

**PORTERVILLE COLLEGE**  
**PROGRAM REVIEW REPORT: INSTRUCTIONAL DIVISIONS**

Name of Division: Mathematics  
Contact Person: Dr. Stewart Hathaway

Submission Date: January 28, 2019

*[Note: The information in this area will repeat on all pages.]*

**Porterville College Mission Statement:**

With students as our focus, Porterville College provides our local and diverse communities quality education that promotes intellectual curiosity, personal growth, and lifelong learning, while preparing students for career and academic success.

In support of our values and philosophy, Porterville College will:

1. Provide quality academic programs to all students who are capable of benefiting from community college instruction.
2. Provide comprehensive support services to help students achieve their personal, career and academic potential.
3. Prepare students for transfer and success at four-year institutions.
4. Provide courses and training to prepare students for employment or to enhance skills within their current careers.
5. Provide developmental education to students who need to enhance their knowledge and understanding of basic skills.
6. Recognize student achievement through awarding degrees, certificates, grants, and scholarships.

**Program Mission Statement:**

The Mathematics Division supports the mission of Porterville College by to making the learning of mathematics interesting, meaningful, and enjoyable to all students, while providing complete coverage of course topics to meet the Learning Outcomes in each course and program. We are committed to placing the majority of students directly into transfer-level math, providing co-requisite support of basic skills where needed, and maximizing student success.

**Overview:**

The Mathematics Division presently offers 11 courses in mathematics. With the upcoming AB 705 implementation, there will be three tracks for mathematics students—non-BSTEM, BSTEM, and Education. Each track will follow the AB 705 mandate from the Chancellor's Office, providing co-requisite support in transfer-level classes at the specified GPA levels. (See the math placement flow charts on pp. 9 - 10 for specifics.) We have eight full-time faculty members, two adjunct faculty members, and one dual enrollment faculty member.

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**Student Learning Outcomes:**

(Please summarize assessments that have been conducted on courses for your division including assessment timeframe, tool(s), results, and analysis/action plan.)

One full cycle of Student Learning Outcomes assessment will be completed in the spring of 2019. As per division agreement, 70% is the required mastery level for each SLO/PLO. Nearly 100% of the math classes have been assessed in the past two years. The one exception is Math P206, which was canceled due to low enrollment in the prerequisite class, Math 205, in the fall of 2017.

Within one month of the conclusion of each semester, the SLO division representative sends SLO assessment forms to faculty members for each of the math classes they are teaching. Selection of SLO assessment tools is currently the instructor's choice; however, a goal of the Mathematics Division is to develop a common assessment of SLOs in each class beginning in the fall of 2019. Examples of assessment tools include online and in-class quizzes, homework assignments, exams, and group assignments. Upon completion of the assessments, faculty members submit their SLO assessments to the SLO division representative, who compiles them in an Excel spreadsheet. SLO/PLO results of all math classes can be found at the following site:  
<https://docs.google.com/spreadsheets/d/1jmm1fdsTR-DCu9Gy9YA94soF-VQsjFIAv8BN15LKq-g/edit#gid=107173495>

Follow up discussions of results have occurred in a number of classes, during which faculty members have identified weaknesses/strengths of their students in specific SLOs, and well as specific teaching strategies that have been helpful. An example of this is Math P122 (Statistics) and Math P051 (Intermediate Algebra). At a division meeting on 12/01/17, we discussed results in these classes for SLO 1. For Math 51, the success rates in this area (radicals) were generally lower than 70%. Strategies for improvement included writing radicals in rational exponent form (in particular, mixed numbers) and formative assessments. For Math 122, there were relatively high success rates on SLO 1 (data classifications). Strategies that were helpful included emphasizing qualitative and quantitative data classifications, using analogies, and writing examples of each level of data on exams. This sharing of strategies has proven to be useful.

Each of these ideas formed an action plan moving forward. Similar discussions on SLO results have occurred in Math P055 (Elementary Algebra), Math P061 (Pre-algebra), and Math PQ (Pre-algebra/Elementary Algebra combination). The Mathematics Division will make an effort to extend these discussions to the other classes as well.

At the conclusion of each 4-year cycle, we re-evaluate the SLO/PLO assessment process, making modifications in SLOs/PLOs and individual course outlines as needed and developing a new plan for the next assessment period. Lead faculty members are assigned to specific classes and are responsible for determining that SLOs in their areas are assessed in a timely manner.

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Below are the 2016 – 2019 and 2019 – 2023 SLO lead faculty members for each class. Following this are the four-year assessment plans for the Mathematics Division. Note that the 2019-2023 Assessment Plan contains new courses to meet the AB 705 mandate, and to provide for a smooth start for the engineering program scheduled to begin in the fall of 2019.

2016 – 2019 SLO Lead Faculty Members

Faculty Name – Responsibility

Dustin Acres – Math P051  
Sherie Burgess – Math P122  
Terry Crewse – Math P101  
Stewart Hathaway – Math P103, P104  
Cindy Pummill – Math P061, PQ  
Di Reagan – Math P055  
Miguel Ruelas – Math P205, P206  
Jon Satko – Phys 104A

2019 – 2023 SLO Lead Faculty Members

Faculty Name – Responsibility

Dustin Acres – Math P110, Math P110AX  
Sherie Burgess – Math P115, Math P115X  
Terry Crewse – Math P101, P101A  
Stewart Hathaway – Math P103, P104  
Ian Onizuka – Outcomes Representative  
Cindy Pummill – Math P100X  
Di Reagan – Math P122AX, P122  
Miguel Ruelas – Math P205, P206  
Staff – ENGR P110, P120, P260.

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**2016 – 2019 Program & Student Learning Outcomes**  
*Assessment Plan – Mathematics*

The learning outcome curriculum map for both the developmental and transfer-level courses are assessed in a 4 year cycle as follows:

Year Course	2016-2017	2017-2018	2018-2019	2019-2020*
Math P103	PLO # 1,2 SLO # 1,2,3	PLO # 3,4 SLO # 4,5,6	PLO # 5 SLO # 7,8,9	Planning for new cycle
Math P104	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3	PLO # 5 SLO # 4,5	
Math P 205	PLO # 1,2 SLO # 1	PLO # 3,4 SLO # 2	PLO # 5 SLO # 3,4	
Math P206	PLO # 1,2 SLO # 1,2,3	PLO # 3,4 SLO # 4,5,6	PLO # 5 SLO # 7,8,9,10	
Phys 104A	PLO # 1,2	PLO # 3,4	PLO # 5	
Math P122	SLO # 1	SLO # 2	SLO # 3,4	
Math P102	SLO # 1,2	SLO # 3,4,5	SLO # 6,7,8	
Math P101	SLO # 1	SLO # 2	SLO # 3,4	
Math P051	SLO # 1	SLO # 2	SLO # 3,4	
Math P055	SLO # 1	SLO # 2	SLO # 3,4	
Math P061	SLO # 1	SLO # 2	SLO # 3,4	
Math PQ				

\*The fourth year is intended for division assessment and planning of the next four year cycle.

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**2019 – 2023 Program & Student Learning Outcomes**  
**Assessment Plan – Mathematics and Engineering**

The learning outcome curriculum map for the Mathematics and Engineering Programs will be assessed in a 4-year cycle as follows:

Note: With the implementation of AB 705 in the fall of 2019, the SLO-Coordinator advised the division not to assess SLOs in all pre-transfer-level classes, as these classes will be eliminated. The division has decided to follow this plan, which is reflected in the chart below.

		Year	2019-2020	2020-2021	2021-2022	2022-2023*	
		Course					
M A T H  E N G I N E E R I N G	M A T H	Math P103	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3	PLO # 5 SLO # 4	The fourth year is intended for division assessment and planning of the next four year cycle.	
		Math P104	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3	PLO # 5 SLO # 4		
		Math P205	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3,4	PLO # 5 SLO #5		
		Math P206	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3,4	PLO # 5 SLO #5,6		
		Phys 104A	PLO # 1,2	PLO # 3,4	PLO # 5		
	E N G I N E E R I N G	Engr P110	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3,4	PLO # 5 SLO # 5,6		
		Engr P120	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3,4	PLO # 5 SLO # 5		
		Engr P260	PLO # 1,2 SLO # 1,2	PLO # 3,4 SLO # 3,4	PLO # 5 SLO # 5,6,7		
		Math P122	SLO # 1,2	SLO # 3	SLO # 4		
	Math P122X*	SLO # 1*,2*	SLO # 3*	SLO # 4			
	Math P101	SLO # 1,2	SLO # 3,4	SLO # 5			
	Math P101A	SLO # 1,2	SLO # 3	SLO # 4			

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	Math P100X*	SLO # 1*	SLO # 2*	SLO # 3*,4*	
	Math P115	SLO # 1,2	SLO # 3	SLO # 4	
	Math P115X*	SLO # 1*	SLO # 2*	SLO # 3*,4*	
	Math P110	SLO # 1	SLO # 2	SLO # 3,4	
	Math P110X*	SLO # 1*	SLO # 2*	SLO # 3*,4*	

\*Signifies that co-requisite SLOs will be assessed at this time as well as course SLOs.

**Program Learning Outcomes:**

(Please list your PLOs and provide an overview of the assessments that have been conducted, changes to your program based on those assessments, and your planned assessment cycle.)

The PLOs for the AS-T degree in Mathematics are the following:

- 1) Use mathematics to investigate, model, and solve real-world problems using a variety of problem-solving methods.
- 2) Use technology as a tool for exploring mathematical concepts.
- 3) Demonstrate an understanding of concepts and skills needed for future mathematics courses or courses in related disciplines.
- 4) Demonstrate a solid understanding of functions from multiple perspectives.
- 5) Demonstrate an ability to work with and analyze mathematical relationships.

The Mathematics Division recently completed a fall 2017 assessment of Program Level Student Learning Outcomes 1 - 4 in the calculus sequence (Math 103, Math 104, and Math 205). Results were generally favorable. For PLOs 1, 3, and 4, the average scores were over 80%. However, results for PLO 2 were relatively low, indicating that students were not sufficiently competent in the use of technology for exploring mathematical concepts. Follow up discussions with the calculus instructors suggested that certain strategies such as making exams more similar to homework and more practice with technology in a lab setting could be helpful.

Below is a list of the PLOs for the engineering program.

- 1) Explain engineering ethical principles and standards.
- 2) Apply the engineering design process to design projects.
- 3) Apply appropriate engineering analysis techniques for engineering applications.
- 4) Legibly and effectively communicate engineering solutions to others, whether the audience members are engineers or not.

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**Program Analysis and Trends:**

(Please review current performance based on the data provided by the Office of Institutional Research (or other relevant data) for your department(s) and summarize trends for the past three years. These data cover enrollment, faculty load, productivity, and course retention and success rates.)

***Changes in Program over Last Three Years***

Over the past three years, many changes have occurred in the Mathematics Division. We have worked to streamline pathways for both STEM and non-STEM majors, while implementing multiple measures for both current and dual enrollment/concurrent enrollment students. The following is a brief description of each of these changes, and how they all fit together to promote student success.

Acceleration: Beginning in 2014, we consolidated some of our basic skills classes, permitting students to complete two math classes within one course. Math PQ combined Math 61 (Pre-algebra) and Math 55 (Elementary Algebra), while Math PS combined Math 55 and Math 51 (Intermediate Algebra). In 2015, a different form of acceleration was implemented, giving students the opportunity to complete the first class of a given sequence in the first eight weeks and the following class in the second eight weeks. In this way, as with Math PQ and Math PS, students could complete a full year of their mathematics requirements in one semester. This strategy has been particularly effective in the Math 55/Math 51 and Math 51/Math 122 sequences.

Jump Start Program: The objective of the Math Jump Start Program is to enable students to advance one level above their assigned math placement in the fall. Therefore, the primary emphasis is to prepare students to pass the challenge exam for the course in which they are initially placed. Under the leadership of Reagen Dozier and Ian Onizuka, enrollment in the Math Jump Start Program has grown tremendously over the past two years. Beginning in the summer of 2019, the focus of the Jump Start Program will be to provide students opportunities to successfully challenge co-requisites.

Math Mentor Program: The Math Mentor Program was established in the fall of 2014 to provide free tutoring to students on a walk-in basis. Students who have completed at least intermediate algebra with an A and have strong instructor recommendation(s) are eligible to become math mentors. Final selections of math mentors are based on effective communication skills and the ability to work with a wide range of personalities. The program is currently open from 8:00 a.m. to 9:00 p.m., Monday through Thursday, and 9:00 a.m. to noon on Friday.

Engineering Program: In response to the growing demand for an engineering program at PC, we developed the Associate of Science in Engineering degree. (There is no AS-T in Engineering degree to date.) The Associate of Science in Engineering is designed to prepare students to continue studies

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toward a B.S. degree in any field of engineering. Its intent is to assist students in transferring to an engineering program in the UC/CSU system. The Engineering A.S. degree is comprised of twenty-seven units of required core classes—including physics and calculus—and twelve units of elective courses in the areas of chemistry, computer programming, circuit analysis. The degree will be launched in the fall of 2019, with one course (ENGR P110—Introduction to Engineering) to be offered. An adjunct engineering position at PC is currently in the recruitment stage.

Multiple Measures: In October 2017, AB 705 was signed into law, requiring community colleges to use multiple measures when placing students. We worked closely with John Hetts and Mallory Newell, lead researchers of the Multiple Measures Assessment Project (MMAP), and adopted the MMAP Decision Rules Multiple Measures in November 2017. In multiple measures, an emphasis is placed on high school GPA, which, according to the research, is the most valid predictor of student success.

In June 2018, the Chancellor's Office issued a mandate to all California community colleges, specifying the criteria to be used in the placing students into math classes. The rationale behind the mandate is that if students are placed directly into the transfer-level class and provided support as needed, they have a much higher likelihood of successfully completing the course within one year. In response, the Mathematics Division developed a revised multiple measures plan. Essentially, beginning in the fall of 2019, all pre-transfer-level courses will be eliminated, and 100% of students will be directly placed into transfer-level mathematics. Co-requisite support will be available for the least prepared students. The Math Multiple Measures Placement Guide is shown below, indicating placement criteria for each of the three tracks.



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<b>Non-BSTEM Major Math Placement</b>					
Major	HS GPA <sup>†</sup>	Additional Requirement	Test Code	Placement <sup>‡</sup>	Option
<b>Education</b>	<b>≥ 2.8</b>	<b>None</b>	<b>PABM/45</b>	<b>Math 115*</b> Structures and Concepts (4 units)	Student can challenge placement. (Challenge is Math 51 exam)
	<b>&lt; 2.8</b>	Algebra 2, Integrated Math 3, or equivalent with B- or better both semesters	<b>PABM/40</b>		
	Students who do not meet the criteria for Math 115 should follow the Math 110 track and then take Math 115.				
<b>Other Non-BSTEM</b>  (Students can choose track: Math 122 OR Math 110) <sup>§</sup>	<b>≥ 2.8</b>	<b>None</b>	<b>PABM/45</b>	<b>Math 122*</b> Statistics (4 units)	<b>Math 122 and 22X</b> Statistics with Corequisite Support (6 units)
	<b>&lt; 2.8</b>	Algebra 2, Integrated Math 3, or equivalent with C- or better both semesters	<b>PABM/35</b>		
	<b>≥ 2.3</b>	<b>None</b>	<b>PABM/20</b>	<b>Math 122 and 22X</b> Statistics with Corequisite Support (6 units)	Student can challenge the corequisite placement. (Challenge is Math 51 exam)
	<b>&lt; 2.3</b>	<b>None</b>			
	<b>≥ 2.6</b>	Algebra 1, Integrated Math 1, or equivalent with C- or better both semesters	<b>PABM/30</b>	<b>Math 110<sup>§</sup></b> College Algebra for Liberal Arts (4 units)	Student can challenge the corequisite placement. (Challenge is Math 51 exam)
	<b>&lt; 2.6</b>	Algebra 2, Integrated Math 3, or equivalent with C- or better both semesters	<b>PABM/25</b>		
	<b>&lt; 2.6</b>	<b>None</b>		<b>Math 110 and 10X</b> College Algebra for Liberal Arts with Corequisite Support (6 units)	

\* An EAP/CAASPP test score of 4 or better (2718-2862) can also place a student here  
<sup>†</sup> GPA through at least grade 10. Students without a transcript can self-report GPA.  
<sup>‡</sup> A student can challenge his or her placement with an exam in the Learning Center  
<sup>§</sup> The following majors require Math 122: Administration of Justice, Agribusiness, Anthropology, Political Science, and Sociology. Advanced Information Systems majors can take Math 122 or BSAD 155.

**Revised 1/21/19**  
**Effective Fall 2019**

<b>BSTEM Major Math Placement</b>					
Major	HS GPA <sup>†</sup>	Additional Requirement	Test Code	Placement <sup>‡</sup>	
<b>STEM</b>	<b>None</b>	High school calculus or equivalent with C- or better both semesters	<b>PABM/70</b>	<b>Math 103</b> Calculus (4 units)	
	<b>≥ 3.2</b>	Precalculus or equivalent with B- or better both semesters and trigonometry with C- or better	<b>PABM/70</b>		
	<b>≥ 3.0</b>	Precalculus or equivalent with C- or better both semesters	<b>PABM/60</b>	<b>Math 101</b> Trigonometry (4 units)	
	<b>≥ 3.4</b>	<b>None</b>	<b>PABM/55</b>		
	<b>≥ 3.0</b>	Algebra 2, Integrated Math 3, or equivalent with B- or better both semesters	<b>PABM/55</b>	<b>Math 101A*</b> Trigonometry and Pre-Calculus (6 units)	
	<b>≥ 2.6</b>	Enrolled in high school calculus or equivalent	<b>PABM/55</b>		
	<b>&lt; 2.6</b>	<b>None</b>		<b>Math 100 and 50</b> College Algebra with Corequisite Support (6 units)	
<b>Business</b>	<b>None</b>			<b>BSAD 150</b> Business Calculus (3 units)	<b>or</b> <b>BSAD 155</b> Business Statistics (3 units)

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<sup>†</sup> GPA through at least grade 10. Students without a transcript can self-report GPA.  
<sup>‡</sup> A student can challenge his or her placement with an exam in the Learning Center

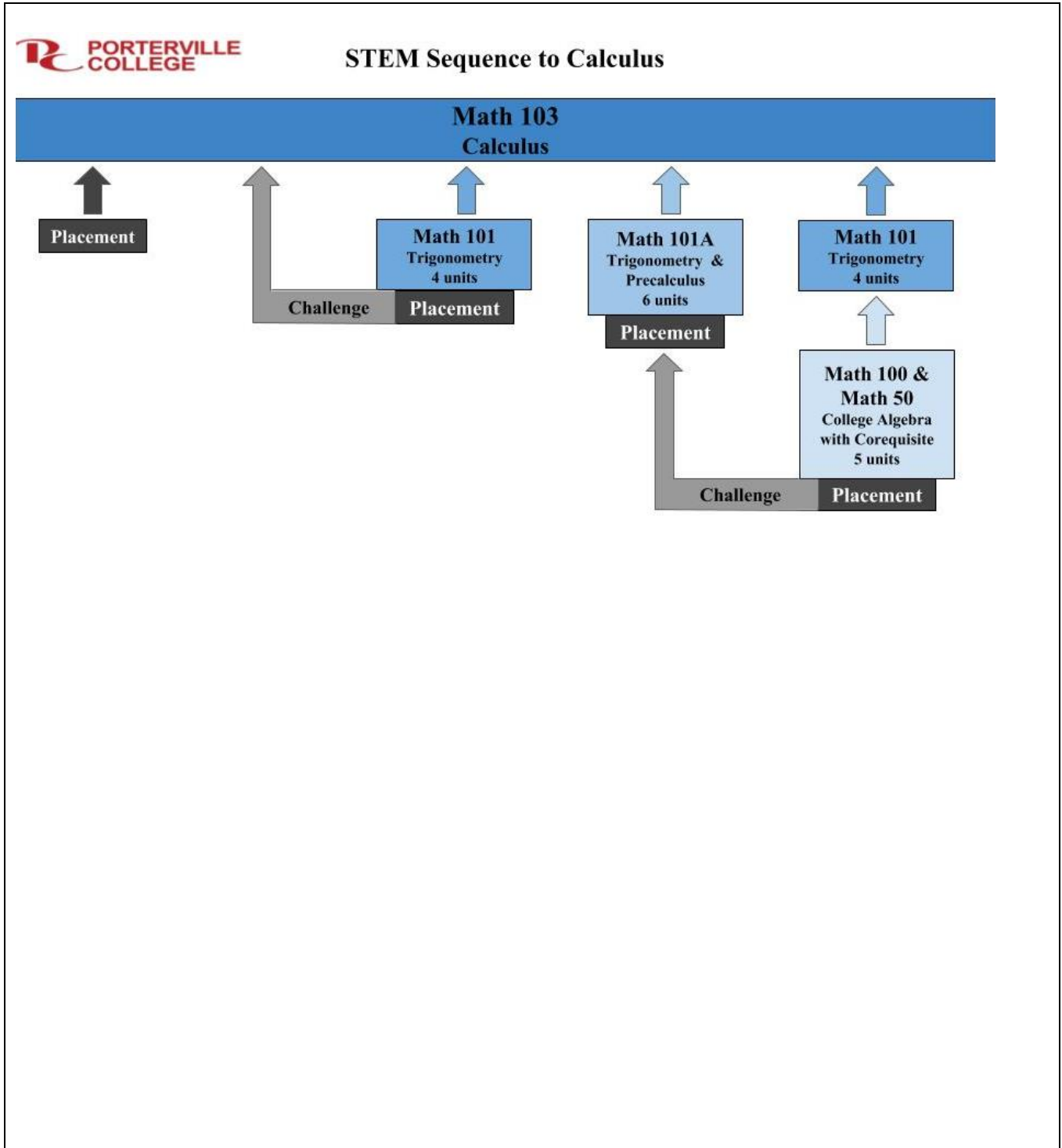
**Revised 1/21/19**  
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		2013-14	2014-15	2015-16	2016-17	2017-18
<b>Data Review</b>						
The source of the following data is the 2018-2019 Program Review, Subject Trend Data ( <a href="https://ir.kccd.edu/program-review/pc/subject/2018-19_APR_PC_MATH_Subject.pdf">https://ir.kccd.edu/program-review/pc/subject/2018-19_APR_PC_MATH_Subject.pdf</a> )						
<b>PROGRAM REVIEW SUBJECT TREND DATA FOR MATHEMATICS</b>						
<a href="https://www.kccd.edu/institutional-research/reports/subject-1">https://www.kccd.edu/institutional-research/reports/subject-1</a>						
		2013-14	2014-15	2015-16	2016-17	2017-18
Enrollment at Census (pg 2)		2213	2271	2374	2589	2762
Average number of students per section		40	39	36	35	32
First Day Waitlist (pg 2)		505	551	592	502	443
FTEF (pg 2)	<b>TOTAL</b>	18.7	19.2	21.1	22.1	23.0
	Full-Time	13.5	13.1	14.6	13.6	16.3
	Overload	3.2	2.8	3.7	3.6	2.4
	Adjunct		1.3	0.7	2.5	2.4
	Summer	2.0	2.0	2.2	2.3	1.9
FTES (pg 2)		381.2	390.4	398.1	408.3	399.2
Degrees & Certificates (AS-T)		3	9	5	7	2
(AA) Liberal Arts/Math and Science		5	9	13	13	23
Success rates (Traditional)		67%	64%	64%	64%	65%
Success rates (Distance Ed)		71%	71%	72%	74%	73%
Retention rates (Traditional)		91%	87%	88%	90%	88%
Retention rates (Distance Ed)		92%	86%	90%	89%	90%

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<b>Subject Productivity (2017-18)</b>	<b>Math</b>	<b>Collegewide</b>
<i>Traditional</i>	17.7	14.2
<i>Distance Education</i>	15.8	13.7
<i>Overall</i>	17.4	14.1

<b>Subject Gender</b>	<b>Retention</b>	<b>Success</b>
<i>Female</i>	89%	67%
<i>Male</i>	89%	63%

<b>Subject Age</b>	<b>Retention</b>	<b>Success</b>
<i>19 and younger</i>	90%	62%
<i>20 – 29</i>	88%	67%
<i>30 – 39</i>	88%	63%
<i>40 and older</i>	84%	70%

<b>Subject Ethnicity</b>	<b>Retention</b>	<b>Success</b>
<i>African American</i>	94%	69%
<i>American Indian</i>	96%	62%
<i>Asian/Filipino/Pac. Islander</i>	92%	78%
<i>Hispanic/Latino</i>	89%	65%
<i>Two or more races</i>	90%	67%
<i>White</i>	88%	67%

<b>Subject Overall Combined</b>	<b>Retention</b>	<b>Success</b>
<i>Mathematics</i>	89%	66%

<b>College-wide Overall Combined</b>	<b>Retention</b>	<b>Success</b>
<i>Porterville College</i>	89%	72%

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***Program Strengths***

- The Mathematics Division functions as a collaborative team, developing goals, improving ways to meet the needs of our students, and restructuring its math offerings to meet the AB 705 mandate.
- Between spring 2018 and fall 2018, we developed four new courses and five co-requisite courses in response to AB 705.
- We attend numerous conferences and workshops, collaborating with faculty from other community colleges and universities on such programs as 15 to Finish, Math Pathways, co-requisite remediation, and multiple measures. An example of this is our representation in the Central Valley Higher Education Consortium (CVHEC). This organization is comprised of 27 higher education institutions in the Central Valley who are committed to developing strategies that maximize student success.
- We developed AB 705-compliant multiple measures, eliminating all pre-transfer-level classes. Students will now be placed directly into transfer-level math with co-requisite support provided as needed. (Porterville College Strategic Plan, 2018-2021, Objective 1.2b,d, p. 36)
- We initiated three separate tracks for math students: BSTEM, non-BSTEM, and education majors. A fourth track (business) is under the purview of the CTE Division.
- We developed an engineering program designed to prepare students for upper-division coursework at 4-year universities.
- Despite the fact that adjunct instructors are difficult to find in the area, we generated 23.0 in FTEF with only eight full-time faculty members. This suggests that the division could support at least two additional full-time faculty members.
- We have expanded the number of online course offerings by 50% in past two years.
- The success rates in our online courses have consistently been over 70%, representing a significant improvement over pre-2013 levels.
- The productivity ratio (FTES/FTEF) for math is significantly higher for both traditional and distance education than for that of the college as a whole (17.4 versus 14.1 in 2017 – 2018).
- The Math Jump Start Program has more than doubled in enrollment since 2017. For Jump Start 2018, 19% of students successfully challenged their placement and were placed into a higher-level math course.
- The attendance in the Math Mentor Program has increased from 482 to 1528 students since the program's inception in the fall of 2014. This represents an increase of almost 217%.
- The enrollment in Math P103 (Calculus 1) has increased by almost 80% from 2016, expanding the number of classes from one to two. We have experienced the same level of growth in Math 104 (Calculus 2). These numbers are especially favorable for our new engineering program, as the majority of our calculus students typically plan to pursue engineering.
- For the Student Success cohort of students placed into college-level math, successful course completion increased from 68.9% in 2011-2012 to 78.1% in 2015-2016 (Porterville College Strategic Plan, p. 12).

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***Areas for Improvement***

- The success rate for traditional classes is currently 65%, which is lower than both the college-wide success rate (72%) and the math distance education success rate (73%). We are committed to increasing the success rates for all mathematics classes through co-requisite support, ongoing collaboration, and professional development opportunities.
- There are currently only two dual enrollment math classes being offered—Trigonometry and Pre-calculus—with both being taught by the same high school teacher. Finding individuals in the area who meet minimum qualifications for mathematics (i.e., possessing a master’s degree in mathematics) is difficult; however, we need to continue our efforts to recruit local high school teachers for the dual enrollment program. (Porterville College Strategic Plan, 2018-2021, Objective 3.2b, p. 38).
- Waitlists for math classes have been consistently high. For example, in 2017-2018, there were 443 students on the first day waitlists, indicating that many students are forced to delay their educational plans by not satisfying their math requirements immediately. This suggests that we are currently understaffed to meet demand adequately.
- The high cost of textbooks is becoming increasingly difficult on our students. In addition, most math classes require students to purchase access codes to either Aleks or My Math Lab, making supplies even more costly. We have proposed using SSSP funds to help offset the cost of access codes to students; however, this has not come to fruition yet.
- There is no designated space on campus for the engineering lab classes. If our program is to become competitive with those of COS, BC, or Taft, an engineering lab is critical.
- Some STEM majors will need to take two math classes before enrolling in Calculus—Math 100/Math 50 (College Algebra with co-requisite support) and Math 101 (Trigonometry). This creates two exit points for these students, placing a potential burden on success rates.
- There is no separate math lab to accommodate our math classes, many of which require students to do most of their homework, quizzes, and tests on the internet. The Learning Center, populated by students in other disciplines, does not have the space to meet this demand.
- The pool of available adjunct instructors in math is very small. It is difficult to find individuals who are fully qualified and willing to teach part-time at PC. Without an additional full-time faculty member, demand will continue to go unfulfilled.
- There is no MESA program at PC for assisting disadvantaged student populations in math, engineering, and computer science. Having a MESA is consistent with Objective 2.1b of the Porterville College Strategic Plan, “Advance Student Equity,” 2018-2021, p. 37.
- We do not have an Engineering Technology degree program, which would prepare students for family-supporting jobs without the high emphasis on theory and upper-level mathematics.
- We need certificates of achievement in our degree programs to serve as motivators for students pursuing their math and/or engineering degrees.
- As noted previously, more follow-up discussions on SLO/PLO results are needed.

**PORTERVILLE COLLEGE  
PROGRAM REVIEW REPORT: INSTRUCTIONAL DIVISIONS**

Name of Division: Mathematics  
Contact Person: Dr. Stewart Hathaway

Submission Date: January 28, 2019

[Note: The information in this area will repeat on all pages.]

**Goals** (This section is for you to report on progress on *previously established goals*. If your program is addressing more than 2 goals, please duplicate this page)

Goal(s)	Completion Date	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
1. Evaluate the feasibility of developing an engineering program to bridge between the local high schools (Harmony Magnet Academy) and 4-year institutions.	Fall 2016		Division Chair and division faculty	

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Completed (Date: December 2017 )

Revised (Date )

Comments: An engineering program subcommittee was formed and comprised of both math and physics faculty to investigate the possibility of developing for an engineering program at PC. Input from local stakeholders—primarily Harmony Magnet Academy Principal Jeff Brown—and college planning documents indicated the need for developing pathways (Educational Master Plan, 2017-2021, p. 54; Guided Pathways Workplan, p. 2, and the Porterville College Strategic Plan, p. 39). In response, we supported a proposal in the spring of 2018 to develop an engineering program. The curriculum was developed and approved by the Curriculum Committee in the fall of 2018, after which the Academic Senate approved the program’s being housed within the Mathematics Division.

**PORTERVILLE COLLEGE  
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Name of Division: Mathematics  
Contact Person: Dr. Stewart Hathaway

Submission Date: January 28, 2019

*[Note: The information in this area will repeat on all pages.]*

Goal(s)	Completion Date	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
2. Develop and implement an engineering program to bridge between local high schools and 4-year institutions.	Fall 2017	Laboratory equipment, additional faculty, and classroom/lab space.	Division Chair and division faculty	Lack of classroom/lab space and funding

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date October 2018)

Revised (Date )

Comments: Currently, there is no AS-T engineering degree; however, the Associate of Science in Engineering degree that we developed is designed to prepare students to continue their studies toward a B.S. degree in any field of engineering. The intent of the program is to assist students in transferring to an engineering program in the UC/CSU system. As an added benefit, students who complete the AS degree in Engineering will also earn an AS-T degree in mathematics

The program will begin in the fall of 2019 with one engineering course (ENGR P110 Introduction to Engineering), followed by two courses in the spring: (ENGR P120 Introduction to Programming Concepts and Methodologies for Engineers and ENR P260 Circuit Analysis). After visitations to the Harmony Magnet Academy and Bakersfield College engineering programs, it became clear that an engineering lab with specific equipment is necessary for subsequent courses in our program.



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Goal(s)	Completion Date	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
3. Obtain a class set of laptops.	Spring 2017	Funding	Division Chair	Lack of funding

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Completed (Date Laptop cart 1: Fall 2014, Laptop cart 2: Fall 2017, Laptop cart 3: Fall 2018)  
 Revised (Date )

Comments: Three laptop carts were obtained over the past four years. Laptop cart 1 has 35 17-inch laptops, laptop cart 2 has 40 15-inch laptops, and laptop cart 3 has 35 iPad Pros. These laptop carts enable students to take online assessments in class and receive immediate feedback from their instructors.

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Goal(s)	Completion Date	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
4. Increase retention and success rates in the basic skills math classes.	Fall 2018		Division Chair and division faculty	

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date Fall 2018)  
 Revised (Date )

Comments: In Math P055 (Elementary Algebra), there were significant gains in success rates, advancing from 56% in 2015-2016 to 70% in 2017-2018. In Math P061 (Pre-algebra), success rates decreased from 76% in 2015-2016 to 69% in 2017-2018. In Math P051 (Intermediate Algebra), success rates were essentially unchanged (approximately 60%). Data from the Porterville College Strategic Plan, 2018-2021 (p. 12), suggests positive results in this area. For the Student Success cohort of students in remedial math, the percentage of students achieving successful course completion with a C or better increased from 58.6% in 2011-2012, to 65.4% in 2015-2016.

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**Goals** (This section is for you list *new goals* for your program. If your program is creating more than 2 new goals, please duplicate this page)

Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
1. Develop an engineering lab.	Spring 2020	Funding	Division Chair and division faculty	Lack of funding and space on campus

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1\_x\_\_ Item 2\_\_\_ Item 3\_x\_\_ Item 4\_x\_\_ Item 5\_\_\_ Item 6\_x\_

Progress on Goal:

\_\_\_Completed (Date )  
\_\_\_Revised (Date )

Comments: As identified earlier, we will require space and equipment for an engineering lab for several of the courses in the program. A recent tour of BC's engineering program suggested specific equipment that will be needed (listed under the Facilities Request).

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
2. Hire an additional full-time faculty member in the Mathematics Division.	Summer 2020	Funding	District/College	Lack of full-time faculty positions allotted to college

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date )  
 Revised (Date )

Comments: As identified from the data, we do not have an adequate number of full-time faculty members to meet the current demand for classes. Compounding the problem is the shortage of qualified adjunct faculty in the Porterville area. In response to this, we will continue to apply for an additional full-time tenure-track mathematics faculty position.

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
3. Implement a one-semester pathway to calculus for entry-level STEM students. (Math 101AX)	Fall 2019	none	Division Chair and division faculty	Possible impact on students' financial aid

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal: The course was submitted to the Curriculum Committee in the fall of 2018, but it was later withdrawn due to concerns from the administration.

Completed (Date )  
 Revised (Date )

Comments: As identified previously, with our new multiple measures being implemented in the fall of 2019, entry-level STEM majors will have two exit points prior to Calculus 1. Research has shown, however, that exit points reduce the probability of student success significantly. Math 101AX responds to this problem by preparing entry-level STEM students to advance to calculus in one semester instead of two. This past fall, the administration expressed concerns that the high number of units of Math 101AX (7) might jeopardize students' financial aid; however, we believe that the resulting positive impact on student success would be an overwhelming advantage. In light of this, we are committed to continuing dialogue with the administration with the hope of gathering their support for this course.

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
4. Create a math lab.	Fall 2021	Funding and space	Division Chair, division faculty	Funding and space

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date            ) )  
 Revised (Date            ) )

Comments: A concern arose in our Program Level Outcomes over the lack of student success in using technology to explore mathematical concepts. In addition, as noted earlier, the Learning Center does not have sufficient space for our math students. (It is currently shared with Language Arts.) Lastly, the supply of laptops does not currently meet classroom demand. In response to this need—and the fact that the teaching of math is becoming more technology-dependent—we believe that a math lab would be a great asset to the students.

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
5. Develop a MESA program.	Spring 2023	Funding	Division faculty	Funding not available through 2020.

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date )  
 Revised (Date )

Comments: As identified previously, there is a need to recruit and provide assistance to disadvantaged students in the areas of mathematics, engineering, and computer science. Because of this, many California community colleges have MESA programs. Porterville College, with its high percentage of disadvantaged students, appears to be an ideal place for a MESA program. As the engineering program will soon be implemented, this would be an especially timely addition to the college. In addition, closing achievement gaps between demographic groups is a core value in the Porterville College Strategic Plan, 2018-2021 (p. 2).

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
6. Develop an Associate of Science degree in Engineering Technology.	Fall 2019	Laboratory equipment, additional faculty, and classroom/lab space.	Division faculty	Funding and classroom space

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date )

Revised (Date )

Comments: An Associate of Science degree in Engineering Technology would provide several benefits, among which are the following:

- 1) It would attract students who are interested in pursuing engineering without taking several of the higher-level math courses that are required in the Associate of Science in Engineering.
- 2) It would require less time to complete than the engineering degree, while still equipping students with the necessary skills to qualify for many engineering jobs.
- 3) It would emphasize the application of engineering techniques with less attention to theory, a feature which could appeal to many students.

The Associate of Science degree in Engineering Technology would further support the goal of providing clear pathways from high school to college in helping students “prepare for transfer and success at four-year institutions” (Porterville College Mission Statement, <https://www.portervillecollege.edu/mission-and-values>).



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Goal(s)	TimeLine for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
7. Develop certificates of achievement in the Engineering and Engineering Technology degrees.	Spring 2020		Division faculty	None

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date )

Revised (Date )

Comments: As noted previously, it would be useful to have certificates of achievement in our degree programs to motivate students to complete their degrees. A certificate of achievement in the Associate of Science in Engineering and the Associate of Science in Engineering Technology would respond to this need. These certificates would be attained by students at approximately midway through both engineering programs. They would provide students a level of marketability in the engineering field prior to obtaining their degrees, while motivating them to continue pursuing their degrees in engineering.

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
8. Expand the number of dual enrollment course offerings.	Spring 2021		Division Chair and division faculty	Finding high school teachers who meet the minimum qualifications in mathematics

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date        )  
 Revised (Date        )

Comments: As noted above, a weakness in our program is the fact that we currently offer only two dual enrollment classes. A large dual enrollment program provides a head start for high school students to complete their college degrees, while contributing to additional FTES to the college. Currently, only one high school offers dual enrollment classes (Monache High School). As Harmony has a successful engineering program in place, and PC will be launching its engineering program in the fall of 2019, it would be especially helpful if there were dual enrollment classes offered at Harmony. This would expedite students' completing their engineering degrees at PC and transferring to four-year universities.

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Goal(s)	Timeline for Completion	Needed resources	Person(s) Responsible	Obstacles to completion (if any)
9. Work for a successful implementation of AB 705 and respond as appropriate to student performance data.	Ongoing		Division faculty	none

Which of numbered items under the Mission Statement (see page 1 of this document) will be furthered if this goal is completed? (select all that apply)

Item 1  Item 2  Item 3  Item 4  Item 5  Item 6

Progress on Goal:

Completed (Date        )  
 Revised (Date        )

Comments: Our multiple measures placement guide is AB 705-compliant; however, we are committed to making necessary changes in response to the needs of our students. The primary focus is to increase the number of students who successfully complete transfer-level math in one year. We will evaluate the data after the first year of implementation and determine if any changes are warranted to meet this goal.

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STAFFING REQUEST				
<b><u>Staff Resources:</u></b>				
<b><u>Current Staffing Levels</u></b>				
<u>Full-time Staff</u>		<u>Part-time Staff</u>		
Faculty	8	Faculty	2	
Temporary	0	Temporary	0	
Classified	0	Classified	0	
Management	0	Management	0	
Project dates of temporary staff:				
<b><u>Request for New/Replacement Staff</u></b>				
Use one line for each position requested. Justify each position in the space below.				
	Title of Position	Classification (Faculty, Classified, or Management)	Full or Part Time	New or Replacement
Position 1	Math Instructor		FT	New
Position 2	Engineering Instructor		FT	New
Position 3	Engineering Lab Technician	Classified	PT	New
Justification: (Address each position requested)				
<p>As noted earlier, waitlists for math classes have been consistently high. In 2017-2018, there were 443 students on the first day waitlists, suggesting that we are currently understaffed. With the new engineering program, we will require additional STEM courses to meet the anticipated demand. Along with this, the new education degree at PC will increase demand for Math P115, a requirement for the degree. Our subject productivity for 2017-2018 was 17.4, compared to 14.1 for the college, indicating that FTES is relatively high. We have an FTEF of 23.0, suggesting that we could support at least two more full-time faculty members. Quite simply, math is required for practically all majors, and at our current level of staffing, students are forced to delay their educational plans. Because of this, we are requesting an additional full-time mathematics faculty position. In addition, as the engineering program is anticipated to expand in the next couple years, we plan to request a full-time engineering instructor and part-time engineering lab technician by fall 2020.</p>				

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<b>TECHNOLOGY REQUEST</b>	
Use this section to list any technology needs for your program. It is not necessary to put a price on these items; that will be done by the IT department. If you have more than two technology needs, add rows below.	
<u>Technology Need</u>	<u>Justification</u>
Item 1 AutoCAD and SolidWorks software.	AutoCAD is a civil/structural engineering industry standard drafting software. It is used to produce structural drawings, a key lab activity in core engineering classes. SolidWorks is used more in the mechanical/aerospace industry. It interfaces well with a 3D printer. Each of these software items help to provide a solid foundation in the learning of essential engineering skills.
Item 2 3D printer and bath wash for printed materials	3D printers are on the cutting edge of engineering design and development. They allow students to extend classroom theories to practice through creating models and prototypes of their designs. This equipment is essential to a successful engineering program.
Item 3 Laser Cutter	A laser cutter is another standard piece of equipment used in many manufacturing applications in engineering.
Item 4 Laptop carts in math classrooms.	Co-requisite support classes rely heavily on students having time on task practice on computers. In addition, online access to certain websites allows higher-level students to experience the benefit of computer graphics (especially 3-D graphics) in the illustration of mathematical problems. In short, online access is conducive to student success in both upper- and lower-level mathematics courses. A laptop cart for each of the math classrooms would help to accomplish this.
Item 5 UTM	This is needed to accomplish concrete compression testing and tensile strength testing.

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**FACILITIES REQUEST**

Use this section to list any facilities needs for your program. It is not necessary to put a price on these items; that will be done by the Maintenance & Operations department. If you have more than two facilities needs, add rows below.

<u>Facilities Need</u>	<u>Justification</u>
Item 1 Engineering lab	As stated previously, we need an engineering lab for several of our engineering courses to be offered. Without this, other options would need to be explored, such as having our students attend lab outside the Porterville College campus. This would be a last resort, however.
Item 2 Math lab	As noted, co-requisite support classes will increase the need for a math lab. In addition, as mathematics instruction is becoming more dependent on the internet, demand will continue to increase. In support of this request, the Porterville College Educational Master Plan, 2017-2021 (p. 90), indicates that the need for laboratory space is projected to increase by approximately 50% by 2030 (as per Title 5 standards).

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**SAFETY & SECURITY REQUEST**

Use this section to list any safety & security needs for your program. It is not necessary to put a price on these items; that will be done by the Safety and Security Program Manager. If you have more than two safety & security needs, add rows below.

<u>Safety &amp; Security Need</u>	<u>Justification</u>
Item 1	
Item 2	

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**BUDGET REQUEST**  
(Do not include staff increases in this section)

Account	Description	Program	2015-16 Actuals	2016-17 Actuals	2017-18 Actuals	2018-19 Request	2019-20 Request
4310	Inst Supplies & Materials	170100				450.00	2,300.00
4313	Non-Inst Supplies & Materials	170100	889.69	29.16	0.00	200.00	200.00
6419	Other Equipment	170100					
	<b>TOTAL OF BUDGET REQUEST</b>		<b>889.69</b>	<b>29.16</b>	<b>-</b>	<b>650.00</b>	<b>2,500.00</b>

Program Review Justification	Comment(s)	Grant or Categorical Supported Funding
See Program Review Update	The Mathematics Division separated from the Science Division last year. The additional funding is requested to purchase supplies AB705 and to provide for the new standalone division.	
See Program Review Update		
		Basic Skills has funded equipment in prior years. However, this funding is no longer being provided as a separate categorical program. Additional requests may be made but will depend on the new Student Success Initiative. New equipment information for the classrooms and Engineering Lab will be included in the updated program review in 2019.