload a copy of your SLO assessment plan for SLOAC here. If you have an Excel sheet, please convert to one of the supported files listed below before submission.

Respondent skipped this question

Q7 2. Please provide an analysis of your Student Learning Outcomes (SLO) findings and what changes, if any, were made as a result.

All SLOs have been assessed on the previous three year cycle. Within the past year the retirement of our previous full time instructor and acquisition of two brand new instructors with essentially no overlap has made for a chaotic transition.

Currently we are going through the process of examining and revising all SLOs for the multitude of courses we offer trying to emphasize assessing the core skills acquired in a course rather than a double-digit laundry list of topics that were covered. So far about half of these have gone through curriculum and we plan to do the other half this year. At this point we will set up a new assessment plan and see what data we can salvage from the old one to make a reasonable comparison.

Q8 3. Does your department or discipline offer any degrees and/or certificates?   **Yes**

Page 3: II. Assessment and Student Achievement

Q9 4. How are you currently assessing your PLOs?

Currently our PLOs are just as messy as our SLOs but they are assessed by assessing the SLOs that are mapped to them. We have developed a draft of new, much more relevant PLOs which can be done both using this technique AND with direct assessment, but we are waiting to see if we should do this as a program or for the entire ACP.

Q10 5. Are your PLOs in the catalog an accurate   **No**
reflection of the department or discipline's current
learning objectives?To access the College Catalog
Associate Degree Programs and Certificates section,
click here.

Q11 6. Are the PLOs mapped onto the course SLOs? If   **Yes**
you require assistance, please contact Madison Harding
in the IESE Office at madison.harding@gcccd.edu

Page 4: II. Assessment and Student Achievement

Q12 Referencing the last 5 years of data, discuss the changes in course success rate since the last program review (annual or comprehensive) report.

Engineering classes are known for their technical difficulty, but improvements in course design and teaching have worked to bring the success rate for engineering closer to that of the college (see figure 4).

Q13 Considering the college's 2024 goal of increasing course success rates to 77%, discuss how your department/discipline will help meet that goal.

Engineering has begun the process of redesigning course and training both full and part time faculty in active, equitable teaching practices. We are also working to communicate with counseling and student services to increase support for students both navigating academics and life. These efforts have already yielded higher success rates and we hope to continue this trend.

Q14 Please describe any equity gaps, in which specific groups (e.g., by gender and ethnicity) have success rates lower than that of the department or discipline overall.

Over the last five years, we have been working hard to close the equity gaps, particularly for African American, Hispanic, and Filipino students who have generally had lower success rates compared to the average.

We also recognize that women extremely underrepresented in engineering (<20%) versus the college (>50%).

Q15 What department/discipline (or institutional) factors may be contributing to these lower success rates for these groups of students?

Remaining traditional teaching practices that emphasize lecture over active and project-based learning are known to disproportionately affect these particular groups.

Additionally the design of the classroom space seems to be particularly unfriendly to women as assessed from a survey of random students.

Q16 What specific steps will the department of discipline take to address these equity gaps in the 2020/21 academic year?

We will continue the process of redesigning course and training both full and part time faculty in active, equitable teaching practices. We are also working to communicate with counseling and student services to increase support for students both navigating academics and life. These efforts have already yielded higher success rates and we hope to continue this trend.

Q17 How do these steps inform the long-term department or discipline goals that you are setting in this annual program review?

We plan to work to make the entire department more open and equitable to all students though the design of courses and classrooms. We also plan to create better pipelines by creating K-12 outreach and mentoring programs for incoming first year students expressing interest in engineering.

Q18 In what way does your department/discipline work across instruction and student services to advance the college's student success & equity goals?

Our lead instructor has led a trend of placing the campus resource page directly into course syllabi. In addition we are working to create better communication with counseling about the intricacies of the engineering pathways.

Q19 OPTIONAL: If you would like to attach any charts or additional documentation (aside from the program review report prepared by the IESE Office), please upload it using the button below.

SP2020-AU_ENGR_DATA.pdf (1MB)

Page 5: II. Assessment and Student Achievement

Q20 Do you offer distance education (online) courses?   **No**

Page 6: II. Assessment and Student Achievement

Q21 Are there differences in success rates for distance education (online) versus in-person sections? **Respondent skipped this question**

Q22 If there are differences in success rates for distance education (online) versus in-person sections, what will the discipline or department do to address theses disparities? **Respondent skipped this question**

Q23 What mechanisms are in place to ensure regular and effective contact within online courses across the discipline or department? **Respondent skipped this question**

Page 7: III. Previous Goals: Update (If Applicable)

Q24 Would you like to provide an update for your previous program review goal(s)? **Yes**

Page 8: III. Previous Goals: Update (If Applicable) continued

Q25 Previous Goal 1:

Hire a new and replacement full-time tenure-track engineering instructor.

Q26 Which College Strategic Goal does this department goal most directly support? **Organizational Health**

Q27 Please describe how this goal advances the college strategic goal identified above.

Enrollment in the program has grown by 376% from Fall 2013 through Spring 2018 and the full-time instructor responsible was retiring. With quality part-time instructors in short supply, and Grossmont looking enviously at our enrollment numbers, this was the only real option to keep the program running. The previous full-time instructor had an unusually wide breadth of engineering education an experience with degrees in mechanical, electrical, and earth science as well as industry and field experience, in order to get all of that specialization we would need to hire 3-4 different people.

Q28 Goal Status **Completed**

Page 9: III. Previous Goals: Update (If Applicable) continued

Q29 Please describe the results or explain the reason for deletion/completion of the goal:

We hired 2 people. Success!

Q30 Do you have another goal to update?   **Yes**

Page 10: III. Previous Goals: Update (If Applicable) continued

Q31 Please describe action steps for the year: **Respondent skipped this question**

Q32 How will this goal be evaluated?   **Respondent skipped this question**

Q33 Do you have another goal to update?   **Respondent skipped this question**

Page 11: III. Previous Goals: Update (If Applicable) continued

Q34 Previous Goal 2:

Increase student success in sophomore-level engineering courses through increased support for ENGR 100 and all other lab classes

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Q35 Which College Strategic Goal does this department   **Student Validation and Engagement**
goal most directly support?

Q36 Please describe how this goal advances the college strategic goal identified above.

There is ample evidence to suggest that success in ENGR 100: Introduction to Engineering and Design leads to increased success in subsequent classes. For example, students in ENGR 200: Statics who have previously taken ENGR 100 have historically enjoyed a 6.5 percent grade differential over the class average (which includes the same students, meaning that the advantage over those students who haven't had ENGR 100 is even more dramatic). In response to this clear signal we have increased the annual number of sections of ENGR 100 from 0, 17 years ago, to 7 in the 2019-2020 school year. In addition, this course would be included as the gateway course in the STEM guided pathways meta-major, hopefully drawing even more students into the program. This costs money, as do other lab classes which we have added over the years. Meanwhile, the supplies budget has increased slightly from $500 in 2001 to $800 in 2016, an increase that fails even to keep up with inflation. Actual expenditures average $2700. Where has the money come from? From begging from other disciplines, from McGehee's pocket, and from uncertain budget augmentations that, when we do receive them, arrive in December, after we've done our scheduling for the year, and from asking students to pay for supplies which we do not like to do. As we have grown, it has also become impossible, even with two full time faculty on staff, to staff this class and then support the instructors with consistent information in both lecture and lab. A lab technician familiar with the class could easily bridge this gap and manage the money and supplies, a cheaper and safer alternative to the current situation where full time faculty try to assist while not preoccupied with their own classes and the running of the program. For example, the full-time instructor who designed the class hand assembled 30 Arduino kits including wires and components. 30 kits is annoying. Now that we run four sections assembling the kits has become a more than a full day of work for an instructor and a lab technician who does not have the technical background for this kind of work. Using a full time instructor to do this work is not a good use of resources and this is only one of many examples that occur throughout the semester.

Q37 Goal Status   **In Progress-will carry this goal forward into next year**

Page 12: III. Previous Goals: Update (If Applicable) continued

Q38 Please describe the results or explain the reason for deletion/completion of the goal: **Respondent skipped this question**

Q39 Do you have another goal to update?   **Respondent skipped this question**

Page 13: III. Previous Goals: Update (If Applicable) continued

Q40 Please describe action steps for the year:

1. Increase the engineering budget to $5000 a year
2. Hire an engineering lab technician to help manage the growing lab supplies.
3. Hire student workers to help manage the lab equipment, help other students build projects and assist with the massive organization that needs to be done in the lab.
4. Purchase more modern equipment for circuits

Q41 How will this goal be evaluated?

We will monitor enrollment growth and SLOs/student success numbers in this course and subsequent related courses.

Q42 Do you have another goal to update?   **Yes**

Page 14: III. Previous Goals: Update (If Applicable) continued

Q43 Previous Goal 3:

(a) Adapt the engineering curriculum to suit the Transfer Model Curriculum (TMC) for engineering and (b) develop a Materials Lab.

Q44 Which College Strategic Goal does this department goal most directly support?   **Guided Student Pathways**

Q45 Please describe how this goal advances the college strategic goal identified above.

The previous Cuyamaca College engineering faculty has participated in discussions, both in person and by email, on what the TMC would look like. In general our current AS degrees look a lot like most of the proposed ideas for the TMC plus we would like to add one in Environmental Engineering (a rapidly growing field in which one of our full time instructors is trained). However the current draft TMC includes a Materials Lab, which we don't have. This lab would be a REALLY GOOD addition to our course offering whether or not the draft TMC becomes the law of the land. For example, SDSU currently has a materials lab requirement for Mechanical Engineers, which we aren't meeting. The California Polytechnic Universities as well have materials lab requirements. Developing the materials lab will not be trivial. Typically the equipment in a materials lab runs about $100,000

We also need to form better connections with SDSU to make sure all our courses articulate properly. This will prevent future problems like when Engineering 120 briefly had articulation in question which sent enrollment flocking to Grossmont.

Q46 Goal Status   **In Progress-will carry this goal forward into next year**

Page 15: III. Previous Goals: Update (If Applicable) continued

Q47 Please describe the results or explain the reason for deletion/completion of the goal: **Respondent skipped this question**

Q48 Do you have another goal to update?   **Respondent skipped this question**

Page 16: III. Previous Goals: Update (If Applicable) continued

Q49 Please describe action steps for the year:

1. Finish the curriculum
2. Design the course
3. Set up meetings with SDSU's engineering program

Q50 How will this goal be evaluated?

We will evaluate this goal by still being able to transfer engineering students under the TMC and also by looking at student success in the materials lecture once it has a lab component.

Q51 Do you have another goal to update?   **No**

Page 17: III. Previous Goals: Update (If Applicable) continued

Q52 Previous Goal 4:   **Respondent skipped this question**

Q53 Which College Strategic Goal does this department goal most directly support?   **Respondent skipped this question**

Q54 Please describe how this goal advances the college strategic goal identified above.   **Respondent skipped this question**

Q55 Goal Status   **Respondent skipped this question**

Page 18: III. Previous Goals: Update (If Applicable) continued

Q56 Please describe the results or explain the reason for deletion/completion of the goal: **Respondent skipped this question**

Q57 Do you have another goal to update?   **Respondent skipped this question**

Page 19: III. Previous Goals: Update (If Applicable) continued

Q58 Please describe action steps for the year: **Respondent skipped this question**

Q59 How will this goal be evaluated? **Respondent skipped this question**

Q60 Do you have another goal to update? **Respondent skipped this question**

Page 20: III. Previous Goals: Update (If Applicable) continued

Q61 Previous Goal 5: **Respondent skipped this question**

Q62 Which College Strategic Goal does this department goal most directly support? **Respondent skipped this question**

Q63 Please describe how this goal advances the college strategic goal identified above. **Respondent skipped this question**

Q64 Goal Status **Respondent skipped this question**

Page 21: Copy of page: III. Previous Goals: Update (If Applicable) continued

Q65 Please describe the results or explain the reason for deletion/completion of the goal: **Respondent skipped this question**

Page 22: Copy of page: III. Previous Goals: Update (If Applicable) continued

Q66 Please describe action steps for the year: **Respondent skipped this question**

Q67 How will this goal be evaluated? **Respondent skipped this question**

Page 23: IV. New Goals (If Applicable)

Q68 Would you like to propose any new goal(s)? **Yes**

Page 24: IV. New Goals (If Applicable) continued

Q69 New Goal 1:

Create Maker Space to support labs, student projects, engineering club, and national competition teams

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Q70 Which College Strategic Goal does this department goal most directly support?   **Student Validation and Engagement**

Q71 Please describe how this goal advances the college strategic goal(s) identified above.

A Maker Space would be a lab space that could be used by all engineering courses as a resource but also be open to students outside of class and the campus community at large. Engineers design and build things, and they need practice in a low-stakes environment. Our current curriculum has by necessity been more theoretical than practical which puts our students at a disadvantage versus four-year students who immediately have access to tools and software as part of their tuition and fees. This space would allow our lectures to use applications and our labs to be much more interesting and diverse. Assuming we had staff for this space, student workers and/or a lab technician, we could also open this space up for collaborations with Graphic Design, Art, CADD, CIS's Mechatronics, or anyone else that has an interest. We could also use it to cheaply 3D print equipment for anyone on the campus.

Q72 Please indicate how this goal was informed by SLO (student learning outcome) assessment results, PLO (program learning outcome) assessment results, student achievement data, or other data:

Currently much of our lab space occupies a prep room abandoned by Chemistry over a decade ago There is a nonfunctional refrigerator growing some sort of organism, equipment we can and cannot identify, and a lot of dust and disorder. This space has needed to be updated and maintained for years, but nevertheless has functioned to grow a thriving program. It looks like the messy garage of Microsoft or Apple or Google lore. Unfortunately, although this look has a certain kitschy appeal, it is certainly not the glossy structure that many students have come to expect from those companies now, and, as we have grown to what is now the largest community college program in the county, it has become wholly inadequate to the point of embarrassment. So much so that when the Board and District visited, the tour guide passed off the CADD department as engineering because it looked so much nicer. In addition to this, there is one group that this is disproportionately repelled by this space: women. In an informal survey of random students, women were twice as likely as men to find this room and it's adjacent classroom visually unwelcoming. As the group with the largest gap between college and program representation, this is a huge and disappointing problem.

Q73 Action steps for this year:

1. Acquire skilled, full time lab technician to manage equipment, assist with labs and projects, and make the space open and welcoming to students, other departments, and the campus community
2. Student workers to assist in staffing the space and assisting with equipment/organization/maintenance
3. Renovation of existing space or larger, more welcoming space elsewhere

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Q74 How will this goal be evaluated?

Student success in courses
Transfer and employment rates

Q75 Do you have another new goal?   **Yes**

Page 25: IV. New Goals (If Applicable) continued

Q76 New Goal 2:

Partner with CTE and the Career Center to get students better connected to their goals

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Q77 Which College Strategic Goal does this department goal most directly support?   **Guided Student Pathways**

Q78 Please describe how this goal advances the college strategic goal(s) identified above.

More Certificates - Revive Mechatronics (CIS), explore the possibility of designing an Engineering Technician program through CTE, advertise SolidWorks Certificate
Work with CADD and CIS to make sure their courses that support our students are in good standing with SDSU and meet our needs. We have revived our work experience course so that we can start a pipeline via CTE and the new career center to get students into good local internships and jobs so they can transfer and/or move on to careers. To help them decide they want these careers and keep them motivated though the educational part we would also like to partner with the Career center to get more speakers/job talks/Industry field trips, as well as help with resumes, interviews, and things as basic as a closet of interview clothes that can be checked out.

Q79 Please indicate how this goal was informed by SLO (student learning outcome) assessment results, PLO (program learning outcome) assessment results, student achievement data, or other data:

Engineering still has one of the fasted growing job markets in the country and especially in California. With a good industry partnership, we can ensure that our students have access to good quality, local jobs and experience.

Q80 Action steps for this year:

1. Work with CADD and CIS on curriculum articulation with SDSU for courses that fall in our pathway
2. Investigate new Certificates
3. Work with the career center on an internship/work experience pipeline

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Q81 How will this goal be evaluated?

We will track internships and their correlation with student success.

Q82 Do you have another new goal?   **Yes**

Page 26: IV. New Goals (If Applicable) continued

Q83 New Goal 3:

STEAM Collaborations

Q84 Which College Strategic Goal does this department goal most directly support?   **Student Validation and Engagement**

Q85 Please describe how this goal advances the college strategic goal(s) identified above.

Collaboration with other programs including Art, Graphic Design, Anatomy, and Physics. We would like to share resources, plan cross-disciplinary curriculum, and plan events like a STEAM day. We hope this would be a way to maximize college resources, make students aware of all the options available to them for careers, plan dynamic curriculum, and provide useful community outreach.

Q86 Please indicate how this goal was informed by SLO (student learning outcome) assessment results, PLO (program learning outcome) assessment results, student achievement data, or other data:

Engineering has a lot of crossover into other disciplines and a lot of skills to offer the college. We want to expose our students to other ways of thinking and designing while maximizing any resources given to us by sharing them.

Q87 Action steps for this year:

1. Set up meetings with interested departments to show them what resources we have get to know their faculty.
2. Explore development of an interdisciplinary program in Product Design, shared between Art and Engineering.

Q88 How will this goal be evaluated?

Cost savings on 3D printed items for other departments and less tense meetings?

Q89 Do you have another new goal?   **Yes**

Page 27: IV. New Goals (If Applicable) continued

Q90 New Goal 4:

First year Physics/Engineering Major Mentoring

Q91 Which College Strategic Goal does this department goal most directly support?   **Guided Student Pathways**

Q92 Please describe how this goal advances the college strategic goal(s) identified above.

We are looking to reach out to incoming students indicating an interest in Physics or Engineering (most students in physics are engineering majors) and providing them with mentoring. Most of these students do not show up in our classes until their second or third year, and they encounter many barriers before we see them in the classroom. We hope to do this in collaboration with Engineering (obviously), Grossmont, Guided Pathways, and the UC Irvine NSF-sponsored resonance program.

Q93 Please indicate how this goal was informed by SLO (student learning outcome) assessment results, PLO (program learning outcome) assessment results, student achievement data, or other data:

Looking at our poor demographic representation of certain genders and ethnicities compared to college populations, we feel this would be a good first step to making sure we have cleared barriers to our program for these students.

Q94 Action steps for this year:

1. Acquire list of interested students from CCCApply
2. Design a database with mailing list functionalities
3. Get faculty to agree to mentor
4. Explore an older peer mentor model

Q95 How will this goal be evaluated?

We will monitor student demographics and equity gaps in our program

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Page 28: V. Resources Needed to Fully Achieve Goal(s)

Q96 Is the program requesting resources this year to achieve this program goal(s)? (Faculty Resource Needs, Classified Staff Resource Needs, Technology Resource Needs, Supplies/Equipment Resource Needs, Facilities Resource Needs or Other Resource Needs)   **Yes**

Page 29: VI. Faculty Resource Needs

Q97 Are you requesting one or more Faculty Positions to achieve this program goal(s)?   **No**

Page 31: VIII. Classified Staff Resource Needs

Q98 Are you requesting one or more Classified Positions to achieve this goal?   **Yes**

Page 33: X. Technology Resource Needs

Q99 Are you requesting technology resources to achieve this goal?   **Yes**

Page 35: XIV. Supplies/Equipment Resource Needs

Q100 Are you requesting supplies and/or equipment resources to achieve this goal?   **Yes**

Page 37: XVI. Facilities Resource Needs

Q101 Are you requesting facilities resources to achieve this goal(s)?   **Yes**

Page 39: Final Check

Q102 Are you ready to submit your program review?If you would like to go back and review a section, select a section a click "Next."

I am ready to submit my program review