#20

COMPLETE

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Page 1: I. Program Overview and Update

Q1

I.1. Department(s) Reviewed:

Engineering

Q2

I.2. Lead Author:

Keenan Murray

Q3

I.3. Collaborator(s) - list of any person that participated in the preparation of this report:

Respondent skipped this question

Q4

I.4. Dean/Manager(s):

Kim Dudzik

Q5

Initial Collaboration Date with Manager/Dean:

Enter the initial date you met with your dean to discuss your program review using this format: MM/DD/YYYY **12/07/2021**

Q6

I.5. Program Update (Required): Please summarize the changes, additions, and achievements that have occurred in your program since your last program review was submitted. To access your Spring 2021 program review, visit the Program Review webpage.

Last year we had plans to acquire equipment through an NSF grant and start implementing more hands-on projects for the students. We changed our proposed projects; but this is what we started implementing this semester:

1. ENGR-100 – Historical Structure Project

In this group project, groups research a historical structure of their choosing. They record 3 facts about the structures form, function, and structure for a total of 9 facts. Then, in SOLIDWORKS they attempt to create the overall shape of the structure and provide the overall size of the structure. Once they have created a representation of the structure in SOLIDWORKS, they scale the structure down and print it with a 3D printer. The last step of the project is for them to present their work to the class!!

2. ENGR-100 – Derby Car Racing

Inspired by the Boy Scouts of America derby car racing, groups of students designed their own derby cars in SOLIDWORKS and created technical drawings of their cars. They then 3D printed their cars, assembled them, and raced them. We had originally three different race days scheduled, but due to some unforeseen issues, two of the race days were optional. A portion of the grades earned by the students were related to how fast the car raced, as well as the cost of the car. To earn the highest grade, students needed to find a balance of speed and cost, much like designing a car in the real world!

3. ENGR – 200 - Centroids – Creating “Wacky” structures

Working in groups, students sketched drawing of structures that don’t exactly look like they can stay erect. Then by calculating the centroid of the structure, they updated their original designs to ensure the centroid was located under the footing of the structure. To prove the calculations worked, they 3D printed the structures and demonstrated that they remained erect despite their “wacky” shape.

We currently have 6 new 3D printers operating in our new Makerspace that have assisted with the running of these projects. With our current curriculum, and if we expand to include even more projects, two facts have become very evident:

1. Engineering needs a technician

Currently our Embedded Learning Assistants and I are working together to keep student prints running. Originally, we had the students run the printers by themselves after some instruction, but as more projects coincided with each other, this meant that classes later in the day did not have as much of an opportunity to use the printers. Hence, we moved to a “que” system where we either helped students run the 3D printers when it was their turn or we would run the prints for the students so that the 3D printers are continually running to avoid backup of queued prints. I will not necessarily have Embedded Learning Assistants who can help me in the future, so I would have to do this all by myself. Additionally, I am running maintenance on the printers on my free time to keep them up and running, which ideally should be performed by a paid technician instead. With the new CNC mill and other equipment in the Makerspace, it would be extremely beneficial to have the technician maintain the space and ensure student safety practices as more projects are introduced. Ideally, I would like to continue designing and implementing projects into courses as well as create teaching aids. I can create the designs and the technician can fabricate them

2. We could use a few more 3D printers!

If we acquire a few more printers, it will allow us more opportunities for the students to run the 3D printers throughout the semester and experiment. Additionally, we will be designing a project for our ENGR-220 Dynamics course, which will create more congestion in the 3D printing ques. However, our goal is to include a fabrication project in as many of our engineering courses as possible to engage our students and increase our modalities of teaching.

Page 2: II. Assessment and Student Achievement

Q7

II.A.1. Describe the progress your program has made in your 4-year assessment cycle. Include any assessment results your department has found and changes you have made as a result. If your assessment plan has changed, please upload this new plan as well.

We have our SLO assessment plan uploaded from last year's comprehensive program review. Additionally, we have recently updated many of the SLOs, so we can start comparing SLO data in the next year or two to assess the impact of curriculum changes on student comprehension. Additionally, I was a part of the OAC group to pilot assessing SLOs in Canvas and across courses; I plan to continue doing so and will encourage my instructors as well!

Q8

Respondent skipped this question

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

Page 3: II. Assessment and Student Achievement

Q9

II.B.1. What progress has been made in your program to address the institutional goals set around student success and equity? {2019 Equity Plan} If qualitative or quantitative data is available, please summarize any findings.

- Despite women being a marginalized group in engineering with 331 enrolled women over the past 5 Spring semesters compared to the 1,478 enrolled male students, the retention and success rates of women are higher than men! This implies that if we should focus on making the engineering program more accessible to women to increase women enrollment as once they are in the program, the data reflects that they are successful, with retention rates over the past 5 years being 89% and a success rate of 79%. Similar, but slightly lower percentages are reported over the past 5 Fall semesters as well.

- Engineering has been identified as having equity gaps for African American/Black Non-Hispanic, Asian, Hispanic Latino, and Multiple Race populations. The gaps exist in both retention and success. So not only do we need to plan to make engineering more accessible to these students, we also need to assist and engage them. The new project-based learning curriculum and Makerspace is one example of how we are trying to engage our students in the hope of increasing retention and success. However, I do know that we have not had consistent Engineering tutoring for the past few years and nor do we have "catch-up" resources for students who may not have been as successful in prerequisite courses. I think it will be a good idea for me to start thinking about how to strengthen these resources and making sure they are not centered around myself providing them, as that is only sustainable to a point.

Q10

II.B.2. In light of the goals set in your program review, what are your plans to improve equitable student outcomes (success, retention, persistence, graduation, etc.) in the coming year?

We are continuing to create and use the Makerspace combined with project-based learning opportunities to encourage enrollment in the engineering program and increase the retention and success rates of our students.

Q11

II.B.3. What did your program learn from the transition to remote teaching and operations over the past year? How can this be used to improve the student experience in the future?

Different courses and different instructors have different levels of retention and success. In the chaos of the past 2 years due to the pandemic, we have created curriculum content that can still be used to help assist our students even after we return to campus. For example, I have video recorded lectures for my ENGR-200 and ENGR-220 courses that I can still share with my F2F courses. In fact, with all the video content I created, I may try a flipped classroom approach where students are expected to watch the lecture before coming to class so we can spend class time clarifying concepts and working on assignments together!

Q12

II.B.4. Is your program a career education program (e.g., does it prepare students to directly enter the workforce)?

No

Page 4: II. Assessment and Student Achievement continued

Q13

II.B.5. Please share your observations about the employment rate for your program over the past several years.

Respondent skipped this question

Q14

II.B.6. What is the institution-set standard for your program's employment rate? The institution set standard is what you would consider the lowest acceptable employment rate for your program (or "floor").

Respondent skipped this question

Q15

II.B.7. What would you like your program's employment rate to be, ideally (stretch goal)?

Respondent skipped this question

Page 5: II. Assessment and Student Achievement continued

Q16

Does your department offer classes that are approved distance education courses excluding emergency remote teaching in 2020-21 (classes that would have been taught in person if not for the pandemic)?

Yes

Page 6: II. Assessment and Student Achievement

Q17

II.C.1. If there were differences in success rates for distance education (online) versus in-person sections of program courses in your last comprehensive program review, what has the department done to address these disparities? If online and in-person sections had comparable success rates, please describe what the program did to achieve that.

Fall 2020 was the first semester we had DE courses, and the retention and success rates of our DE courses were lower than our “on-campus” ERT courses. However, in Spring 2021, the retention and success rates of DE courses bounced back to be nearly identical to “on-campus” ERT courses. My hypothesis is that the first semester the curriculum and resources were still being created, in part due to COVID-19 “chaos”. Once the backbone of the courses was created, in Spring 2021 we were better able to serve our students. This is merely a hypothesis, and we will continue to monitor the retention and success of our DE courses as we acquire more data.

Page 7: III. Previous Goals: Update

Q18

1. Previous Goal 1:

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

Q19 — **Student Validation and Engagement**

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q20 — **In Progress - will carry this goal forward into next year**

3. Goal Status

Page 8: III. Previous Goals: Update continued

Q21 — **Respondent skipped this question**

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

Q22 — **Respondent skipped this question**

Do you have another goal to update?

Page 9: III. Previous Goals: Update continued

Q23

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Continue creating the Makerspace and project-based learning opportunities.

Q24

Do you have another goal to update?

Yes

Page 10: III. Previous Goals: Update continued

Q25

1. Previous Goal 2:

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

Q26

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Guided Student Pathways

Q27

3. Goal Status

In Progress-will carry this goal forward into next year

Page 11: III. Previous Goals: Update continued

Q28

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

Respondent skipped this question

Q29

Do you have another goal to update?

Respondent skipped this question

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

Q30

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

I personally had the time to review this older goal of reviewing the TMC for engineering. As it happens, there is none! This goal was set several years ago by someone else, and I now had the chance to investigate it more.

We are currently discussing with SDSU about their requirements for a Material Lab for it to articulate it with SDSU. Currently, it looks like they will require us to acquire a large and expensive Vickers Hardness tester; if this is the case, we will most likely not pursue creation of this course as the costs to create this 1-unit course would be better spent elsewhere. However, we have not given up quite yet!

Q31

Yes

Do you have another goal to update?

Page 13: III. Previous Goals: Update continued

Q32

1. Previous Goal 3:

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

Q33

Student Validation and Engagement

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q34

In Progress-will carry this goal forward into next year

3. Goal Status

Page 14: III. Previous Goals: Update continued

Q35

Respondent skipped this question

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

Q36

Respondent skipped this question

Do you have another goal to update?

Page 15: III. Previous Goals: Update continued

Q37

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

We are already working on the Makerspace, so now we will keep improving it and student projects.

Q38

Yes

Do you have another goal to update?

Page 16: III. Previous Goals: Update continued

Q39

1. Previous Goal 4:

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

Q40

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Guided Student Pathways

Q41

3. Goal Status

In Progress-will carry this goal forward into next year

Page 17: III. Previous Goals: Update continued

Q42

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

Respondent skipped this question

Page 18: III. Previous Goals: Update continued

Q43

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

This past year I have been appointed the coordinator for the Surveying program which will assist with collaboration between the Surveying and Engineering programs. Additionally, Larry McLemore and George Dowden have sent me to an Advanced Manufacturing training and we are pondering some ideas of creating some certificates related to Engineering Technology.

Page 19: IV. New Goals

Q44

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

No

Page 20: IV. New Goals continued

Q45

1. New Goal 1:

Respondent skipped this question

Q46

Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q47

Respondent skipped this question

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

Q48

Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q49

Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q50

Respondent skipped this question

6. How will this goal be evaluated?

Q51

Respondent skipped this question

Do you have another New Goal?

Page 21: IV. New Goals continued

Q52

Respondent skipped this question

1. New Goal 2:

Q53

Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q54

Respondent skipped this question

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

Q55

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Respondent skipped this question

Q56

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Respondent skipped this question

Q57

6. How will this goal be evaluated?

Respondent skipped this question

Q58

Do you have another New Goal?

Respondent skipped this question

Page 22: IV. New Goals continued

Q59

1. New Goal 3:

Respondent skipped this question

Q60

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q61

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

Respondent skipped this question

Q62

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Respondent skipped this question

Q63

Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q64

Respondent skipped this question

6. How will this goal be evaluated?

Q65

Respondent skipped this question

Do you have another New Goal?

Page 23: IV. New Goals continued

Q66

Respondent skipped this question

1. New Goal 4:

Q67

Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q68

Respondent skipped this question

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

Q69

Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q70

Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q71

Respondent skipped this question

6. How will this goal be evaluated?

Page 24: Resources Needed to Achieve Program Goal(s)

Q72

What resources is your program requesting this year to achieve the program's goals? (Check all that apply)

Faculty Resource Needs,

Classified Staff Resource Needs

Page 26: Final Check

Q73

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