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Page 1: I. Program Overview and Update

Q1 Department(s) Reviewed:

Engineering

Q2 Lead Author and Collaborators:

Kathryn Nette, Duncan McGehee, Keenan Murray

Q3 Dean:

Pam Kersey

Q4 Program Update (Required): Please summarize the changes, additions, and achievements have occurred in your program since the last program review. To access last year's program review, visit the IPRPC Intranet Page, accessible here.

Cuyamaca College is home to the only comprehensive transfer Engineering program in San Diego County Community Colleges. Enrollment in the program has grown by 376% from Fall 2013 through Spring 2018. Unlike other local colleges where Engineering is an offshoot of a physics program and where many of the classes are taught by physics instructors without any real engineering background (either through work or education), this program has been led for nearly 20 years by a full-time engineer with real world engineering experience. His decision to become a full-time instructor has made the program grow with great vigor in the last 10 years, and his dedication to the program has resulted in the program having an excellent reputation with students and 4-year transfer institutions such as SDSU.

The program grew dramatically between 2012 and 2016, with the number of Engineering majors increasing from 292 in Fall 2012 to 468 in Fall 2016, an increase of 66%. Since Fall 2016, the absolute number of majors has remained relatively constant, with 448 majors in Fall 2018. Although the number of majors has remained flat, when evaluated with regard to the percent of total declared majors at the college, the program has continued to grow in total percentage of majors at the college, increasing from 6.2% in Fall 2016 to 7.3% in Fall 2018. This indicates that the program is still strong and has potential for growth in an environment where many majors are shrinking in number of students.

This past year, the college fended off an attempt by Grossmont college to start a competing engineering program that would have had potentially devastating effects on our program. There is no indication (based upon real data) that there are enough students in the district to be able to successfully operate two competing programs; other local districts that do this (San Diego Community College District, for example), have weak programs at multiple colleges. After this failed attempt by Grossmont (which does not mean that they have given up this idea), Cuyamaca finally stepped up to replace our soon to be retired full time instructor, and we were able to start a new full-time engineering instructor as of the start of the Spring 2019 semester. In addition, we have the go-ahead for a second full-time instructor and are in the process of starting the selection process this week. This is going to have a marked impact on the program, as our ability to hire part-time instructors for engineering is extremely poor, and the number of part-time instructors we have needed to hire in the past few years has been increasing as we have been adding engineering sections to meet student demand. Most engineers are employed during the day and only available at night. Thus we have an extremely difficult time hiring qualified engineers who are also good PT faculty. Turnover is great for two common reasons: 1) people come in and stay only for a semester or two and then leave because of issues with their regular day job, or 2) the engineers we find are not high quality teachers.

In the past two years, we have greatly expanded the number of sections of engineering, but still have substantial wait lists on many classes. As of Fall 2019, we will now offer at least one section of every Engineering class every semester. Our core classes, ENGR 200, ENGR 210 and ENGR 220 are now offered every semester in multiple sections, with two sections of ENGR 200 every fall and one in spring, two sections of ENGR 210 in spring and one in fall, and two sections of ENGR 220 in spring and one in fall. Engineering 270 is also offered every semester, as is ENGR 120 and ENGR 260. This provides a comprehensive program for students to complete a transfer program in 2-3 years depending upon their background at the start of the program. Our entry level course ENGR 100 fills 3 sections every spring, and at least 2 sections every fall (which we think could be increased if we have adequate classroom space and quality instructors). There were significant waitlists for ENGR 200 this spring 2019, and also students waitlisted for ENGR 220 despite having two sections. We know that once waitlists grow past 5 students, that students will shop around to find courses elsewhere, so it is difficult to tell how many students we could bring in if we actually were able to run increased numbers of sections for waitlisted classes. (Figure 1)

One thing of note is that we have a number of engineering students who have joined our HSI-STEM cohort. A total of 12 of our 53 year one and two cohort students are engineering majors. These are clearly students who are highly motivated and want to do well. We have one part time engineering instructor who is mentoring about 8 of these students; others are spread among the other faculty mentors. A number of the students have taken SCI 100, which is designed to support their reading, writing and study skills. It is too soon to tell if their participation will have an effect on their success rates, but we will be clearly watching for those numbers.

Page 2: IIB. Student and Program Learning Outcomes

Q5 Do you have an assessment plan on file with 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.

No

Q6 Please provide an analysis of your student learning outcomes (SLO) findings and what changes, if any, were made as a result.

All of the SLO's for ENGR 100, 200, 220, 260 & 270 have been assessed in the past 4 years. ENGR 120 and 210 have been partially assessed. One of the improvements that has been made across the board in engineering as a result of SLO assessment has been the expanded use of low-stakes daily quizzing (retrieval practice) that ask students to recall concepts and techniques at random from earlier in the semester. This approach, which was developed after reading the book Make It Stick, has yielded generally good results by increasing student exposure to those items that SLO data show they are weak in. One example is the use of dimensional analysis in ENGR 100. Before applying this approach, we regularly "failed' this SLO. Once we started using this process, this SLO assessment for this topic has been regularly successful, and in fact, in in ENGR 200 we found that the students did a letter grade better on the final exam than they had previously done. This methodology is particularly interesting, because this is the book that used as a textbook for SCI 100. So this is a great follow-up for students that have taken that course, as it reinforces how this type of practice can increase student success.
Most of these courses are up for review in the next semester, and it is possible that SLO's will be changed. Once they are reviewed and any rewrites are completed and approved through curriculum, we will then rebuild a new assessment plan and start the cycle over and turn in an assessment plan to SLOAC.
By the way, there are some issues with some of the SLO's that have been uploaded to TracDat. ENGR 260 & 270 both have big red X's next to them, but it is not clear why and no one has been able to tell us why. When you dig into the data, it is clear that the assessments have been done. If anyone can figure this out, let us know.

Q7 Review your PLOs. Are the listed PLOs an accurate reflection of the program’s current learning objectives?

No

Q8 Are the PLOs mapped onto the course SLOs?

Yes

Q9 Discuss your assessment plan for the PLOs.

Before we can develop a plan, new PLO's need to be written for all 3 of the degrees in engineering. This will happen along with the review of the courses that need to be reviewed. Then a new plan that addresses SLO assessment for the next 4 years, along with PLO assessment for the same period will be developed and submitted to SLOAC.

Page 3: IIB. Student Achievement

Q10 How has the program's success rate changed over the past year?

Overall success rates appear to be trending upward based on setting a trendline to the data from F2013-SP2018. However, whether this means anything or not is anyone's guess. The data is so random from semester to semester, it is really impossible to tell whether the success rate is really of significance. The data in Figure 2 show the extreme variability from semester to semester, so for practical purposes of whether students will be successful in any given semester, is not predictable. Data for individual courses is really not any better, also showing extreme variability. Retention rates have been more predictable, with rates in the mid to high 80's. This is not surprising, as engineering students tend to be extremely drive to be successful, and they are likely to stay in a class with the hope that they will make it through rather than giving up.

Q11 The College has set a 2024 goal of reaching a 77% course success rate (students passing with a grade of A, B, C, or P out of those enrolled at census) for the College as a whole. Consider how your will program help the College reach its long-term goal of increasing the course success rate to 77%. This is intended to provide a goal for improvement only; programs will not be penalized for not meeting the goal. What is your program's one-year goal for success rate across all courses in the program?

Frankly, the success data is so variable that this is just picking a number out of the air at this point. There is no clear, predictable way to pick a goal at this point. We might just as well choose the 77% mark, as the numbers have been close to that in the last two semesters. (Figure 2)

Q12 Which specific groups (by gender and ethnicity) have success rates lower than that of the program overall?

As far as gender, once again, there seems to be no particular pattern to success rates. If you run a trendline through the data, it appears that females are actually becoming less successful overall, and males are becoming slightly more successful. But if you look at any single semester, the females can be more successful than the males. One thing that is very clear is that the percentage of female engineering students is far lower than the percentage of male students. Females tend to make up between 15-20% of the total student population, but this also varies greatly from semester to semester. As far as other ethnic groups, again the data is difficult to assess because in many of the semesters the population numbers are extremely low for many of the ethnic groups. Those groups with reasonable representation seem to have numbers that are similar to overall success in the program. (See figure 3)

Q13 What program (or institutional) factors may be contributing to these lower rates of success for these groups of students?

We are very much seeing the same patterns that are seen nationally; few women in engineering. There is really not a clear indication that is because they are doing more poorly than other students.
One of the biggest factors is likely to be the great amount of instructor turnover that we have had in engineering. As explained earlier, it is difficult to find and keep high quality engineering instructors. More stability in the instructor pool by having more full time instructors will at least allow us to make a serious attempt at determining where the real issues may lie.
In general, other factors contributing to low success rates are likely to be the same ones that affect low success rates for most students; low income, poor reading and writing skills, and other equity issues that are common throughout the college.

Q14 What specific steps will the program take to address these equity gaps in the 2019/20 academic year?

The best options are 1) to increase the number of full time faculty who become well trained in instructional active learning techniques that are known to increase student success such as active learning and 2) to identify these students as early as possible in the program and get them into our HSI-STEM cohort where they can receive STEM counseling, mentoring and other support that has been shown to affect student success and retention. As mentioned earlier, we do have a significant number of engineering students in the program already, but catching them earlier in their program could have a significant impact on their overall success and retention. The basic programs of study are determined by the transfer needs to get students in to the transfer schools, and so are not likely to be changed.

Q15 How do these activities align with the goals set forth in your last comprehensive program review?

This is not a comprehensive program review.
Once we get our second engineering faculty hired, we will be able to sit down and put together a program that addresses where the program should go in the next 5 years, and how any equity gaps can be addressed.

Q16 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. You can upload PDF, Word, and image files.

PR Figures Feb 2019.pdf (100.7KB)

Page 4: Distance Education

Q17 Does your program offer any courses via distance education (online)?	**No**

Page 5: Distance Education Course Success

Q18 Are there differences in success rates for distance education (online) versus in-person sections?	**Respondent skipped this question**
Q19 If there are differences in success rates for distance education (online) versus in person sections, what will the program do to address these disparities?	**Respondent skipped this question**

Page 6: IV. Previous Goals: Update (If Applicable)

Q20 Would you like to provide an update for your previous program review goal(s)?	**Yes**

Page 7: Previous Goal 1

Q21 Previous Goal 1:

Hire a second FT tenure track engineering instructor

Q22 Link to College Strategic Goal(s):	**Guided Student Pathways**
Q23 Goal Status	**In Progress**

Q24 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

By having a person hired by July 1 2019. The selection committee is in progress now.

Q25 Please provide the rationale for this goal:	**Respondent skipped this question**
Q26 Please provide the goal action steps for the year (previously "Activities"):	**Respondent skipped this question**
Q27 Do you have another goal to update?	**Yes**

Page 8: Previous Goal 2

Q28 Previous Goal 2:

Increase student success in sophomore level engineering courses by supporting ENGR 100 and other lab classes

Q29 Link to College Strategic Goal(s):	**Guided Student Pathways**
Q30 Goal Status	**In Progress**

Q31 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

We received a one time augmentation of $1900 for engineering supplies just today. So we will continue to ask for this funding on a yearly basis until it gets added to the budget. We are going to ask for a total of $3000 for next year, as we will be adding a materials lab to the program which is going to increase supplies costs.

Q32 Please provide the rationale for this goal:

Every STEM program has costs for supplies for lab courses. The budget for Engineering has been absurdly low, and the current Engineering instructor has paid for a lot of things out of his own pocket, and by getting some funds he begs from other disciplines. With 2 new engineering faculty in place by July 1, 2019, it is time that the discipline be given a reasonable, with an additional $3000 per year added to the current budget.

Q33 Please provide the goal action steps for the year (previously "Activities"):	**Respondent skipped this question**
Q34 Do you have another goal to update?	**Yes**

Page 9: Previous Goal 3

Q35 Previous Goal 3:

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

Q36 Link to College Strategic Goal(s):	**Guided Student Pathways**
Q37 Goal Status	**In Progress**

Q38 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

We were given about $20K in funds to develop the materials lab necessary for this goal in mid December. So, now we will be able to look at actually putting the curriculum together for the lab, and then evaluate whether it will be possible to build the TMC.

Q39 Please provide the rationale for this goal:

Adapt the engineering curriculum to suit the draft Transfer Model Curriculum (TMC) for engineering. Articulate all engineering courses with the Course Identification Numbering System (C-ID). We now know for sure that this process will require modification of ENGR 260: Engineering Materials to include a lab component.

Q40 Please provide the goal action steps for the year (previously "Activities"):

Develop the curriculum for the materials lab with a goal of offering it in Spring 2019, assuming we have adequate space..

Q41 Do you have another goal to update?	**No**

Page 10: Previous Goal 4

Q42 Previous Goal 4:	**Respondent skipped this question**
Q43 Link to College Strategic Goal(s):	**Respondent skipped this question**
Q44 Goal Status	**Respondent skipped this question**
Q45 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?	**Respondent skipped this question**
Q46 Please provide the rationale for this goal:	**Respondent skipped this question**
Q47 Please provide the goal action steps for the year (previously "Activities"):	**Respondent skipped this question**

Page 11: V. New Goals (If Applicable)

Q48 Would you like to propose any new goal(s)?	**Yes**

Page 12: New Goal 1

Q49 New Goal 1:

Develop a new 5-year plan for Engineering

Q50 Link to College Strategic Goal(s):	**Guided Student Pathways**

Q51 Please provide the rationale for this goal:

Assuming that we have both new engineering instructors in place by July 1 2019, it will be time to sit down and evaluate where the engineering program is going over the next 5 years. This will require a jobs analysis for engineering, an evaluation of transfer engineering programs at local universities, and a survey of our students to better understand their interests, This will lead us into the next full program review cycle for engineering. Determine whether we need a lab tech for the program.

Q52 Please provide the goal action steps for the year (previously "Activities"):

Hire second engineering instructor.
Set up plans for research on engineering jobs and development of new transfer degrees (if necessary) for engineering.

Q53 How will the goal be evaluated?

A plan will be developed and put in place for the engineering program in time for the next full program review.

Q54 Do you have another new goal? **Yes**

Page 13: New Goal 2

Q55 New Goal 2:

Support Guided Pathways for Engineering students

Q56 Link to College Strategic Goal(s): **Basic Skills Acceleration** , **Guided Student Pathways**

Q57 Please provide the rationale for this goal:

The number of sections of engineering classes has increased substantially over the past 5 years (see overview at introduction of this report). We currently have one engineering lab, that is used as much as is possible. Other classes are offered in a vagabond fashion all over the college, in different places each semester. There is no place to store equipment that would augment the class experience for the students. With the planned addition of a materials lab, we are going to have additional issues with space, and the lab requires a real lab environment, not just a lecture style classroom.

Q58 Please provide the goal action steps for the year (previously "Activities"):

Identify an additional classroom of 32 seats to be dedicated to engineering. Ideally this room should be somewhere in proximity to the prep room
Purchase appropriate furniture and equipment necessary to make this a state-of-the-art active learning classroom.
Purchase and install appropriate technology. We actually have the money for computers for this lab in the HSI-STEM grant. But we do not have money for furniture or a Smart Board for the classroom.

Q59 How will the goal be evaluated?

Completion of the classroom and occupation with lots of engineering students1

Q60 Do you have another new goal? **No**

Page 14: New Goal 3

Q61 New Goal 3: **Respondent skipped this question**

Q62 Link to College Strategic Goal(s):	**Respondent skipped this question**
Q63 Please provide the rationale for this goal:	**Respondent skipped this question**
Q64 Please provide the goal action steps for the year (previously "Activities"):	**Respondent skipped this question**
Q65 How will the goal be evaluated?	**Respondent skipped this question**
Q66 Do you have another new goal?	**Respondent skipped this question**

Page 15: New Goal 4

Q67 New Goal 4:	**Respondent skipped this question**
Q68 Link to College Strategic Goal(s):	**Respondent skipped this question**
Q69 Please provide the rationale for this goal:	**Respondent skipped this question**
Q70 Please provide the goal action steps for the year (previously "Activities"):	**Respondent skipped this question**
Q71 How will the goal be evaluated?	**Respondent skipped this question**

Page 16: VI. Resources Needed to Fully Achieve Goal(s)

Q72 Is the program requesting resources this year to achieve this goal?	**Yes**

Page 17: V. Faculty Resource Needs

Q73 Are you requesting one or more faculty positions to achieve this goal?	**No**

Page 18: Faculty Position Request(s)

Q74 Please remember to complete the Faculty Position Request Form (accessible here, under Staffing Request Information) for this position that you are requesting and upload it using the button below.The Faculty Position Request Form (In Word) can be located here (under Staffing Request Information).Brief Description of the Position Requested:	**Respondent skipped this question**
Q75 Faculty Position Request 1 - Related Program Goal(s):	**Respondent skipped this question**
Q76 Faculty Position Request Upload 1: Please upload the completed faculty request form for the above position using the button below. You can access the Word version of the Faculty Position Request Form here (under Staffing Request Information).	**Respondent skipped this question**
Q77 Faculty Position Request 2 (if applicable): Please remember to complete the Faculty Position Request Form (accessible here, under Staffing Request Information) for this position that you are requesting and upload it using the button below.The Faculty Position Request Form (In Word) can be located here (under Staffing Request Information).Brief Description of Position Requested:	**Respondent skipped this question**
Q78 Faculty Position Request 2 - Related Program Goal(s):	**Respondent skipped this question**
Q79 Faculty Position Request Upload 2: Please upload the completed faculty request form for the above position using the button below. You can access the Word version of the Faculty Position Request Form here.	**Respondent skipped this question**

Page 19: VI. Classified Staff Resource Needs

Q80 Are you requesting one or more classified positions to achieve this goal?	**No**

Page 20: Classified Staff Position Request(s)

Q81 Classified Staff Position Request 1: Please remember to complete the Classified Staff Position Request Form (accessible here, under Staffing Request Information) for this position you are requesting.Brief Description of Position Requested:	**Respondent skipped this question**

Q82 Classified Staff Position 1 Related Program Goal(s):	**Respondent skipped this question**
Q83 Classified Staff Position 1 Request Upload: Please upload a completed Classified Position Request Form for this request using the button below. You can access the Word version of the Classified Position Request Form here.	**Respondent skipped this question**
Q84 ***OPTIONAL*** Please use the button below to upload the position classification description (obtained from HR).	**Respondent skipped this question**
Q85 Classified Staff Position Request 2: Please remember to complete the Classified Staff Position Request Form (accessible here, under Staffing Request Information) for each position you are requesting.Brief Description of Position Requested:	**Respondent skipped this question**
Q86 Classified Staff Position 2 Related Program Goal(s):	**Respondent skipped this question**
Q87 Classified Staff Position Request 2 Upload: Please upload a completed Classified Position Request Form for this request using the button below. You can access the Word version of the Classified Position Request Form here (under Staffing Request Information).	**Respondent skipped this question**
Q88 ***OPTIONAL*** Please use the button below to upload the position classification description (obtained from HR).	**Respondent skipped this question**

Page 21: VII. Technology Resource Needs

Q89 Are you requesting technology resources to achieve this goal?	**Yes**

Page 22: Technology Request(s)

Q90 Technology Request 1: Please remember to complete a Technology Request Form for each request you are submitting. You can access the online Technology Request Form here: Technology Request Form

Description:	**One Promethean Smart Board**
One time or On-going	**One time**
Amount Requested $	**$8,300**
Related Program Review Goal(s):	**Support Guded Pathways for Engineering Students**

Q91 Technology Request 2: Please remember to complete a Technology Request Form for each request you are submitting. You can access the online Technology Request Form here: Technology Request Form	**Respondent skipped this question**

Page 23: VIII. Perkins and Strong Workforce Resource Needs

Q92 Are you requesting Perkins and/or Strong Workforce resources to achieve this goal?	**No**

Page 24: Perkins Request and Strong Workforce

Q93 Perkins Request and Strong Workforce 1: Please remember to complete the Perkins Request Form and submit it via the annual Perkins/Strong Workforce request process/cycle.	**Respondent skipped this question**
Q94 Perkins Request and Strong Workforce 2: Please remember to complete the Perkins Request Form and submit it via the annual Perkins/Strong Workforce request process/cycle.	**Respondent skipped this question**

Page 25: IX. Supplies/Equipment Resource Needs

Q95 Are you requesting supplies and/or equipment resources to achieve this goal?	**Yes**

Page 26: Supplies/Equipment Request(s)

Q96 Supplies/Equipment Request 1: In the boxes below please provide information on your request. Supplies/Equipment requests will be considered on a one-time funding basis.

Description:	**Increase Engineering supply budget**
Amount Requested $:	**$3000**
Related Program Review Goal(s):	**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 point 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, 15 years ago, to 5 in the 2017-2018 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 and with the addition of the new materials lab, costs are going to increase further. Where does 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 (or this year, in February) after we've done our scheduling for the year. The new engineering instructors cannot be expected to pay for supplies out of their own pockets.**

Q97 Supplies/Equipment Documentation 1: Please upload any supplies/equipment quotes or additional documentation for this request.

Respondent skipped this question

Q98 Supplies/Equipment Request 2: In the boxes below please provide information on your request. Supplies/Equipment requests will be considered on a one-time funding basis.

Respondent skipped this question

Q99 Supplies/Equipment Documentation 2 : Please upload any supplies/equipment quotes or additional documentation for this request.

Respondent skipped this question

Page 27: X. Facilities Resource Needs

Q100 Are you requesting facilities resources to achieve this goal?	**Yes**

Page 28: Facilities Request

Q101 Facilities Request 1: Please provide the information below and remember to complete a Facilities Request Form accessible here: Facilities Request Form

Related Program Review Goal(s):	**We need a second engineering classroom; the room needs to be identified, and should be large enough to hold 32 students. The room will need desks and seating for these students, and based upon recent furniture purchases in the H and F buildings, the desks for the computers shoudl cost approximately $32236 and the chairs approximately $6316.**

Q102 Facilities Request 2: Please provide the information below and remember to complete a Facilities Request Form, accessible here:Facilities Request Form	**Respondent skipped this question**

Page 29: XI. Professional Development Resource Needs

Q103 Are you requesting professional development resources to achieve this goal?	**No**

Page 30: Professional Development Request

Q104 Professional Development Request 1: Please provide the information identified below and follow the process for requesting professional development funds, outlined here.	**Respondent skipped this question**
Q105 Professional Development Request 2: Please provide the information identified below and follow the process for requesting professional development funds, outlined here.	**Respondent skipped this question**

Page 31: XII. Other Resource Needs

Q106 Are you requesting any other resources to achieve this goal?	**No**

Page 32: Other Resource Requests

Q107 Other Resource Requests 1: Other resource requests will be considered on a one-time funding basis. Please fill in the information below.

Respondent skipped this question

Q108 Other Resource Requests 2: Other resource requests will be considered on a one-time funding basis. Please fill in the information below.

Respondent skipped this question

Page 33

Q109 Are you ready to submit your program review? If you click "No," you will be redirected to the start of the program review module.

Respondent skipped this question