Program Review Summary Page

For Instructional Programs

Program or Area(s) of Study under Review: Mathematics

Term/Year of Review: Spring 2022

Summary of Program Review:

A. Major Findings

1. Strengths:

The mathematics department has embraced the widespread and significant changes brought on by the passage of AB705. Using data driven decisions, the department no longer offers poorly performing multi-semester pre-requisite pathways to either transfer level Statistics or College Algebra. This change has brought about serious decreases in the success rates of those individual transfer courses. But more importantly, they do reflect an increase in the success rate for students who would have previously placed below transfer level. Although it is distressing to see a single class success rate of say 50%, it represents more students being successful than successive success rates of 70% in a two-course pathway (49% throughput). Prior to AB705 many students were placed into a three or four-course pathways, making the increase even more dramatic.

Through the Statistics and College Algebra Communities of Practice, faculty meet regularly to assess, revise, and re-assess pedagogical approaches to these first-year transfer-level courses now composed of a vastly different student body than a few years ago. Robust discussions surrounding success and retention rates for all student groups, including historically underrepresented groups, are ongoing.

The Math Success Center has made changes to encourage student utilization of the resources available. Multiple assignments were developed in the Math Success Center shell that faculty can use to introduce students to the Math Success Center and support basic skills learning. Faculty experts now serve as non-credit instructors in the Math Success Center providing wrap-around support for basic skills STEM students who now learn multiple semesters of pre-transfer math at the same time they are taking Math 106. The Math Success Center created a workshop program this semester to offer content directed to the Math 106 student population in response to AB705. The goal of these workshops is to provide support for students who are finding difficulty with topics that are critical to success in the course. In addition, there are faculty experts that work to support statistics students. These experts have worked to create various modules of content in the Math Success Center Canvas shell. These modules provide content on topics that students struggle with historically. Each module provides instruction as well as practice for the students to be used in tandem with the Math Success Center team.

With an additional focus on program effectiveness, the department performs regular assessment of all its classes according to the assessment schedule. The assessment schedule developed and approved by the department embraces a multi-year cycle of data collection, analysis and discussion for each class. This cycle ensures that the department is continually in the process of assessment, while also affording faculty the time necessary to reflect, discuss, and react accordingly.

2. Areas for Improvement:

As noted in department strengths above, consequences of AB705 implementation brought about sharp decreases in the success rates for first year transfer-level courses. Adjustments to placement and curriculum are only the first step in improving success rates for all students, including those in historically underrepresented groups.

Statistics, in particular, has had a challenging time placing students appropriately. Too many students sign up for a co-requisite when it is unneeded. Unfortunately, data collected independently by the Mathematics Department indicates this improper Statistics placement is hindering success rates. Data continually shows that co-requisite sections with the highest percentage of students correctly placed are also the sections with the highest success rates. Unfortunately, the confusing display method of co-requisites in both WebAdvisor and Self-Service have contributed to this issue. By all accounts the department has received, this is not something that can be resolved within the registration program itself. The mathematics department has changed section numbers so that Stat classes requiring a co-requisite appear last when searching for Math 232. The hope being that students who did not need the co-requisite would sign up for classes they saw earlier in the list. This did not prove to show significant improvement in correct placement. In response, the Statistics Community of Practice, in conjunction with that of College Algebra, has developed a new easy-to-read placement document focusing on time required in each pathway and hopes to have it distributed to counselors and available on the college website for Spring 2023 registration. This situation will continually be monitored until an acceptable solution is reached.

The benefits of the Statistics and College Algebra Community of Practices have brought into focus the importance of such groups. Collaborating on a regular schedule with the time to share pedagogical success and failure, research and outside conference experiences has been reported by many faculty to be the stable and supportive platform they needed to make their way through both AB705 and Covid induced change. The department has hopes that this model can be expanded into a Calculus pathway Community of Practice to provide the same level of support and engagement to faculty supporting our most serious STEM students.

Demand for STEM professionals continues to grow and the data suggests that engineering students comprise a substantial portion of students enrolled in the mathematics course. Hence, the expansion of outreach to other STEM areas may attract more students and emphasizes why supporting faculty who support these students is so important.

Our department needs to work closely with the Math Success Center to continue to provide support for students at all levels of math. Math faculty need to continue to encourage their students to use the Math Success Center services. Prior to Covid, the tie between the Math Success Center and the department was strong, functional and providing a solid foundation of support for students and faculty. (Mastery Quizzes had been developed for several classes in the

B-STEM path and were fully operational. These Mastery Quizzes provided a center and framework to rigor and flow in the pathway. Students would take the first version in class, and then receive subsequent support and other versions of the quiz in the Math Success Center if the first quiz revealed further support was necessary.) This process had proved so successful the department was looking toward expanding the process into other classes. In addition, the Mathematics Department had a fairly dependable stream of excellent students ready and willing to take on the role of being a student tutor. Unfortunately, Covid put a damper Mastery Quizzes. The paper form did not work in an online environment. In addition, the pipeline of student tutors decreased, as enrollment declined along with students and faculty became more isolated online. While Online Common Quizzes have replaced Mastery Quizzes in Math 106, it is important to restore the connection between the department and the Math Success Center. In the wake of AB 705 and expanded online expectation, the face of higher education is forever changed. The Math Success Center must continue to research new models for supporting students and faculty. We have set goals for an increased number of statistics workshops starting Spring 2023. The Math Success Coordinator will work with the Statistics Community of Practice to find more ways to increase the success rate of the students in the statistics.

Additionally, the mathematics department recognizes the need for an increased support for students in the Calculus track, Linear Algebra, and Differential equations. Math Success Center staff and mathematics instructors will work together to expand workshop offerings to include and boost the support for the previously mentioned mathematics courses.

Prior to COVID-19, all online mathematics courses were required to administer in-person tests via Testing and Tutoring Center (TTC). TTC is no longer able to administer tests to non-DSPS students and combined with the recent pandemic, shifted the assessment to mostly online. Mathematics department is planning to reduce online testing and increase in-person assessment models. This will require a space that is comfortable for a testing environment and can accommodate all students in class.

3. Projected Program Growth, Stability, or Viability:

Both AB705 and Covid restrictions severely reduced student demand for Mathematics courses. However, the department has continually written data driven, strategic class schedules. As the section offerings allow, the mathematics department is offering multiple sections of the same course in various modalities, including fully in-person, various hybrid, and asynchronous online models. In some cases, not only are the planned classes able to fill, but student demand has prompted the addition of several more sections. As this trend continues, while we are currently not in a state of growth, we do feel the program has stability and shall continue in the future.

B. Program's Support of Institutional Mission and Goals

1. Description of Alignment between Program and Institutional Mission:

Communication and Critical Thinking is first on the list of Institutional Learning Outcomes. In natural alignment, the Mathematics department holds a deep commitment to critical thinking, as noted in the following department mission statement included on all class CORs:
The Napa Valley College Mathematics Department strives to make mathematics accessible and meaningful by employing diverse teaching methods in courses emphasizing vital quantitative skills

and qualitative reasoning ability. Our goal is to ensure that all students receive the instruction and support necessary to become confident, independent, and successful lifelong learners, capable of achieving their academic and professional goals.

In addition to supporting critical thinking skills, the stated commitment to diverse teaching methods drives department discussion and decisions. The department regularly examines teaching methods in support of Student Success, Honesty and Integrity. All listed Institutional values.

This department mission statement has been revisited and reaffirmed throughout the years since its inception, most recently in October of 2020.

2. Assessment of Program's Recent Contributions to Institutional Mission:

The department has repeatedly demonstrated an openness to innovative ideas, creativity and inclusivity as we research and develop new methodologies to support the success of all students, especially regarding structuring our program and embracing AB705.

3. Recent Program Activities Promoting the Goals of the Institutional Strategic Plan and Other Institutional Plans/Initiatives:

The Mathematics department works closely with many departments ensuring that adequate and relevant support is provided to equip incoming students with the skills and resources required for success in our classes. Such departments include counseling to support correct placement and the Math Success Center for learning resources. The department routinely discusses and disseminates more personal supportive resources such as the Student Health Center and Food Basket.

While AB705 created challenges, the department embraced changes with a commitment to increasing student success and closing equity gaps. Though there is more work to be done, most recent data indicates that the changes made so far have taken steps in the right direction to achieving those goals.

C. New Objectives/Goals:

The math department has agreed to hold an Inclusivity, Equity and Diversity Colloquia in Spring 2023. Topics will include social justice, white fragility, how to be an anti-racist, and working to be inclusive in discipline specific curriculum.

The math department would like to revert back to our proctored testing requirement as soon as possible.

D. Description of Process Used to Ensure "Inclusive Program Review"

The department held multiple meetings to discuss Program Review and the draft has been distributed for feedback via email multiple times. All department members have access to this shared document online and have been able to access, comment, and edit it throughout the process.

Program Review Report Spring 2022

This report covers the following program, degrees, certificates, area(s) of study, and courses (based on the Taxonomy of Programs on file with the Office of Academic Affairs):

Program	Mathematics
Degree(s)/Certificate(s)	Mathematics: AS-T
Courses	MATH-55
	MATH-83
	MATH-85
	MATH-86
	MATH-90
	MATH-91
	MATH-92
	MATH-93
	MATH-94
	MATH-95
	MATH-96
	MATH-97
	MATH-98
	MATH-99
	MATH-106
	MATH-108
	MATH-115
	MATH-120
	MATH-121
	MATH-130
	MATH-220
	MATH-222
	MATH-232
	MATH-235

Taxonomy of Programs, June 2021

PLEASE NOTE: Due to AB 1705, which went into effect in Fall of 2019, and the directives issued by the Chancelor's Office to disallow most basic skills classes starting in Fall 2022, the math department will no longer be offering the following class currently listed in our taxonomy: MATH 55, 85, 90, 92, 93, 94, 95, 96, 97, 98 and 99. Since this change was mandated, we will not include discussion or reflection on these classes in this report.

To facilitate understanding of the current program and the significance of these changes without removing the data for reference, those classes will be stuck out in the RPIE Analysis sections.

I. PROGRAM DATA

A. Demand

1. Headcount and Enrollment

	2018-2019	2019-2020	2020-2021	Change over 3-Year Period
Headcount				
Within the Program	2,708	2,566	2,486	-8.2%
Across the Institution	8,176	8,181	7,208	-11.8%
Enrollments				
~~MATH-55~~	~~114~~	~~--~~	~~--~~	~~-100%~~
MATH-83	--	228	167	--
~~MATH-85~~	~~--~~	~~104~~	~~148~~	--
MATH-86	--	149	89	--
~~MATH-90~~	~~538~~	~~--~~	~~--~~	~~-100%~~
~~MATH-92~~	~~51~~	~~--~~	~~--~~	~~-100%~~
~~MATH-93~~	~~--~~	~~145~~	~~277~~	~~--~~
~~MATH-94~~	~~890~~	~~164~~	~~--~~	~~-100%~~
~~MATH-95~~	~~--~~	~~136~~	~~235~~	~~--~~
~~MATH-98~~	~~26~~	~~--~~	~~--~~	~~-100%~~
~~MATH-99~~	~~25~~	~~--~~	~~--~~	~~-100%~~
MATH-106	380	648	471	23.9%
MATH-108	277	299	193	-30.3%
MATH-115	40	20	36	-10.0%
MATH-120	271	313	341	25.8%
MATH-121	140	211	247	76.4%
MATH-130	--	--	16	--
MATH-220	91	85	89	-2.2%
MATH-221	102	66	85	-16.7%
MATH-222	65	45	44	-32.3%
MATH-232	840	1,215	1,170	39.3%
MATH-235	15	14	--	-100%
Within the Program	3,865	3,842	3,608	-6.6%
Across the Institution	32,545	33,102	30,409	-6.6%
Source: SQL Enrollment Files				

RPIE Analysis: The number of students enrolled (headcount) in the Mathematics Program decreased by 8.2% over the past three years, while headcount across the institution decreased by 11.8%. Enrollment within the Mathematics Program decreased by 6.6%, which mirrors the decrease in enrollment across the institution.

Enrollment in the following courses changed by more than 10% (±10%) between 2018-2019 and 2020-2021:

Courses with enrollment increases:

- *MATH-121 (76.4%)*
- *MATH-232 (39.3%)*
- *MATH-120 (25.8%)*
- *MATH-106 (23.9%)*

Courses with enrollment decreases:

- ~~*MATH-55 (-100%)*~~
- ~~*MATH-90 (100%)*~~
- ~~*MATH-92 (100%)*~~
- ~~*MATH-94 (-100%)*~~
- ~~*MATH-98 (-100%)*~~
- ~~*MATH-99 (100%)*~~
- *MATH-235 (-100%)*
- *MATH-222 (-32.3%)*
- *MATH-108 (-30.3%)*
- *MATH-221 (-16.7%)*
- *MATH-115 (-10.0%)*

~~*For MATH-85, MATH-93, and MATH-95, which were was offered in two of the past three years, enrollments increased by 42.3%, 91.0%, and 72.8%, respectively, between 2019-2020 and 2020-2021.*~~

For MATH-83 and MATH-86, which were offered in two of the past three years, enrollments decreased by 26.8% and 40.3%, respectively, between 2019-2020 and 2020-2021.

Program Reflection:

Overall, the math department has not suffered an enrollment decline as severe as the rest of the campus. This is most likely due to the fact that our classes are requirements for programs or degrees and rarely electives. Unfortunately, we do anticipate our department matching decline of the rest of the campus moving forward as the recent drastic changes (due to AB705 and the pandemic) stabilize.

Enrollment declines in our traditional math department have been offset by an increase in our CCAP classes. For future program reviews, we request these classes to be separated from other classes for more accurate analysis.

Reflections for this section of previous program reviews have focused on the shortage of instructors. While not included in this data, that change clearly indicates the changes in our program.

In fall of 2019, the math department had 12 full time faculty and 9 adjunct faculty (CCAP classes excluded). In contrast, in the Spring of 2022, we have 11 full time faculty and only two adjunct faculty.

We anticipate that our future department enrollments will mainly follow campus wide trends of decline, with the exception of our CCAP program, which is expected to maintain or grow in upcoming years.

The main focus of our department's enrollment effort will center around getting students enrolled in the correct math class. This effort will include proper counseling along with high school outreach. However, it will be most successful if we can get changes to the way Self-service lists co-requisite classes.

2. Average Class Size

	2018-2019		2019-2020		2020-2021		Three-Year	
	Sections	Average Size	Sections	Average Size	Sections	Average Size	Average Section Size	Trend
~~MATH-55~~	~~3~~	~~38.0~~	~~--~~	~~--~~	~~--~~	~~--~~	~~38.0~~	~~-100%~~
MATH-83	--	--	7.0	32.6	6	27.8	30.4	--
~~MATH-85~~	~~--~~	~~--~~	~~4.0~~	~~26.0~~	~~5~~	~~29.6~~	~~28.0~~	~~--~~
MATH-86	--	--	6.0	24.8	3	29.7	26.4	--
~~MATH-90~~	~~17~~	~~31.6~~	~~--~~	~~--~~	~~--~~	~~--~~	~~31.6~~	~~-100%~~
~~MATH-92~~	~~2~~	~~25.5~~	~~--~~	~~--~~	~~--~~	~~--~~	~~25.5~~	~~-100%~~
~~MATH-93~~	~~--~~	~~--~~	~~4.0~~	~~36.3~~	~~9~~	~~30.8~~	~~32.5~~	~~--~~
~~MATH-94~~	~~29~~	~~30.7~~	~~5.0~~	~~32.8~~	~~--~~	~~--~~	~~31.0~~	~~-100%~~
~~MATH-95~~	~~--~~	~~--~~	~~4.0~~	~~34.0~~	~~8~~	~~29.4~~	~~30.9~~	~~--~~
~~MATH-98~~	~~1~~	~~26.0~~	~~--~~	~~--~~	~~--~~	~~--~~	~~26.0~~	~~-100%~~
~~MATH-99~~	~~1~~	~~25.0~~	~~--~~	~~--~~	~~--~~	~~--~~	~~25.0~~	~~-100%~~
MATH-106	15	25.3	20.0	32.4	15	31.4	30.0	24.1%
MATH-108	10	27.7	10.0	29.9	8	24.1	27.5	-13.0%
MATH-115	1	40.0	1.0	20.0	1	36.0	32.0	-10.0%
MATH-120	8	33.9	10.0	31.3	11	31.0	31.9	-8.6%
MATH-121	5	28.0	7.0	30.1	9	27.4	28.5	-2.1%
MATH-130	--	--	--	--	1	16.0	16.0	--
MATH-220	--	30.3	3.0	28.3	3	29.7	29.4	-2.0%
MATH-221	3	34.0	2.0	33.0	3	28.3	31.6	-16.8%

MATH-222	3	32.5	2.0	22.5	2	22.0	25.7	-32.3%
MATH-232	2	31.1	37.0	32.8	36	32.5	32.3	4.5%
MATH-235	27	15.0	1.0	14.0	--	--	14.5	-100%
Program Average*	127	30.4	123	31.2	120	30.1	30.6	-1.0%
Institutional Average*	1,313	24.8	1,348	24.6	1,171	25.9	25.1	4.4%

Source: SQL Enrollment and Course Sections Files

Average Section Size across the three-year period for courses, and both within academic years and across the three-year period for the program and institutional levels is calculated as:

$$\frac{\text{Total \# Enrollments}}{\text{Total \# Sections}}.$$

It is not the average of the three annual averages.

RPIE Analysis: Over the past three years, the Mathematics Program has claimed an average of 30.6 students per section. The average class size in the program has exceeded the average class size of 25.1 students per section across the institution during this period. Average class size in the program decreased by 1.0% between 2018-2019 and 2020-2021. Average class size at the institutional level increased by 4.4% over the same period.

Average class size in the following courses changed by more than 10% (±10%) between 2018-2019 and 2020-2021:

Course with an increase in average class size:

- *MATH-106 (24.1%)*

Courses with decreases in average class size:

- ~~*MATH-55 (-100%)*~~
- ~~*MATH-90 (-100%)*~~
- ~~*MATH-92 (-100%)*~~
- ~~*MATH-94 (-100%)*~~
- ~~*MATH-98 (100%)*~~
- ~~*MATH-99 (100%)*~~
- *MATH-235 (-100%)*
- *MATH-222 (-32.3%)*
- *MATH-221 (-16.8%)*
- *MATH-108 (-13.0%)*
- *MATH-115 (-10.0%)*

Program Reflection:

Our current class size numbers are satisfactory given the current financial situation.

We have discontinued Math 235 as it was replaced with COMS 218 which will better meet the needs of those students.

As we continue to support students without prerequisite knowledge, we will continue to request reductions in our class caps. This will allow more individualized instruction and increase instructor contact with each student, particularly in our co-requisite classes, entry level classes, as well as our more intensive challenging higher-level classes.

3. Fill Rate and Productivity

Fill Rate*			
	Enrollments*	**Capacity**	**Fill Rate**
2018-2019	3,595	3,959	90.8%
2019-2020	3,664	3,710	98.8%
2020-2021	3,215	3,335	96.4%
Three-Year Program Total	10,474	11,004	95.2%
Institutional Level	83,156	101,258	82.1%
Productivity*			
	FTES	**FTEF**	**Productivity**
2018-2019	564.6	35.6	15.9
2019-2020	483.5	32.5	14.9
2020-2021	424.8	28.9	14.7
Three-Year Program Total	1,472.9	97.0	15.2
Source: SQL Enrollment and Course Sections Files			

RPIE Analysis: Fill rates within the Mathematics Program tend to be higher than the fill rate at the institutional level. [Compare program-level rate of 95.2% to institution-level rate of 82.1% over the past three years.] Between 2018-2019 and 2019-2020, enrollment increased while capacity decreased, resulting in an increase in fill rate. Between 2019-2020 and 2020-2021, both enrollment and capacity decreased, resulting in a decrease in fill rate (due to a higher rate of decrease in enrollment).

Productivity ranged from 14.7 to 15.9 over the past three years. [Productivity has not been calculated at the institutional level.] The three-year program productivity of 15.2 is lower than the target level of 17.5, which reflects 1 FTEF (full-time equivalent faculty) accounting for 17.5 FTES (full-time equivalent students) across the academic year. (This target reflects 525 weekly student contact hours for one full-time student across the academic year.)

**Note: Fill rates and productivity reported in the table do not include 29 Mathematics section offerings for summer terms over the past three years. As a result, the enrollment figures reported here might differ from those reported in Section I.A.1.*

Program Reflection:

Math department fill and productivity rates continue to be higher than the rest of the campus.

4. Labor Market Demand

This section does not apply to the Mathematics Program, as it is not within the Career Technical Education Division.

B. Momentum

1. Retention and Successful Course Completion Rates

Level	Retention Rates (Across Three Years)			Successful Course Completion Rates (Across Three Years)		
	Rate	Course Rate vs. Program Rate		Rate	Course Rate vs. Program Rate	
		Above	Below		Above	Below
~~MATH-55~~	~~85.1%~~	~~--~~	~~--~~	~~70.2%~~	~~X~~	
MATH-83	77.3%		***X***	51.9%		***X***
~~MATH-85~~	~~79.4%~~		~~X~~	~~61.8%~~		~~X~~
MATH-86	78.2%		***X***	48.9%		***X***
~~MATH-90~~	~~87.7%~~	~~X~~		~~60.2%~~		~~**X**~~
~~MATH-92~~	~~88.2%~~	~~X~~		~~66.7%~~	~~X~~	
~~MATH-93~~	~~93.3%~~	~~**X**~~		~~70.1%~~	~~X~~	
~~MATH-94~~	~~79.7%~~		~~**X**~~	~~54.0%~~		~~**X**~~
~~MATH-95~~	~~88.0%~~	~~X~~		~~48.0%~~		~~**X**~~
~~MATH-98~~	~~100%~~	~~**X**~~		~~96.2%~~	~~**X**~~	
~~MATH-99~~	~~96.0%~~	~~X~~		~~96.0%~~	~~**X**~~	
MATH-106	82.8%		***X***	64.1%	--	--
MATH-108	87.5%	X		68.8%	***X***	
MATH-115	89.7%	X		84.5%	***X***	
MATH-120	87.8%	***X***		69.3%	***X***	
MATH-121	93.4%	***X***		77.9%	***X***	
MATH-130	93.8%	***X***		93.8%	***X***	
MATH-220	85.0%	--	--	53.9%		***X***
MATH-221	91.0%	***X***		73.1%	***X***	
MATH-222	99.1%	***X***		97.2%	***X***	
MATH-232	84.4%	--	--	66.3%	X	
MATH-235	85.2%	--	--	66.7%	X	
Program Level	**85.1%**			**64.5%**		
Institutional Level	90.3%			75.6%		

Source: SQL Enrollment Files
-- Indicates a value that is within 1% of the program-level rate.
Bold italics denote a statistically significant difference between the course-level rate and the program-level rate.
Bold denotes a statistically significant difference between the program-level rate and the institutional rate.
Note: Grades of EW (Excused Withdrawal) for spring 2020 and beyond are not included in the calculations of the three-year retention and successful course completion rates

reported above. This approach reflects the standard recommended research practice of not including EWs in either the numerator or the denominator for these rates.

RPIE Analysis: *Over the past three years, the retention rate for the Mathematics Program was significantly lower than the rate at the institutional level. The retention rates for MATH-83, MATH-86, ~~MATH-94~~, and MATH-106 were significantly lower than the program-level rate. Other Mathematics Program courses (highlighted in the table) had retention rates that were significantly higher than the program-level rate. The retention rate for the Mathematics Program falls in the 2nd percentile among program-level retention rates (across 59 instructional programs, over the past three years).*

Over the past three years, the successful course completion rate for the Mathematics Program was significantly lower than the rate at the institutional level. The successful course completion rates for MATH-83, MATH-86, ~~MATH-90, MATH-94, MATH-95~~, and MATH-220 were significantly lower than the program-level rate. Other Mathematics Program courses (highlighted in the table) had successful course completion rates that were significantly higher than the program-level rate. The successful course completion rate for the Mathematics Program falls in the 2nd percentile among program-level successful course completion rates (across 59 instructional programs, over the past three years).

Over the past three years, the difference between retention and successful course completion at the program level (20.6%) was significantly higher than the difference at the institutional level (14.7%). This figure represents the proportion of non-passing grades assigned to students (i.e., grades of D, F, I, NP).

The following Mathematics Program courses claimed differences (between retention and successful course completion) that exceeded 10%:

- ~~*MATH-95 (40.0%)*~~
- *MATH-220 (31.1%)*
- *MATH-86 (29.3%)*
- ~~*MATH-90 (27.5%)*~~
- ~~*MATH-94 (25.7%)*~~
- *MATH-83 (25.4%)*
- ~~*MATH-93 (23.2%)*~~
- ~~*MATH-92 (21.5%)*~~
- *MATH-106 (18.7%)*
- *MATH-108 (18.7%)*
- *MATH-120 (18.5%)*
- *MATH-235 (18.5%)*
- *MATH-232 (18.1%)*
- *MATH-221 (17.9%)*
- ~~*MATH-85 (17.6%)*~~
- *MATH-121 (15.5%)*
- ~~*MATH-55 (14.9%)*~~

Program Reflection:

Our department level retention and completion rates are lower than the rest of the college, in fact, we have the lowest completion rate on campus. Mathematics is a rigorous program at all levels. It is not surprising that mathematics courses would have success and retention rates below that of the institutional level.

However, it is also important to note that when considering statewide data reported by DataMart, NVC mathematics retention and success rates are consistently in the middle of the pack compared to statewide levels. For transfer level classes we range between 36th - 53rd among the state's 72 listed districts.

Comparing between courses, students do worse in MATH 83 and 86. This is expected as these classes no longer have prerequisite requirements, and many students enter needing support. If a class is a student's first interaction with NVC math classes, it seems reasonable that it may take them some time to adjust to the level of work and rigor required. Our department is working closely with the Algebra and Statistics Communities of Practices and the Math Success Center to find creative ways to help these underprepared students succeed.

The next lowest success rate is in MATH 220. This is our most challenging class, and we need to provide more support for these students. This class appears to be particularly difficult for students to take online, so we are moving it back to in person. We are hopeful that since these students will be on campus for their class, they will also utilize the Math Success Center in person.

2. Student Equity

	Retention Rates (Across Three Years)		**Successful Course Completion Rates (Across Three Years)**	
	Program Level	**Institution Level**	**Program Level**	**Institution Level**
African American/Black	***81.1%***	86.8%	***55.4%***	65.0%
Latinx/Hispanic			***60.3%***	72.6%
First Generation			***60.7%***	74.4%

Source: SQL Enrollment Files
Bold italics denote a statistically significant difference between rates at the program and institutional levels, with the lower of the two rates in ***bold italics***.
Shaded cells pertaining to retention rates indicate that statistically significant differences for those groups were not found at the institutional level.
Note: Grades of EW (Excused Withdrawal) for spring 2020 and beyond are not included in the calculations of the three-year retention and successful course completion rates reported above. This approach reflects the standard recommended research practice of not including EWs in either the numerator or the denominator for these rates.

RPIE Analysis: This analysis of student equity focuses on the three demographic groups with significantly lower retention and/or successful course completion rates found at the institutional level (vs. the corresponding rates among all other demographic groups, combined) over the past three years. Tests of statistical significance were conducted to compare program-level and institution-level rates among the three groups listed above.

Within the Mathematics Program, the retention rate among African American/Black students was significantly lower than the rate at the institutional level.

Within the Mathematics Program, the successful course completion rates among African American/Black, Latinx/Hispanic, and First-Generation students were significantly lower than the corresponding rates at the institutional level.

These patterns reflect the findings from the comparison of retention and successful course completion at the program vs. institutional level, where the program-level rates were significantly lower than the institution-level rates for both retention and successful course completion. (See Section I.B.1 above).

Program Reflection:

The decline in retention and success for these groups compared to the department averages was worse than the campus as a whole for retention among Black students and success among LatinX and First-Generation students. However, our decline in success rates for Black students is 1.5% less than the decline campus wide. In recent semesters we have worked closely with the UMOJA program to allow their students to take math as part of their learning community. We are attempting to expand that model to other programs that could help the above-mentioned students.

One of the main objectives of AB 705 was to help colleges close these achievement gaps. While we are nowhere near done with the work needed to achieve this goal, these numbers do show progress. For this data cycle, Black students succeed in their math class at a rate **9.1**% below department averages. However, during our last program review, that rate was **13.2%**. Even more progress has been made among LatinX students who succeed at a rate **4.2%** lower than department averages in this cycle but the difference was **12.5%** last time.

3. **Retention and Successful Course Completion Rates by Delivery Mode (of Courses Taught through Multiple Delivery Modes, i.e., In-Person, Hybrid, and Online)**

	Retention Rates (Across Three Years)			**Successful Course Completion Rates (Across Three Years)**		
	In-Person	Hybrid	Online	In-Person	Hybrid	Online
MATH-232						
In-Person vs. Hybrid	78.5%	84.7%		46.6%	69.1%	
In-person vs. Online	80.1%		70.7%	50.1%		50.3%
Hybrid vs. Online		84.7%	70.7%		69.1%	50.3%
~~MATH-90~~	~~87.7%~~		~~87.8%~~	~~60.5%~~		~~57.1%~~
~~MATH-94~~	~~78.8%~~		~~83.6%~~	~~55.4%~~		~~47.7%~~
~~MATH-95~~		~~85.7%~~	~~81.3%~~		~~50.0%~~	~~15.6%~~
Program Total						
In-Person vs. Hybrid	81.6%	84.8%		***55.9%***	68.7%	
In-person vs. Online	79.9%		77.2%	59.2%		***47.3%***
Hybrid vs. Online		84.8%	***77.2%***		68.7%	***47.3%***
Institutional Total						
In-person vs. Hybrid	90.8%	94.1%		84.4%	84.9%	
In-person vs. Online	88.1%		88.6%	71.6%		71.7%
Hybrid vs. Online		85.7%	***82.2%***		69.2%	***63.4%***

Source: SQL Course Sections Files
This table compares student performance in courses offered through multiple delivery modes within the same academic year.
Bold italics denote a significantly lower rate within that delivery mode.
Note: The analysis of retention and successful course completion by delivery mode does not include spring 2020 – spring 2021 because most courses shifted to an online/hybrid delivery mode beginning in spring 2020 due to the COVID-19 pandemic (thereby blurring the distinction between delivery modes).

RPIE Analysis: RPIE Analysis: Over the past three years, four courses within the Mathematics Program have been offered through at least two delivery modes within the same academic year. In 2018-2019, MATH-90 was offered through in-person and online formats. In 2018-2019 and 2019-2020, MATH-94 was offered through in-person and online formats. In 2019-2020, MATH-95 was offered through online and hybrid formats. In 2018-2019 and 2019-2020, MATH-232 was offered through in-person, online, and hybrid formats. This analysis focuses on program-level rates. Details for the course level are reported in the table above.

Within the Mathematics Program:

- *The retention rate in in-person sections was lower than the retention rate in hybrid sections. (The difference was not statistically significant.) This pattern reflects the findings at the institutional level.*
- *The retention rate in online sections was lower than the retention rate in in-person sections. (The difference was not statistically significant.) This pattern deviates from the findings at the institutional level, where the retention rate in online sections mirrored the rate in in-person sections.*
- *The retention rate in online sections was significantly lower than the retention rate in hybrid sections. This pattern reflects the findings at the institutional level.*

Within the Mathematics Program:

- *The successful course completion rate in in-person sections was significantly lower than the successful course completion rate in hybrid sections. This pattern deviates from the findings at the institutional level, where the successful course completion rate in in-person sections mirrored the rate in hybrid sections.*
- *The successful course completion rate in online sections was significantly lower than the successful course completion rate in in-person sections. This pattern deviates from the findings at the institutional level, where the successful course completion rate in online sections mirrored the rate in in-person sections.*
- *The successful course completion rate in online sections was significantly lower than the successful course completion rate in hybrid sections. This pattern reflects the findings at the institutional level.*

Program Reflection:

This data is meaningless. Exactly half of it was collected from “normal semesters” while the other half was collected during a global pandemic where most of our classes were online for safety reasons not necessarily by choice. It is anticipated that barring another major disaster, the next cycle will show more meaningful data that can be used to drive our decisions.
However, the math department has looked at the results comparing semester throughout the pandemic to help drive our decisions for schedule building each semester, but especially as we move toward finding the right balance between online and in-person instruction.

C. Student Achievement

1. Program Completion

	2018-2019	2019-2020	2020-2021
Degrees			
Mathematics: AS-T	18	37	26
Institutional: AS-T Degrees	**93**	**128**	**136**
Average Time to Degree (in Years)+			
Mathematics: AS-T	4	5	4
Institutional: AS-T	**4**	**5**	**4**

Source: SQL Award Files

*Time to degree/certificate within the program reported among cohorts with at least 10 graduates within the academic year. Asterisk indicates that data have been suppressed.

+Average time to degree/certificate was calculated among students who completed a degree/certificate within 10 years (between first year of enrollment at NVC and award conferral year). Among 2018-2019 completers, the average time to degree/certificate was calculated among students who enrolled at NVC for the first time in 2009-2010 or later. Among 2019-2020 completers, the average time to degree was calculated among students who enrolled at NVC for the first time in 2010-2011 or later.

RPIE Analysis: The number of AS-T degrees conferred by the Mathematics Program increased by 44.4% between 2018-2019 and 2020-2021. Over the same period, the number of AS-T degrees conferred by the institution increased by 46.2%. The Mathematics Program accounted for 19.4% of the AS-T degrees conferred in 2018-2019 and 19.1% of those conferred in 2020-2021. The average time to degree among Mathematics AS-T recipients ranged from four to five years, which reflects the institutional average time to AS-T degree over the past three years.

Program Reflection:

While it is exciting to see the number of Math AST degrees increase, our student surveys suggest many students are using them to allow transfer in Engineering. More outreach activities in calculus classes informing students of career opportunities in mathematics may be one way to recruit students.

The time to degree of four or five years is completely appropriate. A math major who enters NVC at the College Algebra level has a minimum of three years of sequential math classes once they start the sequence.

2. Program-Set Standards: Job Placement and Licensure Exam Pass Rates

This section does not apply to the Mathematics Program, as the discipline is not included in the Perkins IV/Career Technical Education data provided by the California Community Colleges Chancellor's Office, and licensure exams are not required for jobs associated with the discipline.

II. CURRICULUM

A. Courses

Subject	**Course Number**	**Date of Last Review** *(Courses with last review dates of 6 years or more must be scheduled for immediate review)*	**Has Prerequisite*** Yes/No **& Data of Last Review**	**In Need of Revision** *Indicate Non-Substantive (NS) or Substantive (S)* ***& Academic Year***	**To Be Archived** *(as Obsolete, Outdated, or Irrelevant)* **& Academic Year**	**No Change**
MATH	83	Approved by NVC CC 12/3/2022	No	No	No	x
MATH	86	8/12/2019	No	No	No	x
MATH	106	8/12/2019	Yes, see left	No	No	x
MATH	108	8/12/2019	Yes, see left	No	No	x
MATH	115	8/1/2018	Yes, see left	No	No	x
MATH	120	Approved by NVC CC 2/4/2022	Yes, see left	No	No	x
MATH	121	8/11/2013	Yes, see left	Yes (NS) submitted in CurricUNET Spring 2022	No	
MATH	130	Approved by NVC CC 12/3/2021	Yes, see left	No	No	x
MATH	220	Approved by NVC CC 12/3/2021	Yes, see left	No	No	x
MATH	221	8/11/2013	Yes, see left	Yes (NS)	No	
MATH	222	8/6/2004 this is probably not accurate as CID approval is dated 2012	Yes, see left	Yes (NS)	No	
MATH	232	Approved by NVC CC 12/3/2021	Yes, see left	No	No	x
MATH	235	Approved for Archival by NVC CC 3/5/2021	NA	No	Yes	x

*As of fall 2018, prerequisites need to be validated (in subsequent process) through Curriculum Committee.

B. Degrees and Certificates[+]

Degree or Certificate & Title	**Implementation Date**	**Has Documentation** Yes/No	**In Need of Revision+** *and/or* *Missing Documentation* **& Academic Year**	**To Be Archived*** *(as Obsolete, Outdated, or Irrelevant)* **& Academic Year**	**No Change**
Mathematics: AS-T	3/1/21	Yes	No	No	x

*As of fall 2018, discontinuance or archival of degrees or certificates must go through the Program Discontinuance or Archival Task Force.

+Degrees and Certificates cannot be implemented until the required courses in them are approved and active.

Program Reflection:

While there has been MUCH curricular change in our basic skills and entry level classes, our other classes in the STEM pathway have remained consistent for decades. We do need to immediately update our CORs for MATH 121, 221 and 222.

Recently our department developed a COR writing guide specific to math classes that includes a plan for updating SLO Assessment problems. Starting Fall 2023 every math class will be on a five-year cycle to ensure CORs revised within the six-year limit. As of this writing, the schedule is as follows:
2022/23 MATH 121, 221 and 222
2023/24 MATH 86, 106
2024/25 MATH 108, 221 and 130
2025/26 MATH 120, 220, 115
2026/27 AS-T Degree

III. LEARNING OUTCOMES ASSESSMENT

A. Status of Learning Outcomes Assessment

Learning Outcomes Assessment at the Course Level

	Number of Courses with Outcomes Assessed		Proportion of Courses with Outcomes Assessed	
Number of Courses	Over Last 4 Years	Over Last 6 Years	Over Last 4 Years	Over Last 6 Years
25	15	21	60%	84%

Learning Outcomes Assessment at the Program/Degree/Certificate Level

Degree/Certificate	Number of Outcomes*	Number of Outcomes Assessed		Proportion of Outcomes Assessed	
		Over Last 4 Years	Over Last 6 Years	Over Last 4 Years	Over Last 6 Years
Mathematics: AS-T Degree	4	4	4	100%	100%

Program Reflection:

Due to the major recent curricular changes, looking at this data in groups of classes is more appropriate.

Transfer Level STEM Classes: 8 classes 100% of which have had all SLOs assessed since 2018.
This category includes MATH 106, 108, 115, 120, 121, 220, 221 and 222

Transfer Level Statistics: 1 class which was last assessed in 2018
This category consists of MATH 232

Other Transfer Level Classes: 1 class which is being offered for the second time this semester (Spring 2022) and is being assessed this semester.
This category consists of MATH 130

Basic Skills Classes: 2 classes (our new co-requisites) which will have SLOs assessed in the 2023/24 school year. We have been doing in-depth evaluations and studies of these classes paying particular attention to the success in the accompanying transfer level classes and making changes as needed. Department faculty agreed that these kinks needed to be worked out before it would be appropriate to conduct a formal SLO assessment.
This category includes MATH 83 and 86

B. Summary of Learning Outcomes Assessment Findings and Actions

All SLO and PLO results, actions, and reflections are posted in TracDat. Please refer there for details.

Program Reflection:

Overall, the math department is responsive to SLO and PLO results, making changes as needed throughout our evaluation process.

IV. PROGRAM PLAN

Based on the information included in this document, the program is described as being in a state of:

- ○ Viability
- ○ **Stability**
- ○ Growth

*Please select ONE of the above.

This evaluation of the state of the program is supported by the following parts of this report:

Based on program data our enrollment did decrease 8%, however enrollment institution wide had an 11% decrease. The average class size for the program is higher than that of the institution and is only down 1% for the three-year trend.

Complete the table below to outline a three-year plan for the program, within the context of the current state of the program.

Program: Mathematics
Plan Years: 2022-2023 through 2024-2025

Strategic Initiatives Emerging from Program Review	Relevant Section(s) of Report	Implementation Timeline: Activity/Activities & Date(s)	Measure(s) of Progress or Effectiveness
DEI Colloquia	All	Spring 2023	completion
Community of Practice Expansion	All	As soon as approved	Participation, followed by increased success rates
Expand faculty experts' participation in the Math Success Center	All	Ongoing	Increase participation by faculty and students
Reinstate proctored testing requirements.	All	As soon as practical.	Implementation in all math classes.

Describe the current state of program resources relative to the plan outlined above. (Resources include: personnel, technology, equipment, facilities, operating budget, training, and library/learning materials.) Identify any anticipated resource needs (beyond the current levels) necessary to implement the plan outlined above.

Note: Resources to support program plans are allocated through the annual planning and budget process (not the program review process). The information included in this report will be used as a starting point to inform the development of plans and resource requests submitted by the program over the next three years.

Description of Current Program Resources Relative to Plan:

Dr. Patricia van Leeuwaarde Moonsammy, Senior Director, Diversity, Equity, and Inclusion has agreed to assist us in this endeavor. Testing Center. Community of Practice expenses.

V. PROGRAM HIGHLIGHTS

A. Recent Improvements

The Mathematics Department continues to put in a tremendous effort in supporting the AB-705 legislation by engaging in congoing collaboration between math 106 and math 232 instructors via Communities of Practice. Communities of Practice allow faculty engage in active discussion to elevate the current tools for student success and develop new methods in an attempt to improve student success rates and retention rates.

B. Effective Practices

Mathematics faculty integrate continuous regular discussion with respect to improvement strategies based on the data collected through SLO and PLO assessments.

In an effort to reflect the current student needs and satisfy the requests of the computer science department, the Finite Mathematics course has been replaced with a Discrete Mathematics course, which promotes cross-discipline collaboration.

Due to the growing need of Math 232 Statistics courses, we were able to successfully hire a full-time tenure mathematics instructor with specific emphasis on statistics.

We have implemented two communities of practice and hope to expand to a third soon.

Feedback and Follow-up Form

Completed by Supervising Administrator:

Robert Van Der Velde. Senior Dean Arts & Sciences

Date:

12/5/2022

Strengths and successes of the program, as evidenced by analysis of data, outcomes assessment, and curriculum:

The Math department has adjusted to seismic shifts wrought by AB 705 and the COVID pandemic, such that the course offerings and success data from the beginning of the time covered in this report look very different from the end of the report. Initial data suggest that curricular changes have made the predicted impact with increased throughput though decreased success rates in transfer level courses.

Areas of concern, if any:

As noted above, although "throughput" has improved, success rates in Math classes are low albeit consistent with state and national trends. Continued work is needed to improve student success, including expanding utilization of the Math Success Center. A return to in person proctored exams should help with concerns about academic integrity.

Recommendations for improvement:

Institutional support for the current Communities of Practice, and expansion that successful model to the Calculus sequence.

Anticipated Resource Needs:

Resource Type	**Description of Need (Initial, Including Justification and Direct Linkage to State of the Program)**
Personnel: Faculty	
Personnel: Classified	
Personnel: Admin/Confidential	
Instructional Equipment	
Instructional Technology	
Facilities	Space for proctored exams
Operating Budget	
Professional Development/ Training	Communities of Practice should be institutionalized and expanded to include the Calculus track.
Library & Learning Materials	