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OVERVIEW OF PROGRAM REVIEW AND PLANNING FOR INSTRUCTIONAL PROGRAMS

Program Review is about documenting the plans you have for improving student success in your program and sharing that information with the community. Through the review of and reflection on key program elements, program review and planning identifies program strengths as well as strategies necessary to improve the academic discipline, program, or service to support student success. With our new Guided Pathways plan, this review becomes even more crucial for the success of our students and college.

We are using the Strengths, Opportunities, Aspirations, Results (SOAR) strategic planning technique to help us focus on our current strengths and opportunities, create a vision of future aspirations, and consider the results of this approach.

BASIC PROGRAM INFORMATION

Academic Year
2020-2021

Are you completing a comprehensive or annual PRP?
Comprehensive

Department Name
Mathematics

Discipline Name
Mathematics (MATH)

Department Chair Name
Craig Chamberlin

Division Name
Mathematics, Science and Engineering

Website address for your discipline
<https://www2.palomar.edu/pages/math/>

Discipline Mission statement

The mission of the Palomar College Mathematics Department is to provide an environment where a diverse student body can learn and become competent users of mathematics and mathematical applications. Moreover, the department will contribute to the development of students as mathematical thinkers, to continue to grow in their chosen professions, and to be successful after transferring to a college or university.

In pursuing this mission, primary departmental functions are the development, dissemination, and application of mathematical knowledge in the areas of mathematics and statistics. We will serve students who are STEM majors and minors, general education students, at both basic skills and transfer levels.

In fulfilling this mission, the department creates an environment where the faculty can continue to grow as teachers and scholars, while providing public and professional service.

[\(click here for information on how to create a mission statement\)](#)

Does your discipline have at least one degree or certificate associated with it?
Yes

Are any of your programs TOP coded as vocational (CTE/CE)?
No

List all degrees and certificates offered within this discipline.
Associate in Science in Mathematics for Transfer
Associate in Science in Mathematics

Please list the names and positions of everyone who helped to complete this document.

Craig Chamberlin - Chair

Kelli Miller - ADA

Tracy Johnston - Math Faculty and SLO Facilitator

Cindy Anfinson - Math Faculty and Title V/STEM Activity Director

Fari Towfiq - Math Faculty and Math Center Director

Mathews Chakkanakuzhi - Math Faculty

Use the link to provided to help answer the staffing questions below. This form requires a login and password to access. Please use your Palomar email and password to log in.

Link: [Permanent Employees Staff Count](#)

Full-time Faculty (total number of FT faculty in your discipline)

29

Full-time Faculty (FTEF)

24.00

Part-time faculty (FTEF)

27.57

Classified and other permanent staff positions that support this discipline

Kelli Miller - ADA

Additional hourly staff that support this discipline and/or department

PROGRAM INFORMATION

In this section you are asked to consider your programs, their learning outcomes, the annual number of completions, goals for completions and enrollment and efficiency trends.

PROGRAM LEARNING OUTCOMES

Begin this section by reviewing the Program Review reports for programs and courses in Nuventive Improve (TracDat). All active course and program learning outcomes should be systematically assessed over a 3-year cycle. First, look at program learning outcomes.

- **Program** = Leads to a degree or certificate
- **Discipline** = A group of courses within a discipline

*Programs will be able to complete program completion and outcome questions.

How well do your program's learning outcomes communicate the scope and depth of the degree/certificate offered?

The program's learning outcomes fully support the scope and depth of the degrees offered by the Math Department. Both degrees require students to know the fundamentals of calculus (derivatives and integrals) as well as using them for problem solving and for applications to other disciplines. The transfer degree also requires math a step beyond calculus, and the non-transfer degree requires programming skills. All these requirements are addressed by the PLOs.

How do they align with employer and transfer expectations?

Employers expect our AS graduates to have calculus knowledge as well as programming and problem-solving skills that they know how to apply to other disciplines. Universities expect our AS-T graduates to have calculus knowledge and also linear algebra or differential equations knowledge as part of the traditional calculus sequence so they can continue with their bachelor's degree studies. Our PLOs are well-aligned with those expectations.

Describe your program's plan for assessing program learning outcomes.

The courses required for each degree have student learning outcomes that are assessed every three years. Those courses are mapped to the program learning outcomes, which means the PLOs are also assessed every three years.

Summarize the major findings of your program outcomes assessments.

Here are the findings for AS degree program SLOs:

1. Find the derivative of functions using the rules of derivatives.

Math 140 instructors found that students performed overwhelmingly well on the derivative problems on their final exams. A strong majority of students were able to apply the basic rules of derivatives - power rule, sum and difference rule, product rule, and quotient rule. While fewer students (only about seventy percent) were successful in applying the chain rule.

2. Evaluate integrals using various techniques of integration.

In Math 141, 70.4% of the students showed proficiency in evaluating integrals using various techniques of integration.

3. Use calculus to solve a variety of science, math, and engineering problems.

In Math 140, the calculus team instructors found mixed results when it came to the optimization problems clearly indicating that more work needs to be done in this area. While more than half of the students tested were able to solve a simple optimization problem, very few students (about one-third) were successful in solving a complex optimization problem.

In Math 206, 85% of students scored at least 70% on solving science and engineering problems.

4. Apply the fundamentals of programming to solve science, math, and engineering problems.

In Math 146, students were asked to write a program during a lab time to approximate e^x using a Taylor Polynomial. The assignment requires the knowledge of sequence, selection and iteration structures. Three students were assessed and all (100%) were able to produce the result.

5. Understand other uses of mathematics in some STEM (Science, Technology, Engineering, Mathematics) disciplines in an introductory format.

In Math 206, 85% of students scored at least 70% on solving science and engineering problems.

Here are the findings pertaining to the AS-T degree program SLOs:

1. Find the derivative of functions using the rules of derivatives.

See number 1 above.

2. Evaluate integrals using various techniques of integration.

See number 2 above.

3. Use calculus to solve a variety of science, math, and engineering problems.

See number 3 above.

4. Understand the theoretical foundations of linear algebra and/or apply appropriate analytical techniques to solve differential equations.

Math 200 (Linear Algebra)

"Question 2 on specific subspaces showed differences between the evening and day students. For part a of Question 2, 76.5% of the day students received a 3 or higher as compared to 34.6% of the evening students. For part b of Question 2, 73.5% of the day students received a 3 or higher versus 69.2% of the evening students. For part c of question 2 76.5% of the day students received a 3 or higher versus 42.3% of the evening students. For part d of question 2, 82.4% of the day students achieved competency (3 or higher) versus 73.1% of the evening students.

Question 3 covered the eigenvalue and eigenvector problem. Here the results between the day and evening students were opposite that of question 2; the evening students did better overall. 82.4% of the day students achieved

competency on question 3a, versus 96.2% of the evening students. And 58.8% of the day students achieved competency on question 3b, as compared to 73.1% of the evening students.

Overall, 72.8% of the day students achieved competency on the SLOs, as compared to 64.09% of the evening students.

Reflection of Results Question 2: we feel the differences are due to the differences in the populations who take this class during the day and evening. The evening students tend to be older working professionals and very dedicated to their own success.

Question 3: we feel that both courses did well on this question as the eigenvalue problem is covered late in the semester, closer to the final exam when this SLO was assessed.

Math 206 (Differential Equations)

Students scored 70% on this requirement.

5. Understand other uses of mathematics in some STEM (Science, Technology, Engineering, Mathematics) disciplines in an introductory format.

See number 5 above.

Reflecting on the major findings you summarized, what are some questions you still have about students' learning in your program that you have not yet been able to address with your outcomes assessments?

I want to know what can be done to improve student understanding and solving of the more complex optimization problems.

Also, we would like to improve students' conceptual understanding of eigenvalues and eigenvectors in linear algebra. To that end, the department is working on incorporating more real-world data analytics into linear algebra.

Depending on the degree or transfer goals of our students, they have the choice of three different GE pathways:

- [Associate Degree GE Requirements](#)
- [CSU GE Requirements](#)
- [IGETC Requirements](#)

Palomar College has identified a set of General Education/Institutional Learning Outcomes, which represent the overall set of abilities and qualities a student graduating from Palomar should possess. [Click here for a link to Palomar's GE/ILOs.](#)

Next, review your course outcomes as they relate to Palomar's GE/ILOs.

How do the courses in your discipline support General Education/ Institutional Learning Outcomes? In your response, please specify which GE/ILO(s) your discipline supports.

The following GE/ILOs map to all five PSLOs for the AS degree:

- GE Foundational Knowledge of Discipline - This is a General Education Outcome. Applies to certificate and degree programs.
- GE Integrative Learning - This is a General Education Outcome. Applies to certificate and degree programs. Also, useful in assessing learning communities.
- ILO 1, Communication: A - Written communication
- ILO 1, Communication: C - Visual communication
- ILO 2, Computation: A - Quantitative literacy
- ILO 2, Computation: B - Inquiry and analysis
- ILO 3, Creative, Critical, and Analytical Thinking: A - Critical thinking

Note that, for the AS-T degree, the above GE/ILOs also map to PSLO numbers 1-3, and 5, which are the same for both degrees. We could not get Nuventive to generate a mapping for the AS-T degree and so did not generate a correspondence for PSLO number 4: "Apply the fundamentals of programming to solve science, math, and engineering problems." However, after analyzing this PSLO and how it was assessed, I believe it also corresponds to the above GE/ILOs.

Summarize the major findings from your course outcomes assessments that are related to the General Education/Institutional Learning Outcomes that your discipline supports.

The following information is a repeat from above because our PSLOs for our two degree programs correspond with course-level SLOs.

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Math 206 (Differential Equations)

Students scored 70% on this requirement.

5. Understand other uses of mathematics in some STEM (Science, Technology, Engineering, Mathematics) disciplines in an introductory format.

See number 5 above.

PROGRAM COMPLETIONS

Student success is at the core of what we do in assisting students in achieving their goals.

The Chancellor's Office Vision for Success stresses the importance of Program Completion as a major goal for our students. In addition, transfer and career readiness are key components of Palomar College's mission statement. This year, our funding formula has also changed reflecting this emphasis, providing additional funding as a function of the number of completions.

In this section we will identify a program standard and a stretch goal (what you would like to move toward) for program completions.

The standards represent the lowest number of program completions deemed acceptable by the College. In other words, if you were to notice a drop below the set standard, you would seek further information to examine why this occurred and strategies to increase completions.

In this section we will identify a program standard and a stretch goal (what you would like to move toward) for programs.

List the number of completions for each degree/certificate for the previous year.

AS - 5

AS-T-55

Have your program completions Increased, decreased, or stayed the same over the last 5 years?

Increased

What factors have influenced your completion trends?

Although the number of AS degrees awarded oscillates from year to year, the number of AS-T degrees awarded has been increasing on average.

Flexible course schedules, including offerings in the mornings, afternoons, and evenings, help students stay on track. In pre-Covid times, the hiring of quality support staff and tutors in our Mathematics Learning Center and Saturday hours in the Mathematics Learning Center have allowed the students to get the quality help that they need with their mathematics courses.

Are the courses in your discipline required for the completion of other degrees/certificates?

Yes

Please list them

All pathways at Palomar require at least some math.

Do you have programs with 7 or fewer completions in the last 5 years?

No

What is your program standard for program completion?

38

Why did you choose this standard?

It is about the average number of yearly completions over that last 6 years.

What is your Stretch goal for program completion?

40

How did you decide upon your stretch goal?

Based on the number of degrees awarded over last two years (65 and 60), the number of completions has the potential to be well above our current program standard for completions. However, with the Covid situation, I expect fewer degrees to be awarded in the near future than the previous two years. Hopefully 40 completions is not wishful thinking.

ENROLLMENT AND EFFICIENCY TRENDS

Palomar College uses the WSCH/FTEF ratio as one indicator of overall efficiency in addition to the overall fill-rate for courses.

Although the college efficiency goal is 525 WSCH/FTEF and 85% fill-rate (minimal), there are many factors that affect efficiency (i.e. seat count / facilities / accreditation restrictions).

This information can be found by going to the "Program" page in the [PRP Data Dashboard](#).

What was your enrollment trend over the last 5 years?

Decreased

What was your efficiency trend over the last 5 years?

Stayed the same

Were these trends expected? Please explain.

Yes, the trend has been relatively flat over the last five years because as enrollment decreased, we decreased the number of class offerings to keep pace. The math program's yearly average of 548 WSCH/FTEF is well above the institutional goal of 525.

Program Information Summary

Consider your program outcome assessments, completions, and enrollment/efficiency trends, as well as other internal and external factors.

How have these factors contributed to the success of your program(s)?

The program outcome assessments were generally satisfactory. Rather than contribute to the success of the program, they are designed to gauge success. We do have some areas that could be improved. For example, we need to help students become better at solving complex optimization problems. Also, we would like to improve their conceptual understanding of eigenvalues and eigenvectors in linear algebra. To that end, the department is working on incorporating more real-world data analytics into linear algebra. The "number of completions" and "enrollment/efficiency trends" are descriptive statistics. As such, they haven't done anything to directly contribute to the success of our program. They simply quantify results, and I don't have enough data to determine much useful information from them (other than our efficiency goal has been met). For example, to determine if we should be aiming to increase the proportion of program completions, I need to know the number of students who set out to get AS or AST degrees in math for any particular year, which is not available.

How have these factors presented challenges for your program(s)?

The program outcome assessments tell us that we would like to improve students' conceptual understanding of eigenvalues and eigenvectors in linear algebra. To that end, the department is working on incorporating more real-world data analytics into linear algebra. Also, in calculus, We do have some areas that could be improved. For example, we need to help students become better at solving complex optimization problems and application in general.

The Chancellor's Office Vision for Success stresses the importance of reducing equity gaps through faster improvements of underrepresented groups.

ACCJC also requires that colleges establish institutional and program level standards in the area of success rates. These standards represent the lowest success rate deemed acceptable by the College. In other words, if you were to notice a drop below the rate, you would seek further information to examine why the drop occurred and strategies to address the rate.

Click on this link to review the course success rates (A, B, C, or Credit) for your discipline.

In this section we will identify a course success rate standards and a stretch goal (what you would like to move toward) for programs.

Course Success Rates by gender, age, ethnicity, special population, location, and modality (You can access the Student Equity Plan on the SSEC website <https://www2.palomar.edu/pages/ssec/>)

COURSE INFORMATION

COURSE SUCCESS AND RETENTION

What is your program's standard for Discipline COURSE Success Rate?

48.0%

Why did you choose this standard?

Math is a very difficult subject for a vast majority of the population. It is, perhaps, the only subject in which it is socially acceptable to fail a class. Students plan on failing. With these conditions, it would be a great feat to even break the 60% mark. Furthermore, multiple measure placement may be placing students too high, causing lower success rates.

Have your overall course success rates increased, decreased, or stayed the same over the last 5 years?

Decreased

Was this expected? Please explain.

The continued decrease is not unexpected as success rates have been on the decline over the last three years. This decline coincides with new placement guidelines and new co-requisite course offerings that comply with AB705. Of course, the irony is that these policies were designed to increase success. However, we just started offering the new co-requisite courses last year, and it is still too early to know whether the co-requisite model will be a success in the long run. There are individual course successes. For example, the corequisite Math 56 had a 53.6% success rate compared to Math 60, which had a dismal 35.7% success rate.

What is your stretch goal for course success rates?

55.0%

How did you decide upon the goal?

We think that our rate should be higher than the state average of 53% (source: https://datamart.cccco.edu/Outcomes/Course_Ret_Success.aspx)

Have your overall course retention rates increased, decreased, or stayed the same over the last 5 years?

Decreased

Was this expected? Please explain.

Expected, since retention rates have declined on over the last 5 years, though not by much over the last two years (from 83.7% to 83.2%). Again the co-requisite Math 56 is a bit brighter than average with a retention rate of 85.6%.

Are there differences in success or retention rates in the following groups? (choose all that apply)

Gender

Age

Ethnicity

Special Pop. (Veteran, foster youth, etc.)

Gender: Why do you think gender differences exist? What do you need to help close the gap?

Women have outperformed men over the last 5 years. However, the difference in success rates between females and males is typically too small to worry about. For example, last year women outperformed men by 1.6%. Last year, the success rate of those of unknown/unassigned gender dipped to 41.7% from 66.7% the previous year.

Age: Why do you think age differences exist? What do you need to help close the gap?

We see fairly consistent trends in success rates of different age groups. Typically younger students do worse than the older students. This is likely due to a lack of experience and less mature behavior.

Ethnicity: Why do you think ethnicity differences exist? What do you need to help close the gap?

Asians have the highest success rate, with Pacific Islanders second, and whites third. Hispanic and Black or African Americans have the lowest success rates. These differences are likely due to mostly to socio-economic and historical reasons. Continued student support services (tutoring, financial, etc.) will help. Increased funding for the Math Center will help ensure quality tutoring support. Also, higher pay for attracting quality instructors would help too. One change that would help all students is a push for individual responsibility. It is the individual student who has the most control over their performance in school.

Special Populations: Why do you think special population differences exist? What do you need to help close the gap?

Likely due to their maturity and life experience, veterans do slightly better than non-veterans. The biggest success gap is with foster youth. Typically foster youth have a much lower success rate than non-foster youth. Again, continued student support services (tutoring, financial, etc.) will help.

Are there differences in success/retention between on-campus and online courses?

Yes

Please share any best practice methods you use for online courses.

We emphasize that POET training (or equivalent) is required. POET training includes exposure to the CVC-OEI Online Education Rubric.

COURSE LEARNING OUTCOMES

How is course assessment coordinated across sections and over time?

Course SLOs are assessed every three years. Each course is assigned to a faculty member who is in charge of developing and distributing an assessment for their assigned course. The faculty member reports the assessment results back to the department and makes recommendations about how to improve student learning of the course SLOs.

How have you improved course-level assessment methods since the last PRP?

We have not changed our assessment methods since the last PRP. We are staying on track to assess our many courses on a regular basis, adjusting as needed to accommodate the quick switch to entirely online classes. The lead assessors for each class compare their current results with the previous ones and then the department discusses strategies and insights for improvement as a group.

Summarize the major findings of your course outcomes assessments.

Our most recent assessments in spring 2020 were for Math 100. There were two questions:

1. Critical Thinking

Students were given an syllogistic argument, meaning it has two premises and one conclusion. They needed to translate into symbolic logic and to determine whether the structure of the argument was valid or invalid. The argument was invalid (fallacy of the converse).

54.4%, or 31 out of 54 students, correctly translated the argument into symbolic logic. 24.1%, or 13 out of 54, correctly determined that the argument was invalid.

2. Principles and Technique

Students were asked to solve an applied problem using the Least Common Multiple of two whole numbers.

59.3%, or 32 out of the 54 students who took the assessment answered the question correctly. No partial credit was given.

Reflecting on the major findings you summarized, what are some questions you still have about student learning in your courses that you have not yet been able to address with your outcomes assessments?

The results were not good. However, this was the first batch of results since moving into the multiple measure system of placement, along with first support class (AB 705). Moving forward, I want to know if the support class model will be successful. We'll see.

What are some improvements in your courses that have been, or can be, pursued based on the key findings from your course learning outcomes assessments?

We need to reinforce the distinction between truth and validity. How one is a matter of content while the other is a matter of structure. Future assignments are needed to reinforce this.

Instructors who teach this course should be informed of the results in order to adapt their teaching strategy to improve student understanding of the LCM in context.

PROGRAM CURRICULUM ALIGNMENT, MAPPING, SCHEDULING, & PLANNING

The Chancellor's Office Vision for Success stresses the importance of decreasing the average number of units accumulated by CCC students earning degrees.

Palomar College's Guided Pathways plan includes clarifying paths for students by sequencing course offerings so that they support scaffolding and timely completion. Our goal is to ensure learning through:

- The mapping and assessment of clear program outcomes that are also aligned to employer and/or transfer institution expectations.
- Engaging and applied learning experiences.
- Effective instructional practices to support students in achieving success.

How do your course outcomes help your students achieve their program outcomes?

A course SLO is designed to be a metric to assess long term growth of a student towards a particular over-arching goal that is integral to success in the underlying subject matter. As such, our SLOs don't help students succeed in their programs. Rather, they help measure whether students are successful in particular areas of mathematics. If an SLO accurately measures student success in a particular math domain, then it has done its job.

How do your degree maps and scheduling strategy ensure scaffolding (how all parts build on each other in a progressive, intentional way)? How do you share the maps with students?

Our Math Course Map shows clear pathways to transfer level classes for both STEM and non-STEM majors. A link to this map is found on the Math Department Webpage as well as on the Pathways page.

Not only do we offer both day and evening sections of all of our courses, but we also offer them in the early morning, late morning, early afternoon, late afternoon, Saturdays and in the summer. We also offer many of our courses in multiple locations, working with these locations to determine what their needs are. Plenty of sections are offered and sequenced so that students can finish their program objectives in a timely manner without having to take breaks due to a low number of class offerings.

What is your departmental strategy on how you schedule your courses including the time of day you offer courses? Do you use 4-week, 8-week, or block scheduling (putting required classes near each other) to organize required classes to meet the needs of disproportionately impacted students? Please explain.

Not only do we offer both day and evening sections of all of our courses, but we also offer them in the early morning, late morning, early afternoon, late afternoon, Saturdays and in the summer. We also offer many of our courses in multiple locations, working with these locations to determine what their needs are. Plenty of sections are offered and sequenced so that students can finish their program objectives in a timely manner without having to take breaks due to a low number of class offerings. Furthermore, we use both 8-week and 12-week classes to supplement our full-semester offerings, and care is taken with fast track classes to ensure that they can be used to accelerate a student's course completion.

How do you work with other departments that require your course(s) for program completion?

We frequently communicate via formal and informal meetings with all of the departments within the MSE division to ensure that we are meeting their needs.

Does your discipline offer cross-listed courses?

No

Are there curriculum concerns that need to be resolved in your department? What are they?

We just started the co-requisite model last year. It remains to be seen whether it will be successful. This will be the major curriculum concern over the next several semesters.

Are there courses that should be added or removed from your program - please explain?

We are currently in talks with Computer Science about adding an interdisciplinary data science pathway. This may or may end up necessitating the creation of new math courses.

We recently removed Math 146 (which was our only cross-listed course) from our program because it was in very low demand.

How is the potential need for program/course deactivation addressed by the department?

The department discusses these needs and brings them to the dean.

Is your department pursuing non credit or not-for credit options at this time?

Yes

Are there areas you would like to expand?

We offer non-credit bridge classes and workshops for students who need extra review. We hope to keep funding so as not to shrink these offerings.

Click here for information about [Noncredit](#) and [Community Education](#)

Is your department offering online classes?

Yes

How do you consider student needs when determining which classes and how many classes should be offered online versus face-to-face?

When not in a Covid-induced emergency, we offer only a handful of sections of Math 60, Math 110, and Math 115 that are mostly online (students come to campus for testing). This is due to the department's prevailing philosophy that it is harder for students to be successful in asynchronous online math courses where they have to be extremely well-organized and good time managers. Success data seems to be in line with this philosophy as success rates are significantly higher for face-to-face classes (46.6% vs. 33.6%).

Describe other data and/or information that you have considered as part of the evaluation of your program

None.

CAREER AND LABOR MARKET DATA

The Chancellor's Office Vision for Success stresses the importance of increasing the percent of exiting students who report being employed in their field of study. It is important for us to consider how all of our programs connect to future careers.

Go to this website <https://www.onetonline.org/> and enter your discipline in the bubble on the top right for ideas about potential occupations. Click on an example to see more detail.

What kinds of careers are available for people who complete your programs (and/or transfer)? (Refer to link above) Are there any new or emerging careers and if so how would the new or emerging careers impact your future planning?

Students who get our AS-T or AS degrees are likely pursuing careers in STEM and/or education.

With additional training, there are various other career paths available to those with an A.S. Math degree. These include accounting, finance, business, health care, and insurance.

What are the associated knowledge, skills, abilities (KSA's) needed for the occupations listed above? (click examples in the link above to get ideas)

For STEM fields, students obviously need to have a broad knowledge of both theory and practice in applying statistics, calculus, and linear algebra to analyze ideas and data.

For other career paths, students need to have a basic knowledge algebra, statistics, and calculus to analyze numerical data.

How does your program help students build these KSA's?

We offer courses (precalculus, calculus, linear algebra, and statistics) that teach these skills.

Work Based Learning

Applied and work-based learning (WBL) allows students to apply classroom content in professional settings while gaining real-world experience. WBL exists on a continuum that reflects the progress of experiences from awareness-building to training. Students often cycle back through the continuum many times throughout college and throughout their career. Faculty play a critical role in ensuring these experiences are embedded into curriculum and support learning.

Have you incorporated work based learning (work experience, internships, and/or service learning) into your program?

No

Do you want more information about or need assistance integrating work-based learning into your program?

No

How do you engage with the community to keep them apprised of opportunities in your program?

We sometimes meet with officials from high schools and other colleges to discuss shared issues. For example, last year we met with the Math Department Chair from Cal state San Marcos, along with faculty from Mira Costa Community college, to discuss issues that affect of articulation and our AS-T degree.

Program Goals

In the previous sections, you identified opportunities for improvement. Using these opportunities, develop 3-year **SMART goals** for your department. Goals should be Specific, Measurable, Attainable, Relevant, Time-Specific. Ensure your goals align with the mission of your department and/or [the College's strategic plan](#).

Please list all discipline goals for this three-year planning cycle. [Click here for previous PRPs and goal information](#).

Goals

Goal 1

Brief Description

Improve the number of students who successfully complete a college level mathematics course and comply with AB705.

Is this a new or existing goal?

Existing

Goal Status

Completed

Ongoing

How will you complete this goal?

We have just finished our first year after implementing the corequisite model. Results are mixed, and we are trying to improve messaging to student concerning placement.

The following changes have been completed:

- Math 56, 100, 110, 120, and 130 are offered with and without an integrated support corequisite class, placement determined by MM. Also, we are working on adding support to our new quantitative reasoning course, Math 101.
- These classes, along with their corequisite class, are scheduled back-to-back and taught by the same instructor. Students should feel like the main class and corequisite are one course.
- A class and its support class are linked (students would not be able to register for one and not the other). IT IS SOMETIMES NOT INITIALLY CLEAR TO STUDENTS THAT THEY HAVE TO REGISTER FOR BOTH CLASSES. WE ARE WORKING TO MAKE THIS REQUIREMENT MORE OBVIOUS WHEN STUDENTS SIGN UP FOR CLASSES.
- Instructors pick a linked pair or a class without support.
- Other than their initial placement, students will have the choice of taking future classes with or without support.
- If a student fails a corequisite pairing, they may be allowed to take the class again without the support class. Department chair will make the determination, after consultation with the instructor.
- Classes with support need to be taught with pedagogy that includes classroom activities.
- Faculty training is being provided.
- Support classes are two units, except for Math 1, which is 1/2 unit.
- Math 10, 15, 50, and 53 have been removed from the mainstream schedule.

Outcome(s) expected (qualitative/quantitative)

We hope to have outcomes similar to some states who have implemented co-requisite models, such as

- The State of Tennessee: Completion rates went from 12.3% to 51%
- Georgia: Traditional: 20% success rate in two years Corequisite: 63% success rates
- West Virginia: Traditional: 14% success rate in two years Corequisite: 62% success rates

These sorts of rates have not been achieved in transfer level classes. We are hopeful to see better outcomes in the future.

Here are the success rates in classes that come with support for Fall 2019:

Math 56-53.6%
 Math 100-38.9%
 Math 110-36.3%
 Math 120-49.1%
 Math 130-46.7%

How does this goal align with your department mission statement, the college strategic plan, and /or Guided Pathways?

It will allow us to pursue our primary departmental functions, which are the development, dissemination, and application of mathematical knowledge in the areas of mathematics and statistics. We will serve students who are STEM majors and minors, general education students, at both basic skills and transfer levels.

Expected Goal Completion Date

8/23/2021

Goal 2**Brief Description**

Accelerated Pathways

Is this a new or existing goal?

Existing

Goal Status

Completed

Ongoing

How will you complete this goal?

We plan to grow our Accelerated Mathematics Gateway program, and we are going to offer pathways for non-STEM majors to finish their mathematics in one year.

We still have one accelerated pathway (precalculus w/out trigonometry prerequisite) which is in the "pilot" phase. We will have success data (or lack there of) by the end of the school year.

Outcome(s) expected (qualitative/quantitative)

AB 705 requires a community college district or college to maximize the probability that the student will enter and complete transfer-level coursework in mathematics within a one-year timeframe. We want to increase the number of students who complete transfer-level coursework in mathematics within a one-year timeframe.

How does this goal align with your department mission statement, the college strategic plan, and /or Guided Pathways?

It is a guided pathway.

Expected Goal Completion Date

8/23/2021

Goal 3**Brief Description**

Reduce the class cap on our pre-transfer level courses to 32.

Is this a new or existing goal?

Existing

Goal Status

Ongoing

How will you complete this goal?

We need to convince the union and the district that this is best for our students.

Outcome(s) expected (qualitative/quantitative)

We expect the success rates to improve as instructors will have additional time to work with students and use active learning techniques. The CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES states on its website “we call on institutions of higher education, mathematics departments and the mathematics faculty, public policy-makers, and funding agencies to invest time and resources to ensure that effective active learning is incorporated into post-secondary mathematics classrooms.” Inside Higher Ed’s website states, “instructors in small (10-14) and medium (15-34) classes are more likely to involve students in hands-on projects and real-life activities, assign projects that require original or creative thinking, form teams or discussion groups to facilitate learning, and ask students to help each other understand concepts or ideas.” Furthermore, they state “The evidence found in this analysis unequivocally leads to the conclusion that class size has a negative impact on the student-rated outcomes of amount learned, instructor rating, and course rating.” We need smaller class sizes.

How does this goal align with your department mission statement, the college strategic plan, and /or Guided Pathways?

It will allow us to pursue our primary departmental functions, which are the development, dissemination, and application of mathematical knowledge in the areas of mathematics and statistics. We will serve students who are STEM majors and minors, general education students, at both basic skills and transfer levels.

Expected Goal Completion Date

5/31/2021

Goal 4**Brief Description**

New Building

Is this a new or existing goal?

Existing

Goal Status

Ongoing

How will you complete this goal?

What the last department chair wrote is still appropriate: We don’t know. Maybe the department needs to buy some lumber. Maybe we just need to change the culture of putting the largest department in the district last.

Outcome(s) expected (qualitative/quantitative)

As the largest department in the district (larger than some divisions), we see the vast majority of Palomar College students at some point or another. It would be nice if most of our students didn’t have to track us down as our offices are located in five different buildings, two of which are extremely ugly and inefficient. This is the view of Palomar that we give students. Our faculty teach in 11 different buildings on the main campus, and have to haul around calculators, document cameras, and laptops from building to building. Valuable instruction time is lost with all the setup before and after class our faculty currently engage in. Most important is the need for all math faculty to be located together in one space as well as have the Math Center embedded within the department. This will result in more communication, more collaboration and help us improve the way we educate and serve our students.

How does this goal align with your department mission statement, the college strategic plan, and /or Guided Pathways?

This will result in more communication, more collaboration and help us our guided pathways

Expected Goal Completion Date

6/2/2025

Goal 5**Brief Description**

A combined Math and STEM Center

Is this a new or existing goal?

New

Existing

Goal Status

Ongoing

How will you complete this goal?

We need the support of the district to help us achieve this goal. Data provided by IRP shows that the Math Learning Center contributes to the success of Palomar College math students. Over the last 5 years, students who receive Math Center tutoring have an average success rate of 60.7% compared to 55.2% for those math students who do not receive tutoring. Thus, the Math Center directly supports the Vision for Success by helping to increase the number of completions and transfers (goals 1 and 2 of VFS) and potentially decreasing the number of units that they take (goal 3 of VFS). Furthermore, the Math Center runs a high-quality tutoring program with a math instructor always on duty, a dedicated and knowledgeable faculty coordinator, and CRLA-trained tutors, all of which are needed to decrease equity gaps in mathematics and thereby help the College achieve its AB705 and equity goals. The Chancellor's Office also calls for pairing "...high expectations with high support." The Math Center is one of the necessary supports to help students be successful in mathematics. Combining the Math and STEM Centers will create a more efficient use of staff and space and increase equitable access and completion to underrepresented groups in STEM and Math.

Outcome(s) expected (qualitative/quantitative)

We can continue to provide a vital service to our students. Furthermore, our director of the MLC can actually spend some time with students instead of running around the campus begging for funding..

How does this goal align with your department mission statement, the college strategic plan, and /or Guided Pathways?

It will allow us to pursue our primary departmental functions, which are the development, dissemination, and application of mathematical knowledge in the areas of mathematics and statistics. We will serve students who are STEM majors and minors, general education students, at both basic skills and transfer levels.

Expected Goal Completion Date

8/22/2022

RESOURCES

Congratulations! You are nearing completion. In this section, you will consider the resources you need to implement your three-year program review plan and/or address any findings from your assessment of your discipline.

The section is organized into the following four parts:

PART 1: Staffing Needs (Faculty and Additional Staff)

PART 2: Budget Review

PART 3: Technology and Facilities Needs

PART 4: One Time Request for Other Needs (NonTechnology Equipment, Supplies, Operating Expenses, Travel)

PART 1: STAFFING NEEDS

Requests for faculty will follow the prioritization process currently in place in IPC, and the IPC SubCommittee. Requests for new staff positions will be prioritized at the division level and reviewed at Exec.

Are you requesting additional full-time faculty?

Yes

NOTE: If you are requesting full-time faculty, you must go back to the Labor Market section of the form to complete that section. It is required when requesting additional faculty positions.

REQUEST FOR ADDITIONAL FULL-TIME FACULTY

Faculty Request 1

Title of Full-Time Faculty position you are requesting

Mathematics Instructor 1

How will this faculty position help meet district (Guided Pathways, Strategic Enrollment Management etc.), department and/or discipline goals?

This position will help meet the district's Goal 4 from Strategic Plan 2022: "Attract, support, and engage a workforce to meet the needs of the College's diverse student body."

Furthermore, this position fits in with the District's Mission statement, by helping provide an engaging teaching and learning environment for students of diverse origins, experiences, needs, abilities, and goals. Our new instructor would support and encourage students who are pursuing transfer-readiness, general education, basic skills, career and technical training, aesthetic and cultural enrichment, and lifelong education. They would be committed to promoting the learning outcomes necessary for our students to contribute as individuals and global citizens living responsibly, effectively, and creatively in an interdependent and changing world.

Additional full-time instructors will mean higher quality mathematics instruction and improved student learning of mathematics through increased student/teacher contact, better faculty communication, and greater departmental implementation of current research recommendations.

Is there a scarcity of qualified Part-Time Faculty (for example: Specialized degree/experience, emerging/rapidly changing technology, high demand)

According to the previous department chair, we continue to see a shortage of people with an MS in mathematics or statistics willing to teach adjunct. I see a lot of resumes listing engineering degrees, not mathematics degrees. There are very few people with mathematics degrees, and even fewer that want to work for \$35 per hour. By contrast, though, when we advertise a full-time position, we see plenty of applicants with the proper degree. We have 29 full-time faculty and about 40 adjunct faculty, this semester.

Are you requesting this position for accreditation, regulatory, legislative, health and safety requirements? Please explain.

No.

Utilizing your PRP data, please summarize the discipline productivity, efficiency, and any regional career education needs for this discipline.

Over the last five years, The math program's yearly average of WSCH/FTEF is 548, which is well above the institutional goal of 525.

Is your department affected by faculty on reassigned time. If so, please discuss.

Out of the 29 full-time faculty, we typically lose 3 or 4 FTEF to re-assigned time. We are a large department and very involved in the college, so our loss to re-assigned time is usually quite high.

Faculty Request 2

Title of Full-Time Faculty position you are requesting

Mathematics Instructor 2 (statistician)

How will this faculty position help meet district (Guided Pathways, Strategic Enrollment Management etc.), department and/or discipline goals?

This position will help meet the district's Goal 4 from Strategic Plan 2022: "Attract, support, and engage a workforce to meet the needs of the College's diverse student body."

We need a statistician to help us develop and maintain a robust data science and statistics programs. According to the U.S Bureau of Labor Statistics, statisticians and data scientists are two of the fastest growing occupations in America (source: <https://www.bls.gov/ooh/fastest-growing.htm>). Having a statistician on staff would help us keep our program relevant and help prepare our students to enter the workforce with high paying jobs.

Is there a scarcity of qualified Part-Time Faculty (for example: Specialized degree/experience, emerging/rapidly changing technology, high demand)

According to the previous department chair, we continue to see a shortage of people with an MS in mathematics or statistics willing to teach adjunct. I see a lot of resumes listing engineering degrees, not mathematics degrees. There are very few people with mathematics degrees, and even fewer that want to work for \$35 per hour. By contrast, though, when we advertise a full-time position, we see plenty of applicants with the proper degree. We have 29 full-time faculty and about 40 adjunct faculty, this semester.

Are you requesting this position for accreditation, regulatory, legislative, health and safety requirements? Please explain.

No.

Utilizing your PRP data, please summarize the discipline productivity, efficiency, and any regional career education needs for this discipline.

Over the last five years, The math program's yearly average of WSCH/FTEF is 548, which is well above the institutional goal of 525.

Is your department affected by faculty on reassigned time. If so, please discuss.

Out of the 29 full-time faculty, we typically lose 3 or 4 FTEF to re-assigned time. We are a large department and very involved in the college, so our loss to re-assigned time is usually quite high.

In the last ten years, what is the net change in number of Staff in the department? (loss vs. gain)

We gained 1 faculty member and lost our part-time front desk worker.

Are you requesting new Classified, CAST or AA positions?

No

PART 2: BUDGET REVIEW

Review your Budget/Expenditure reports for 2018, 2019, 2020. Consider your three-year PRP plan.

Click on the link below to access directions to the *Available Budget Report* to complete this section.

[How to Request the Available Budget Report](#)

Reflecting on your three-year PRP plan, are there any budget considerations you would like your dean/supervisor to be aware of for the upcoming year?

No

NOTE: PARTS 3 and 4 – TECHNOLOGY, FACILITIES AND OTHER NEEDS

This year the College is implementing two new processes related to resource needs coming from the PRP process.

1. One-Time Fund Requests. The college is implementing a process for prioritizing and allocating funds for one-time needs/requests tied to Program Review and Planning. Prioritization will take place through participatory governance in planning councils and the Budget Committee. Then, a recommendation will be made to Exec for funding of request utilizing various funding sources.

For more information about funding sources available, see [IELM BLOCK GRANT, LOTTERY, PERKINS AND STRONG WORKFORCE GUIDELINES](#).

Consider submitting one-time requests only if you have verified that you cannot fund the request using your general discretionary funds or other funds.

2. Technology and Facilities Review. From now on, ALL requests for technology will go through an institutional review process. If you request technology here, you will see a description of the process below.

PART 3: TECHNOLOGY AND FACILITIES NEEDS

Will you be requesting any technology (hardware/software) this upcoming year?

No

Do you have resource needs that require physical space or modification to physical space?

No

PART 4: OTHER ONE-TIME NEEDS

For more information about funding sources available, see [IELM BLOCK GRANT, LOTTERY, PERKINS AND STRONG WORKFORCE GUIDELINES](#). Please check with your department chair on the availability for this cycle.

Do you have one-time requests for other items (e.g., Non-Technology Equipment, Supplies, Operating Expenses, Travel) that your budget or other funding sources will NOT cover?

No

I confirm that the Program Review is complete and ready to be submitted.

Yes

Enter your email address to receive a copy of the PRP to keep for your records.

cchamberlin@palomar.edu

Review

Chair Review

Chair Comments

I approve this message.

Chair Name

Craig Chamberlin

Chair Sign Date

10/30/2020

Dean Review

Strengths and successes of the discipline as evidenced by the data and analysis:

The departments collaborative nature is one of its most impressive characteristics as demonstrated by the collaboration with other STEM disciplines and 4 year institutions, its participation in outreach and in reach events, and its ability to come together to make major curriculum revisions as those associated with Multiple Measures and AB705. The Math Learning Center and STEM Center are considered their own programs with separate PRPs but the math department is dedicated to working so collaboratively with both locations that they are an integral part of each other; for students, the transition between the classroom to the learning resource centers is seamless. While the department is not pleased with its success rates it is clearly dedicated to student success, achievement, and completion. This is illustrated by the departments active involvement in assessing and revising outcomes in a way that is student centered. Bridge programs and workshops are offered to support students before entering specific classes. They have developed pathways and cohorts to expedite math completion and encourage degree attainment in all STEM disciplines with a special emphasis on CSIT and CHEM. A very unique and innovative attribute of the department is the inclusion of student learning outcomes that directly address a students ability to apply math skills in other STEM disciplines. The team is truly dedicated to producing students that are well rounded critical thinkers.

Areas of Concern, if any:

The department is experiencing some challenges with students success rates but this is expected with the recent transition to AB705. The department is dedicated to taking the next step in the process by addressing concerns and developing new strategies to increase success. The lack of centralized classroom scheduling often places students and faculty away from the relevant locations necessary to support a thriving STEM culture.

Recommendations for improvement:

My primary recommendation is that the faculty not be discouraged with the success rates reported but instead maintain its focus on moving forward. They demonstrate the dedication and aptitude to overcome this obstacle. While a new building is unlikely during this fiscal crisis, the dean will work with the department and upper administration to devise a reasonable strategy to create a more centralized teaching environment over time.

Dean Name

Patricia Menchaca

Dean Sign Date

11/5/2020

IPC Review

Strengths and successes of the discipline as evidenced by the data and analysis:

It is great to see that this PRP was completed by a team of six.

The department has mapped their course outcomes to their programs outcomes which streamlined their program outcome assessments and ensures their students achieve the program outcomes. The department acknowledged opportunities for continued improvement based on their outcomes, for example focusing on complex optimization problems.

The department has done a good job mapping their PSLO's to the GE/ILOs.

It is great to see that success rate for Math 56 (with the corequisite) at 53.6%, which is much higher than the discipline success rate of 48% and much higher than Math 60 at 35.7%.

The PRP makes a clear argument for the value of faculty sharing a space in which they can effectively collaborate, which the current spread-out locations of math faculty offices and math classrooms make challenging.

Areas of Concern, if any:

It was unclear how the PSLO's map to specific ILO's, for example, which PSLO maps to written or visual communication?

In terms of course success rates and retention, we acknowledge there is a lot that we are not in control of, like salary of faculty, class caps, buildings, and student self-responsibility and motivation. However, although ultimately it is the students' responsibility to commit to their education, we know by seeing the increased success of Math 56, that providing intentional support to our students can have a large impact on their success. Faculty can have a tremendous impact on students' motivation to stay enrolled in college and succeed in their classes. There are faculty in the math department actively working on reducing barriers to success, how might the entire department utilize their work?

Recommendations for improvement:

We recommend the department focus on the structure of Math 56 that has led to increases in student success and how they might be able to utilize the success in that course across the discipline. Also, how might the college and department communicate with students about the value of the corequisite for student success? The PRP states that the Math 56 with corequisite had higher success yet also states "We just started the co-requisite model last year. It remains to be seen whether it will be successful." It seemed to us that the department was seeing success, but with this comment are unsure, it might be helpful to more fully understand the impact of the corequisite model.

The department answered "yes" to the question about the difference in success between on-campus and online, however there was no explanation. What is the difference and what might be contributing to it? The department noted the lower success rate for online courses as being due to students' need to be well-organized and good time managers. These are two skills students need to be successful in ALL online courses, are there any reasons specific to math that might be impacting students' success online?

Although the PRP form does not list them as a Work Based Learning (WBL) approach, inviting guest speakers who work in industries related to your courses is generally considered to be a low-threshold form of WBL. If hearing from professionals is something that is or could be incorporated somewhat systematically into the program that may be something worth mentioning in the WBL section of the report. In the section titled Career and Labor Market Data, under the question about how the Department engages with the community, we recommend including information about the grant-related meetings that are held with CSUSM and the 2020 Math Fields Day that was held at Palomar.

The Department did not ask for any budget considerations or for one-time fund requests, but the Department mentioned in the PRP that additional funding is needed for the Math Center and Tutoring. We recommend that the Department consider adding budget requests to the PRP before finalizing it.

IPC Reviewer(s)

Kelly Falcone and April Cunningham

IPC Review Date

12/1/2020

Vice President Review**Strengths and successes of the discipline as evidenced by the data and analysis:**

understanding of employer expectations; reflection of assessment focuses on how to impact instruction in such a way as to help more students succeed; increased number of completions; thoughtfulness of PRP; collaborations with local high schools and universities to discuss curriculum, challenges, success

Areas of Concern, if any:

1. having access to baseline # of majors by cohort
2. course success rates
3. "individual student who has the most control over their performance"
4. "Instructors who teach this course should be informed of the results in order to adapt their teaching strategy to improve student understanding of the LCM in context."
5. scheduling strategy
6. no WBL
7. facilities

Recommendations for improvement:

1. work with dean and IRP to advocate for baseline # of majors as part of future PRP data
2. I agree with dean's assessment above -- continue to focus on identifying problem spots for students (within a particular course and within a particular pathway) so that you can then focus on addressing issues in that localized spot -- such determinations should help in the development of new SLOs and assessments but also in informing tutor training...ensuring that the tutors are aware of trouble spots and that they themselves have a strong understanding of the issues and ways to reinforce successful classroom strategies.
3. RE: individual student control, I believe that other parts of your PRP suggest that a multitude of factors impact a student's success, some within a student's ability to control and some beyond -- this statement is a good point for discussion.
4. RE: adapting teaching strategy, is there a mechanism for ensuring that this happens within your department?
5. ideally, we'd have all students starting their math in the first semester of college...wondering if the AB 705 subcommittee and/or department have discussed ways to support students as we push them to this direction? clearly, changes to the curriculum are meant to help...other thoughts? what other parts of the student's academic experience can we impact and how -- with an eye to helping them succeed in their 1st 2 semesters of math? I imagine you've had discussions with Grossmont (or is it Cuyamaca?) where their success rates are higher...what are the salient points?
6. work with dean and Nichol Roe to discuss WBL and Career Continuum as it relates to your courses for different programs/pathways. It connects as your dean has mentioned but also in terms of the real-world data analytics you mention wanting to bring into your program.
7. no Facilities request as part of PRP -- add in so that the info is sure to be captured in the planning

Vice President Name

Shayla Sivert

Vice President Sign Date

1/3/2021