#4

COMPLETE

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First Name:	Dan
Last Name:	Curtis
Email:	Daniel.Curtis@gcccd.edu
Custom Data:	Math
IP Address:	72.199.146.252

Page 1: I. Program Overview and Update

Q1

I.1. Department(s) Reviewed:

Math

Q2

I.2. Lead Author:

Dan Curtis

Q3

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

Annalinda Arroyo, Scott Eckert, Bryan Elliot, Tammi Marshall, Chris Navo, Terrie Nichols, Rachel Polakoski, Lamia Raffo

Q4

1.4. Dean/Manager:

Pam Kersey, Kim Dudzik

Page 2: II. Program Reflection and Description

Q5

II.1. Provide your program's mission statement:

Through our ongoing efforts to eliminate barriers to success and close equity gaps, students are empowered to achieve education’s promise.

Q6

II.2. How is this program advancing the college mission, vision and values?

The college vision, mission, and values can be summed up by the statement “Cuyamaca cares.” The Math Department is proud to support this guiding principle. We believe in the capacity of students to succeed in mathematics and that there is no limit to what they can achieve. We have and will continue to address systemic barriers and equity gaps to ensure that all students have an equitable opportunity to succeed. Furthermore, we will continue to evolve as equity-minded teachers so that our every interaction with students communicates, “You belong in College.”

For our successful and groundbreaking implementation of acceleration in mathematics, the Cuyamaca Math Department is a leader for reform efforts throughout the State. Our corequisite support model, changes to our placement policies, innovative pedagogical practices, and elimination of the remedial math pipeline have dramatically reduced the time it takes students to complete their math requirements. Consequently, the “math barrier” is crumbling at Cuyamaca College, and students are much more likely to attain their educational goals.

Q7

II.3. How does your program support the college's strategic goal of implementing guided pathways?

The Math Department strives to support students throughout their entire college experience. We are working on our messaging to students regarding placement and registration to better guide them into the courses that are most appropriate for their educational goals. We work closely with other departments to ensure that we are preparing students for subsequent courses. We are creating a new course (MATH 121-Quantitative Reasoning for Career Education) to support students in Career Education majors by specifically targeting the types of math problems they will be encountering in their chosen discipline.

Within various non-STEM majors, students are required to take discipline-based courses with an algebra prerequisite. However, the prerequisite algebra skills for these courses constitute a small proportion of a traditional Intermediate Algebra course (MATH 110 at Cuyamaca College). In other words, students in these majors do not need an entire Intermediate Algebra course. Consequently, to accelerate student progress within these majors, we tailored the content in two of our support courses, MATH 020 and MATH 060, to satisfy the algebra prerequisites. This allows students who are identified as under-prepared to bypass MATH 110 and enroll directly in a non-STEM college-level math course with support (MATH 120+020 or MATH 160+060) while simultaneously meeting the algebra prerequisite within their major.

Q8

II.4. Is the program description in the current college catalog up to date and accurate?

Yes

Page 3: II. Program Reflection and Description continued

Q9

II.4a. What steps will you take to revise the college catalog description?

Respondent skipped this question

Page 4: III. Course Curriculum, Assessment and Student Success

Q10

III.1. Access the Five Year Curriculum Review Cycle (requires GCCCD login). Have all of your active courses outlines been reviewed within the last five years?

Yes

Q11

III.2. What is your program doing to prepare students for successful transition (e.g. transfer and career readiness)?

We work closely with SDSU to ensure that our courses articulate so students have a smooth transition when they transfer. Since many social science majors need to take PSYC 215 instead of MATH 160 to fulfill their statistics requirement, we worked with the Psychology Department to pair a MATH 060 support course with PSYC 215 to provide support for students that were not eligible to take PSYC 215 through initial assessment.

We are in the process of developing MATH 121 (Quantitative Reasoning for Career Education) – a transfer-level math course intended for CE students. The course will feature a wide variety of application problems that are similar to the math problems these students will face in the discipline-based courses. This should improve overall success for students in CE courses.

Also, we are now offering more sections of MATH 120 (Quantitative Reasoning) as an alternative to statistics for non-BSTEM students. The skills learned in MATH 120 are very different than the skills learned in MATH 160 and for many students these skills may be better aligned with their educational and career goals.

MATH 060 is now a prerequisite for CHEM 102, allowing nursing & Allied Health majors to take MATH 160 (Statistics) for their math requirement as opposed to forcing students to complete MATH 110 (Intermediate Algebra).

Q12

III.3. Please list any planned changes for curriculum and the rationale for those changes:

We are in the process of developing MATH 121. Many of the CE courses require students to solve math problems related to their field. This course is being designed to target the math and critical thinking skills necessary to solve these application problems.

In spring 2021, we will redesign our MATH 160 curriculum to make it more equity-minded. Many colleges throughout California use Cuyamaca's Interactive Statistics on Canvas course (a zero-cost online interactive statistics textbook based on the Open Learning Initiative's content and constructed by Cuyamaca's Math Department). The Canvas course is accompanied by an activity-based workbook as well as guided lesson plans for instructors (both authored by Cuyamaca's Math Department). Unfortunately, while converting the Open Learning Initiative's course to Cuyamaca's Interactive Statistics on Canvas course, there was insufficient time to do the research and update the content. Consequently, nearly all of the examples, research-scenarios, and data in the Interactive Statistics on Canvas materials are outdated and lack cultural relevance. To increase student engagement, validate students' identities and cultures, and increase retention rates in statistics classes at Cuyamaca and other colleges throughout the State, we will update all Interactive Statistics on Canvas materials with current and culturally relevant examples, research-scenarios, and data. We will collaborate with the IESE office to assess the effectiveness of the project and share the results with any interested GCCCD constituency, the California Acceleration Project, and other colleges throughout the State.

More students now place directly into our first-tier BSTEM math courses – MATH 176 (PreCalculus) and MATH 178 (Business Calculus) with or without support. Unfortunately, the activities and lesson plans for these courses were developed early in the implementation of our Math Pathways program. We have learned so much about teaching and learning since that first year. Consequently, we now teach these courses in a student-centered learning environment (no more typical lectures, robotic note-taking or traditional textbooks). In this learning model, the focus of activity shifts from the teacher to the learner. Class time is spent on discussion, collaborative work, and engagement with other brains-on activities. However, the previously developed instructional materials do not support this highly successful learning model. As a result, we must develop new instructional materials for these courses. Additionally, we need to conduct an extensive review of the course content in Math 176 to ensure we are preparing students for success in physics, engineering, or other STEM courses that require MATH 176 as a prerequisite. Additionally, we plan to work with the Business Departments at Cuyamaca and SDSU to ensure the course content in Math 178 is adequately preparing students for their discipline-based courses.

Page 5: III. Course Curriculum, Assessment and Student Success continued

Q13

III.4. Please upload the most recent version of your program's course SLO assessment plan. Click here for an Assessment Plan Template

Math SLO Tracking FA 2021 thru SP 2025.pdf (109.8KB)

Q14

III.5. Please provide a high-level analysis of your SLO findings over the past year and what changes, if any, were made as a result:

Since our last comprehensive program review, we assessed all SLOs in our active courses. During the analysis phase of the SLO assessment process, we realized our SLOs were written more like course objectives or items in the course content list. Therefore, we rewrote the SLOs in all our courses and will develop a new assessment process in fall 2021 with assessment of these SLOs following.

Reviewing our SLO results to date, we are not surprised that many of our students struggle with application problems. Therefore, improving student learning in this area must be a central focus in several of our courses. The SLO data and the student success and completion data indicate that we need to make curricular changes in many of our courses including the development of mini lessons that provide just-in-time remediation. These changes should increase student success in the first attempt at a math course.

Although SLO assessment is useful, we recognize that SLO assessment provides insufficient evidence to determine which structural and pedagogical changes we need to make to improve student success. Consequently, we use SLO and Student Achievement data to identify whether there is a problem with skill mastery and concept attainment in our courses, but to fully understand how to fix the problem, we also rely on our Community of Practice workshops. The dialogue in these workshops reveal why students are struggling and how we can make changes to avoid student frustration and ensure their struggles are productive. Currently, we only offer Community of Practice workshops for courses with a corequisite support option. Math faculty who do not teach these courses are eager to set up a Community of Practice for the courses they do teach. Unfortunately, with the current lack of funding, expanding the Community of Practice program will be difficult.

Also, as part of the Equity-minded Teaching & Learning Institute, faculty who participated received instructor specific equity data. We had amazing discussions regarding this data and subsequently identified areas where we can improve our teaching practices to be more equity-minded. Assessing the equity data motivated the department to offer a syllabus workshop. This resulted in many instructors adopting a more equity-minded syllabus as well as equity-minded classroom practices.

Additionally, over the last two years, we have focused on data relating to the Math Pathways program and our curricular, pedagogical, and placement changes as well as the equity data provided by Institutional Research. Analysis of this data has motivated changes to our Math Pathways program, pedagogical practices, and instructional materials.

Q15

III.6. What student learning-related successes and challenges have SLOs results revealed for your department?Note: If SLO data are not offering useful feedback regarding student learning, and are not currently informing program improvements, please instead discuss the specific steps you plan to take to make learning outcomes and assessments more meaningful.

SLO data reveal problems with students' skill mastery or concept attainment, but not necessarily why that problem exists. We use supplemental data to pinpoint the reasons behind it, which allow us to make meaningful changes. The Math Department relies heavily on data to discover where students are struggling and uses the results to plan and implement changes to course content and student assessment tools. Developing and implementing the Math Pathways program continues to be an enormous undertaking and often dominates our focus while we improve and refine the program. Since our last comprehensive program review, we have gathered SLO data, but we realized that our SLOs were not written to provide actionable data. Over the last two years, we have updated our course SLOs. We will take the next year to rethink how to best assess our course SLOs and then put that plan into action the following year.

Page 6: III. Course Curriculum, Assessment and Student Success continued

Q16

III.7. How was the department of discipline's success rate across all courses changed within the past 4 years (the time frame covered in this comprehensive program review)?

During fall 2016, student success rates across all math courses were at 64%. Since then, the success rates have consistently increased from year to year, with rates reaching as high as 71% in fall 2019 and 74% in spring 2020. These increases have primarily been driven by increases in the success rates in our courses that have a support course option (MATH 160, MATH 176, and MATH 178). The student success rate in each of these courses increased by at least 5 percentage points over this timeframe. We attribute these increases to our Community of Practice program and other teacher-training activities provided by the Department. Through a focus on improved pedagogical practices and teaching students where they are instead of where we expect them to be, we have transformed our program into a much more student-centered learning environment that better promotes student success.

Q17

III.8. 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. What is your department or discipline's four-year (2024-25) goal for success rate across all courses in the department or discipline?

The Math Department does not focus on course success rates. Our focus is to improve student learning and educational goal attainment and, as a consequence, we expect course success rates to continue improving.

Q18

III.9. Please review the college-wide and program data sets, which have identified equity gaps based on the following criteria: 3% n=10 students/enrollments. Which groups are experiencing equity gaps in your program?

Success and retention rates are comparable between genders, with female students performing slightly better than male students. While we do see an equity gap for African-American and Latinx students, these gaps have decreased significantly over the last four years. In spring 2017, African-American student success rates were 18 percentage points below White students. This equity gap has decreased each year since, to a gap of 9 percentage points for spring 2020. Latinx students have seen a similar, though less dramatic, narrowing of the success rate equity gap, from a 15-percentage point gap in fall 2016 to a 9 percentage point gap for spring 2020. Though this is a significant improvement, these equity gaps still exist. With the Math Department’s commitment to equity-minded teaching practices, we expect these gaps to continue to narrow.

Q19

III.10. What department/discipline (or institutional) factors may be contributing to these lower rates of success for these groups of students?

There are several factors that may be contributing to lower success rates:

- It often takes well into the semester for students to receive their financial aid award
- The low number of tutors during the day and lack of evening and weekend tutoring
- Instructors may harbor hidden biases
- Lack of diversity in faculty and tutors
- Lack of open communication about cultural differences
- Students encounter hardships that hinder success or force them to drop such as COVID-19 and wildfires

Q20

III.11. What action will the department or discipline take to address these equity gaps in the short-term (next year) and long-term (next four years)?

To tackle hidden biases and lack of open communication about cultural differences, during the 2018/2019 and 2019/2020 academic years, 16 members of the Math Department, part-time as well as full-time, participated in the Equity-Minded Teaching & Learning Institute. Additionally, 17 Math Department faculty attended the Acceleration Across California conference over those two years which focuses on equity. Based on what was learned the department is working to make curriculum changes and develop teaching practices that are designed to address the equity gaps within our classrooms. A few examples are making the syllabus more equity and student-centered; changing the faculty mindset about students; and incorporating a more student-centered learning environment in all math classrooms. We will continue to encourage faculty to attend the EMTLI activities and other professional development that focus on equity.

To help alleviate student financial difficulties, we are in the process of adopting low to no-cost learning materials in math courses and plan to keep course costs low overall. For example, we have a supply of calculators that students may use during class and outside of class while they are in the STEM center. Additionally, we provide calculators that students may check out from the library for the entire semester. Furthermore, we have developed many of our own learning materials for our support courses. This allows us to offer the materials either free to our students or through the bookstore at cost. In addition, we are using Open Education Resources (OER) textbooks or reduced cost textbooks for several of our classes. For our other courses, we are expanding our free and reduced cost textbook program as part of our ongoing efforts to reduce overall course costs. Now that the purchase of required textbooks for several math courses is included through registration, students have access to the appropriate learning materials on day one and pay less as well. We expect this will increase success and retention rates.

Through the implementation of our corequisite support-model and the elimination of the math pipeline of doom, the Math Department has minimized the structural barriers to student success and rendered math curriculum more relevant. The remaining barriers to student success that we intend to address are: 1) changing mindsets (faculty, classified, administrators, and students); 2) student hardships (working with Cuyamaca Cares, UP!, DSPS, EOPS, etc.); 3) lack of instructional staff (faculty and tutors) that reflect the cultural diversity of our student body.

Q21

III.12. What other qualitative or quantitative data (from any source) is the program using to inform its planning for this comprehensive program review?

The Math Department relies heavily on the use of data and will continue our commitment to data-informed and evidence-based decision making by collecting and analyzing data from a wide variety of sources, including SLO and PLO data, student achievement data, equity-minded teaching and learning data, and our tailored data requests from Institutional Research.

In fall 2020, we received a data report initiated by one of our ad-hoc research requests. The report indicated that students who successfully completed PreCalculus with support (MATH 176+076) were less likely to pass Calculus I (MATH 180) on their first attempt than were students who successfully completed PreCalculus without support (MATH 176). However, those students who successfully completed MATH 176+076 and then successfully completed Calculus I (on more than one attempt), enjoyed nearly the same success rate in Calculus I as students that started MATH 176 without support. Based on this information as well as our combined experience in teaching Calculus, we inferred that students who placed in MATH 176+076 were not as prepared as their MATH 176 peers to successfully complete Calculus I on their first attempt. Consequently, as an intervention, we are creating a series of Canvas modules that review the algebra skills the MATH 176+076 students struggle with in Calculus I. As another intervention, we may develop and offer an optional one-unit online support course for MATH 180 (Calculus I), which we will recommend to students who successfully complete precalculus with support (MATH 176+076).

This research report also found that students that took AP Calculus in high school and placed directly into Calculus II (MATH 280) had higher success rates in MATH 280 than students that placed into PreCalculus (with or without support) and worked their way up to MATH 280. This was not unexpected, since the students placed directly into MATH 280 have the strongest math skills. However, the data also showed that the students that placed directly into MATH 280 had lower success rates in subsequent science and engineering courses than the students that started at a lower level. We are not sure why this is, but we suspect it might be that these students, though strong in math, haven't yet developed their overall college skills by the time they are asked to apply the math they learned in other disciplines.
Another concerning aspect of the data is that enrollments in higher level math courses among African American students are noticeably lower than their population overall at Cuyamaca. We need to do additional research to determine what is causing this. Some ideas are to work with the Umoja Community program as well as several local high schools to encourage African American students to pursue degrees in STEM.

We are running a series of focus groups during fall 2020 and spring 2021 that will include students that participated in Math Pathways courses. The focus groups will consist of students that were not successful as well as students that were successful in their Math Pathways course. The goal is to obtain information about student experiences that we can use to refine the program and improve student success and throughput.

We routinely receive reports from tutoring about how students are utilizing their services. The department uses this information to work with Tutoring on how best to serve our students.

As part of our recent changes to our placement policies, we were required to undergo a validity evaluation. The results of this study showed our placement process is working much better than our previous process. However, there were some issues that were revealed by this study. First, we need to improve our front-end messaging to students to more adequately prepare them for filling out the placement questionnaire. In addition, the back-end messaging needs to more clearly tell students what their results mean, stressing the importance of seeing a counselor. While we currently use a pathways approach to give the student the one or two best math classes for them to take, this needs some revision. We need to reach out to other disciplines so we can best determine which math class is most appropriate for each major and make revisions to the decision tree appropriately.

Q22

Respondent skipped this question

OPTIONAL: Please use the upload button to attach any supporting documentation you would like to include.

Page 7: III. Course Curriculum, Assessment and Student Success continued

Q23

Yes

III.14. Does your program offer courses via distance education (excluding emergency remote teaching in 2020)?

Page 8: III. Course Curriculum, Assessment and Student Success continued

Q24

Yes

III.15. Are there differences in success rates for distance education (online) versus in-person sections?

Q25

III.16. If there are differences in success rates for distance education (online) versus in-person classes, what will the program do to address these disparities?

Math 160 (Elementary Statistics) is currently the only math course offered 100% online. In each of the last 5 years, students enrolled in an online Math 160 class were less likely to successfully complete the course than students enrolled in the equivalent face-to-face course. Although the gap continued to narrow from year to year and decreased to 5.4 percentage points in the 2019/2020 academic year. To help further close this gap, our online MATH 160 classes now use our Interactive Statistics on Canvas learning materials in lieu of a traditional textbook. As the title implies, Interactive Statistics on Canvas is an interactive online textbook. Furthermore, this interactive online textbook was developed by Cuyamaca's math faculty and is offered free to students. Our face-to-face MATH 160 courses have successfully used Interactive Statistics on Canvas since the implementation of our Math Pathways program. Interactive Statistics on Canvas provide students with a more conceptual understanding of the material and help students stay focused and on task as they study statistic in smaller chunks. We anticipate that the adoption of these learning materials in the 100% online version of Math 160 coupled with a more equity-minded approach to teaching statistics online will close the gap between the online and face-to-face success and retention rates.

In addition, the department will refocus our efforts to improve retention in our online classes (as well as face-to-face). If we are able to help more students stay up to date with the material, this should lead to an increase in retention which ultimately will lead to an increase in success rates.

We also adopted another intervention aimed at improving retention and success rates in our short-term online Math 160 classes. These short-term class are now offered in a 12-week format as opposed to 8-weeks. The fast pace of an 8-week course tends to hinder student success and retention. An 8-week course does not allow time for students to catch up if they fall behind. Furthermore, we stagger the start dates of our 12-week online sections to allow students who need to 'start over' the opportunity to start fresh in another section. It is too soon to tell, but we are hopeful this strategy will increase success and help close those equity gaps.

Page 9: III. Course Curriculum, Assessment and Student Success continued

Q26

III.17. What mechanisms are in place to ensure regular and effective contact (see the Guide to Best Practices in Online) within online courses across the discipline or department?

Regular and effective contact hours are ensured by following the Cuyamaca College distance education policies that are currently in place. Some examples that are utilized by math faculty include, but are not limited to the following.

- Instructions for accessing an online orientation are provided in our course announcements.
- An online orientation module is provided in each course. This orientation module includes an affective domain exercise to better prepare students for online learning.
- Clear instructions in our syllabi state each instructor's policy for communicating with students (canvas messaging, email, and the Remind app are examples) as well as the timeframe students can expect for a response.
- During the first week of class instructors provide a syllabus quiz at the end of the orientation. This allows instructors to intervene when a student is not participating during that first crucial week of the online class.
- The Interactive Statistic on Canvas learning materials include substantive and authentic group discussion board assignments that are both summative and formative. These group assignments require students to provide effective and meaningful feedback to one another while also allowing instructors to "jump in" and provide encouragement and just-in-time remediation while the project is progressing. Additionally, students are encouraged to correct their mistakes based on the feedback they receive from their peers and instructor. Instructors also provide instructive feedback to each student when grading these assignments.
- While the course is ongoing, instructors utilize multiple messaging options to contact students who are struggling to keep up with the assignments as well as to offer. An example of a messaging option is the gradebook messaging feature in Canvas where the instructor messages all students who have not turned in the assignment or earned a low score.

Q27

III.18. What innovative tools and strategies are you using in your online courses to engage students and support student success?

As detailed above, we have implemented several innovative tools and strategies in our online courses to engage students:

- Switched instructional materials for our online MATH 160 to the Canvas modules that we developed for our face-to-face MATH 160 courses,
- A focus on retention for students in online classes,
- Adjusting course length of short-term classes to improve student success, including staggered start dates,
- Better communication with students through multiple messaging options (Canvas, email, etc.),
- Incorporating affective domain activities to help students deal with non-instructional issues, and
- Group discussion board activities.

Page 10: IV. Degree and Certificate Programs

Q28 **Yes**

IV.1. Does your program offer any degree/certificate programs?

Page 11: IV. Degree and Certificate Programs continued

Q29

IV.2. Please upload for each degree and certificate indicating how many awards were conferred in the past five years

Mathematics Degrees Confered.pdf (76KB)

Q30

IV.3. Please indicate when each degree and certificate was last reviewed and updated (semester):

Both the AS-T and local Mathematics degrees were last reviewed in fall 2019. We made changes to the local degree to align with the AS-T degree.

Q31

IV.4. How are these degrees/certificates meeting the needs of students, and/or articulation with four-year institutions?

We offer two degrees, Mathematics and Mathematics for Transfer. Our AS-T degree is matched with the CSU degree in Mathematics. Our local Mathematics degree was updated last year, effective this year, to give students additional pathways to a degree. Both of our degrees align well with the CSU and UC math degrees, making it easier for students to transfer to either system.

Q32

IV.5. Are there any changes planned if the degree/certificates are not meeting these needs?

No changes planned

Q33 **Yes**

IV.6. Can students complete the degree/certificate requirements within a two-year period?**requirement of Title 5, California Code of Regulations and Accreditation Standard II.A.

Page 12: IV. Degree and Certificate Programs continued

Q34

IV.7. How are you currently assessing your PLOs?

All of our PLOs are mapped to course SLOs. This allows us to assess the PLOs as we are assessing the course SLOs. Additionally, several faculty have created projects in our capstone courses (MATH 281, 284, and 285) that allow students to demonstrate the knowledge they have learned throughout their time at Cuyamaca.

Q35 **Yes**

IV.8. Are the PLOs in the catalog an accurate reflection of the department or discipline’s current learning objectives?

Q36 **Yes**

IV.9. Are the PLOs mapped to the course SLOs?

Page 13: IV. Degree and Certificate Programs continued

Q37

IV.10. How is your program helping students explore careers in your program area?

For the last several years, the Math Department has participated in the Student Success Day event. We meet with incoming students and give them an overview about the Math Degree and possible career choices. We have also created fliers with a list of possible career options for those with a degree in math. These fliers are available in the STEM Center and posted online on the Math Department website. Since the majority of our students are not math majors, we work alongside other departments to ensure that we are adequately preparing students for the classes they take which have math as a prerequisite. The Math Department website contains a wide variety of resources aimed at helping potential math majors discover a career, including Career Paths to STEM, Best Career for Math Majors, College Success for Women in STEM, and Data Science Careers.

Q38

IV.11. What do the latest labor market data reveal about the careers (including those for transfer students) for which your program prepares students? Labor market data may be sourced from the Program Review Data webpage and California Employment Development Department. You can also contact the Institutional Effectiveness, Success, and Equity Office to access additional labor market information related to your program.

The latest labor market data shows strong labor market growth for graduates with a Math Degree. The occupations listed on the California Employment Development Department website for Mathematics, General (with their expected percentage growth over the next 10 years) are Natural Sciences Manager (11.3%), Statistician (34.9%), and Secondary School Teacher (7.1%). For Mathematics, Applied, the occupations listed are Natural Sciences Manager (11.3%), Statistician (34.9%) and Actuary (28.6%).

Q39

IV.12. What are the labor market implications for the program’s curriculum (degrees, certificates, courses)?

There aren’t really any labor market implications for our curriculum. Math curriculum is determined more from the transferring institutions’ requirements for articulation in STEM fields.

Q40 **Respondent skipped this question**

If your program has labor market data to include in your program review, please use the upload button below to attach the file.

Page 14: IV. Degree and Certificate Programs continued

Q41

IV.13. Please describe your program's strengths:

- Our conversations always circle back to how we can best support students. We focus on student success and meeting students where they are, not where we expect them to be.
- We strive to make our courses more applicable to students' goals and understanding their challenges so we can better help them.
- We are forward thinking; we are not afraid to take risks and deviate from the status quo if we feel it will help students.
- We work well with each other to resolve issues and come up with innovative ideas.
- We have a strong working relationship with other disciplines, which allows us to align our curriculum to better serve students in these areas.
- We also work closely with student services to ensure students are receiving the correct information for their educational goals.
- With the Math Pathways program, we have streamlined the process for students to fulfill their math requirements. This includes the assessment process, the corequisite model, which allows students to complete their classes sooner, and the removal of exit points, which keeps students on the right path to completion.
- We are very inclusive with our part-time faculty. We encourage them to attend department meetings, ask for their input in department decisions, and work hard to ensure they are adequately compensated for their work.

Q42

IV.14. Please describe your program's challenges:

Inadequate funding: Math Pathways could not have been successful without our Community of Practice, where we meet regularly to discuss best teaching practices, affective domain activities, and our new teaching philosophies. The grant that allowed us to have our Community of Practice meetings ended in 2018. Since then, we have relied on college funding, though at a much-reduced rate and with no funding this year. As a result, we have had to scale back our Community of Practice when, in fact, we would like it to grow to all math courses.

Remote teaching environment: With the campus closure due to COVID-19, all our classes have had to be moved online. Like everyone else, we had a difficult transition adapting courses that were never intended to be taught online, being taught by instructors with little or no training on how to teach in an online environment.

Shortage of full-time faculty: Designing and implementing the Math Pathways program was an enormous undertaking that took all our focus over the last five years. We are always looking for innovative ideas that will improve the students' experiences and make it more likely that they fulfill educational goals. Due to all available full-time faculty (and some very exceptional part-time faculty) being tied up with Math Pathways, we have not been able to implement these new ideas.

Communication with students prior to completing the placement questionnaire and registration: Prior to Math Pathways, the math sequence was linear, and students had little choice which class to take. This made it easy to get students into the correct class, though it made it much more difficult for students to succeed. Now that students have many more options when selecting a class, they can choose a course that better matches their educational goals. However, we have found that many students end up in the wrong class for their major, particularly CE and non-BSTEM majors. We are working on creating a pre-message students would read and have to acknowledge prior to completing the placement questionnaire. The hope is this will help students understand the questions they are about to answer so their answers or more accurate, especially for our returning students and those who attended high school in another country. In addition, we are working on a post-message to help students better understand the courses they need to take.

Q43

IV.15. Please describe external influences that affect your program (both positively and negatively):

Funding: There are several ways that inadequate funding negatively impacts our program. We have had to decrease the number of hours our Community of Practice meets. Without enough full-time faculty, we are limited in our ability to implement innovative ideas to help improve student success and close equity gaps. With no weekend and limited evening tutoring, many students are unable to utilize this important service.

COVID-19: The transition to a remote learning environment due to COVID-19 has negatively impacted our program. Most of our classes were not designed to be taught online and we had very few online resources developed for them. Also, many students face very uncertain times that negatively impact their ability to focus on their education.

Outside acceptance and support of our innovative ideas about how to design our curriculum and placement policies: Prior to the passing of AB-705, we did encounter some resistance to our ideas, but we also had many advocates that supported the implementation of our Math Pathways Program. These included the Chancellor's Office, the Public Policy Institute of California, Complete College America, the Dana Center, and, most importantly, the California Acceleration Project. Without the support and encouragement we received, the Math Pathways program would not have been possible.

Cuyamaca Cares: We have many students that are food insecure, which negatively impacts their ability to focus on their education. The Cuyamaca Cares campaign and the amazing work they are doing with San Diego Food Bank has been extremely helpful with providing food to students in need.

Support from the college during the shutdown: When we transitioned to a remote learning environment, many students and faculty did not have adequate technology to engage in such a platform. By providing this much needed technology, such as parking lot wi-fi, computers and hotspots, many students were able to stay in school and continue their education when they otherwise would not have been able to. In particular, the Online Teaching & Learning Committee, led by Jodi and Rhonda, were essential to the success of the pivot from face-to-face to ERT. Their support continues to be invaluable for our continued success throughout the ongoing crisis.

Q44

IV.16. Given these factors, what opportunities exist for the program to advance student success and equity in the next 4 years?

There are many opportunities to advance student success and equity in the future. We will always be improving and refining our Math Pathways program with specific examples given throughout this document. Some examples we identified are providing additional support for students that start in MATH 176+076 when transitioning into MATH 180; our messaging to students, both before and after placement; and continuing to work with other disciplines to better prepare our students with the skills necessary for the types of problems they will face in their subsequent courses. This work will be supported by two faculty members' sabbaticals in spring 2021 geared to help with student success and equity. As discussed, one faculty member will create online educational materials aimed to support students in MATH 180, particularly those that are coming out of MATH 176+076, while the other will be creating equity-minded curriculum and course materials for MATH 160.

Page 15: V. Previous Goals

Q45

Previous Goal 1:

Assess, revise as needed, and continue to improve the Math Pathways program

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Q46

Goal Status

In Progress - Please describe the goal and action steps in the 4-Year Goals section (Section VI)

Page 16: V. Previous Goals continued

Q47

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

Respondent skipped this question

Page 17: V. Previous Goals continued

Q48

Would you like to submit another previous goal?

Yes

Page 18: V. Previous Goals continued

Q49

Previous Goal 2:

Support student success in each Academic and Career Pathway (ACP)

Q50

Goal Status

In Progress - Please describe the goal and action steps in the 4-Year Goals section (Section VI)

Page 19: V. Previous Goals continued

Q51

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

Respondent skipped this question

Page 20: V. Previous Goals continued

Q52

Would you like to submit another previous goal?

No

Page 21: V. Previous Goals continued

Q53

Previous Goal 3:

Respondent skipped this question

Q54

Respondent skipped this question

Goal Status

Page 22: V. Previous Goals continued

Q55

Respondent skipped this question

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

Page 23: V. Previous Goals continued

Q56

Respondent skipped this question

Would you like to submit another previous goal?

Page 24: V. Previous Goals continued

Q57

Respondent skipped this question

Previous Goal 4:

Q58

Respondent skipped this question

Goal Status

Page 25: V. Previous Goals continued

Q59

Respondent skipped this question

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

Page 26: VI. 4-Year Goals

Q60

Goal 1:

Assess, revise as needed, and continue to improve the Math Pathways program

Q61

Basic Skills Acceleration

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

Q62

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

Students in all math pathways (STEM, Liberal Arts, CTE, Business, and Education) benefit from acceleration. We developed the Math Pathways program based on the three high-leverage strategies: Accelerate Remediation, Concurrent-enrollment Support Courses, and a change in placement policies. Simply stated, the goal of Math Pathways is to eliminate the equity gap and increase student completion rates of transferable math courses. By implementing the three high-leverage strategies, Math Pathways provides all students, and, in particular, disproportionately affected students, with an achievable pathway to earning a degree or certificate or transferring to a four-year university.

The Math Pathways program is specifically designed to support the department's vision, namely, to plug holes in the leaky pipeline and to close the equity gap. We have completely eliminated all of our basic skills courses and the number of students enrolling in Math 110 (our only remaining pre-transfer-level course) has also decreased significantly. With our current placement policies and concurrent support model, all students are now eligible to enroll in a transfer level math course upon applying to the college. By shortening the pre-transfer pipeline, we give students fewer opportunities to fall out and allow them to complete their math requirements in a timelier manner. Also, with our previous placement policies, disproportionately impacted students were much more likely to find themselves in pre-transfer math classes. By revamping the placement policies, we have closed the equity gap regarding access to a transfer-level math course. This, in turn, has meant an increase in throughput rates and a considerable narrowing of the equity gap. In addition, we have implemented a pathways approach to matriculating students by asking them their major during their placement assessment and then tailoring the list of math classes they see presented by filtering out the courses that would be inappropriate for their educational goals.

Q63

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

Ever since we launched Math Pathways 5 years ago, we have been collecting data from a multitude of sources, and it all points to the same conclusion. The success of the program is undeniable. We have seen a substantial rise in throughput rates from our students, particularly disproportionally affected students. While the achievement gaps have closed considerably, they do still exist. For example, with success rates over the last 5 years, we see a gap of up to 15% for Latinx and African American students. We must continue to revise and improve our program to address these gaps.

Q64

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 specific the type of request (e.g., submit technology request for new laptop computers).

a. Community of Practice and teacher mentoring programs
Since a considerable percentage of our courses are taught by part-time instructors, the Community of Practice (COP) and Teacher Mentoring programs we have developed have been essential to the success of the Math Pathways program. As part of these programs, we regularly meet to discuss best teaching practices, such as just-in-time remediation, student-centered classrooms, student engagement, productive struggle, and faculty & student mindset. We also develop assignments to address students' affective needs and internal struggles or fears such as affective domain and math interlude assignments. We work on creating culturally relevant teaching materials and develop techniques for using equity-minded practices in the classroom. We are continually in the process of developing new instructional materials, classroom activities and assessments, and online assignments in the support of these practices. We will continue to implement these programs, provided we have the funding required to sustain them. We will be exploring grant opportunities that will allow us to continue with these programs and even expand them to all our courses. We will be developing a guide for how we will do this once funding is available.

b. Collaboration with Tutoring to train tutors for Math Pathways courses
The Math Department collaborates with Tutoring to train tutors so they can better help students in the Math Pathways program. Due to the innovative teaching methodology, tutors need specialized training for these classes. In spring 2020, we received funding for three tutors to participate in this training by having them attend the classes to see what the students are learning, how it’s being taught, and brush the tutors up on some of the harder topics taught in the course(s). We plan to continue and hopefully expand this practice to include the calculus sequence, provided tutoring has the funding available to continue with the training.

In addition, the tutoring budget cuts continue to hit hard. Students need to be able to get help and it needs to be made available at many hours during the week. We would like to see additional tutors during the day as well as have tutoring open until 8:00 pm four nights of the week (instead of just two nights). Also, because of the need to meet students where they are, we feel it is important tutoring be available on weekends, since this is when many students have the time available to dedicate to their studies. But this takes money, and tutoring often finds itself relying on soft money rather than having enough in the general fund. We would like to see the college increase the general funds given to Tutoring.

c. Integration of equity-minded practices into the Math Pathways program
Over the last few years, many members of the Math Department (part-time and full-time) have participated in the year-long Equity-minded Teaching & Learning Institute (and its predecessor). The Math Department also has a strong presence with the Umoja Community program at both Cuyamaca and Grossmont. To continue and expand these relationships the Math Department meets regularly with the members in both programs to discuss best teaching practices, course content coverage, student validation and engagement, community building amongst the students and between the students and faculty & staff. As a result, our tight-knit community better serves our disproportionately impacted students as it can quickly identify and intervene on the behalf of a struggling student providing them with the appropriate resources and guidance to keep that student on their path. Applying what we learned, we plan to redesign our instructional materials to better serve our diverse group of students. In spring 2021, we will start updating our MATH 160 materials to make them more equity-minded and culturally relevant, intended to broaden students’ worldview. Specifically, we plan to develop materials for our statistics and quantitative reasoning courses tailored to be relevant to the Latinx and African American cultures. We currently offer an Umoja Community MATH 160 course. Along with this equity-minded course redesign, we plan to develop criteria for addressing the equity gaps in instructors’ teaching and learning practices. We have created example syllabi that are more equity-minded and have conducted workshops to share them with instructors within the Math Department.

d. Continued use of data to assess the effectiveness of the Math Pathways program and make revisions as needed
Ever since the launch of the Math Pathways program five years ago (as well as our preceding acceleration program with MATH 096), the Math Department has relied heavily on a wide variety of data to inform revisions to the program. This has allowed us to identify where we were losing students and patch these holes in the leaky pipeline. The data also allowed us to recognize the biased nature of our previous placement policy and its adverse impact on disproportionately affected students. This led to a significant change in how students are placed into classes and a significant decrease in equity gaps. Early in fall 2020, we received an extensive report from

Institutional Research titled “Cuyamaca Math Pathways Outcomes with an Equity Lens.” This report includes student data from Math Pathway courses, as well as subsequent courses in math and other disciplines. The data in this report is allowing us to assess the Math Pathways program, both in removing equity gaps and in how well the program prepares students for courses later in their academic pathway. The Math Department will continue its commitment to data-informed decision making by collecting and analyzing data from a wide variety of sources, including SLO and PLO data, student achievement data, and equity-minded teaching and learning data, as well as reports from Institutional Research.

e. Assistance for math faculty transitioning to online or ERT courses
With the shutdown of the campus for most of 2020 and into 2021, the necessity for instructors to have training in online teaching has become apparent. Many instructors were ill-prepared for the sudden transition to online teaching in spring 2020. To provide a better learning experience for students, all faculty were required to take an online or ERT training course to be able to teach in fall 2020. To prepare for the possibility of another shutdown, the Math Department will encourage new faculty to take these courses even after the college opens back up and they are no longer required. Also, the Math Department will continue to assist math faculty new to online teaching by sharing best teaching practices and online resources. To facilitate the transition to online teaching for fall 2020, the department held Community of Practice meetings during summer 2020. These meetings included how to use Zoom and other available online tools to promote a student-centered classroom in an online setting. This training will be incorporated into our Community of Practice and teacher mentoring programs. To facilitate the sharing of resources, we have developed a Canvas shell with modules targeted for specific courses that instructors are able to incorporate into their courses.

Q65

How will this goal be evaluated?

As stated above, the Math Department will continue to collect and analyze data from a wide variety of sources (including SLO and PLO data, student achievement data, and equity-minded teaching and learning data) to assess the effectiveness of the Math Pathways program and to make revisions as necessary. In fall 2020, we are conducting focus groups that will give us feedback from students to help us revise the program to better support student needs. We will continue to rely heavily on reports such as the one we received in fall 2020 to evaluate this goal.

Q66 **Yes**

Would you like to propose a new, 4-year goal?

Page 27: VI. 4-Year Goals continued

Q67

Goal 2:

Support student success in each Academic and Career Pathway (ACP)

Q68 **Guided Student Pathways**

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

Q69

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

One of our primary goals is to get students through their math requirements as quickly and efficiently as possible, while providing pathways tailored toward students' specific career goals. We adjust our offerings as necessary in support of these pathways. Since MATH 160 (Elementary Statistics) and MATH 120 (Quantitative Reasoning) are the only math requirements for most non-BSTEM majors, demand for these courses has increased dramatically. When incoming students complete the initial placement assessment, they are given a list of courses they are eligible for that is tailored to match their educational goal, reducing the likelihood students take wasted courses.

The instructional materials used in MATH 160 and MATH 120 have evolved to be more equity-minded, relating directly with students' academic and career pathways. To support students in the Career Education disciplines, we are in the process of developing MATH 121, Quantitative Reasoning for Career Education. This course targets the math skills CE students will see in their discipline classes. In addition, the department is working with the Biology, Chemistry, and Physics Departments to ensure that the material taught in the math courses remains relevant to the various STEM academic and career pathways and provides students with a solid understanding of the math they will need in their future science and engineering courses.

Q70

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

Only a small percentage of the students taking a math course are math majors. For the majority of our students, math is either a GE requirement or a prerequisite for one or more of the courses required for their major. It is essential that we meet the students where they are and support them on their path. We offer two Math Pathways courses to serve the multitude of non-STEM majors with a wide variety of academic and career pathways, MATH 160 and MATH 120. In fall 2020, we offered eighteen sections of MATH 160 (six with concurrent support) that enrolled a total of 626 students. In addition, the instructional materials used in MATH 160 have evolved to be more equity-minded, relating directly with students' academic and career pathways. Also, the number of MATH 120 sections has continued to increase from no sections offered in spring 2019 to three sections in fall 2020 (one with concurrent support).

With the shortening of the pipeline overall, the number of sections of STEM-supporting courses (MATH 180 and above) has also increased dramatically from 14 sections in fall 2015 to 21 sections in fall 2020. This tells us more students than ever before are making it through the math sequence. One important aspect of all this work is ensuring that students in math classes are learning the appropriate skills that are helping them succeed in their science and engineering courses, which was verified in the extensive research report that was discussed in the Data Analysis section.

Q71

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 specific the type of request (e.g., submit technology request for new laptop computers).

a. Collaboration with various college constituencies to promote student success through math and other pathways
We will continue to collaborate with other departments to ensure students are getting through their math requirements as quickly and efficiently as possible, while still supporting them through their Academic and Career Pathways. Last year, we collaborated with the Psychology Department to provide a concurrent support course, pairing MATH 060 with PSY 215 (Statistics for Behavioral Sciences). Students are now able to complete their math requirements in a single semester with the best math course for their major. We will continue to refine the instructional materials for this MATH 060 course to better support the psychology and social science students.

Political Science has a new course, POSC 170 (Introduction to Political Science Research Methods). The Math Department is planning to work with the Political Science Department so we can link a MATH 160 with this new course starting in spring 2022. This will help students planning to study Political Science learn statistics as it is related to their career pathway.

The department plans to work with Cuyamaca's and SDSU's Business Departments to improve our MATH 178 (Business Calculus) course and ensure that the topics covered are relevant for business students.

Because of the large number of math classes available to first-time students, the Math Department will continue to work with Counseling to help guide students into the appropriate math course for their academic and career goals.

b. Innovative course offerings designed to streamline student pathways
To support STEM students, in spring 2020 we offered a MATH 280/281 (calculus II & III) combo course with MATH 280 the first 8 weeks and MATH 281 the second 8 weeks. This format allows students to complete both in the same semester and enroll in their physics classes sooner. Unfortunately, the college shut down due to COVID-19 concerns just as the MATH 280 portion was finishing up and the MATH 281 had to be taught entirely online. This was less than an ideal situation as MATH 281 is a difficult class to teach (and learn) under the best of circumstances. Despite this, overall, we consider this program successful. We felt the students finishing MATH 280 were prepared for MATH 281 and their future science classes. We are offering this format again in spring 2021 and will continue to monitor its impact on student success.

c. Develop online resources targeting prerequisite skills
In support of STEM students, in spring 2021 the Math Department will work in collaboration with the Physics Department to produce supplemental videos and online Canvas resources to help students in calculus and physics courses. Calculus and physics are difficult subjects for students to learn and without a strong algebra and trigonometry background, students often struggle. By specifically targeting the requisite algebra and trigonometry skills, the materials produced during this sabbatical will provide students with the direct support they need. This will free up more time in the classroom to focus on the calculus topic at hand instead of having to spend time remediating prerequisite skills.

d. Ensure relevance of BSTEM pathway courses
The department has made significant changes in support of the BSTEM pathways by offering concurrent support courses for PreCalculus and Business Calculus. This has shortened the pipeline for BSTEM students dramatically. We plan to continue working with the Biology, Chemistry, Physics, and Business Departments to ensure that the material taught in the math courses remains relevant to the various BSTEM Academic and Career Pathways and provides students with a solid understanding of the math they will need in their future science, engineering, and business courses.

Before Math Pathways, CHEM 102 for Allied Health and Nursing majors had a prerequisite of MATH 090, which we no longer offer. We worked with the Chemistry Department to determine what skills from MATH 090 were necessary for success in CHEM 102 and included those skills in MATH 060 (concurrent support course for MATH 160). This ensured that students in this area could complete their pathway by taking statistics, which is necessary for their major, instead of forcing them into MATH 110, which would cost them an extra semester of math and teach them skills that are not relevant to their educational goals. We will continue this relationship.

e. Support Guided Pathways by helping students stay on the path
The Math Department has a commitment to support students that, for various academic or personal reasons, experience a setback on their pathway and to get them back on the right track. We offer staggered start courses, which allow students that have to drop a course early in the semester to switch to a new section that starts later and gives them the opportunity to move forward without it costing them an additional semester. As part of our Community of Practice and Teacher Mentoring programs, we also encourage faculty to reach out to struggling students so they can intervene before students are forced off their intended path.

Q72

How will this goal be evaluated?

The Math Department continually monitors a wide variety of data to assess the success of its programs, including success, retention, throughput, and completion. Additionally, we collect data on the success rates of students in the subsequent courses in other disciplines to ensure we are preparing students appropriately for the math they need in their Academic and Career Pathway courses. Also, we work in collaboration with members of the disciplines we are preparing our students for, by asking for feedback regarding the strengths and weakness of our students after successfully completing their math sequence, allowing us to identify and target areas where we may not be preparing students adequately.

Q73

Would you like to propose a new, 4-year goal?

No

Page 28: VI. 4-Year Goals continued

Q74

Goal 3:

Respondent skipped this question

Q75

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

Respondent skipped this question

Q76

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

Respondent skipped this question

Q77

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

Respondent skipped this question

Q78

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 specific the type of request (e.g., submit technology request for new laptop computers).

Respondent skipped this question

Q79

How will this goal be evaluated?

Respondent skipped this question

Q80

Would you like to propose a new, 4-year goal?

Respondent skipped this question

Page 29: VI. 4-Year Goals continued

Q81

Goal 4:

Respondent skipped this question

Q82

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

Respondent skipped this question

Q83

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

Respondent skipped this question

Q84

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

Respondent skipped this question

Q85

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 specific the type of request (e.g., submit technology request for new laptop computers).

Respondent skipped this question

Q86

How will this goal be evaluated?

Respondent skipped this question

Page 30: VII. Resources Needed to Fully Achieve Goal(s)

Q87

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

Faculty Resource Needs,

Technology Resource Needs,

Supplies/Equipment and Other Resource Needs,

Facilities Resource Needs

Page 32: Final Check

Q88

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