

Math, Engineering, and Physical Sciences
Program Review
2019-2022

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Mathematics Engineering and Physical Science 2019-2022 Program Review

Part 1: - Program Overview

Program Name: Mathematics Engineering and Physical Science

Program Mission and Description: The Department of Mathematics/Engineering/Physical Sciences offers a broad range of courses that service the career programs of the college, and that will transfer to a baccalaureate degree-granting institution. The department also offers developmental mathematics courses to prepare students for college-level mathematics.

Program Admission and Awards:

The Mathematics, Engineering, and Physical Science Department (MEP Dept.) supports the Associate in Arts and Associate in Science degrees, which are degrees awarded to students who complete a planned university-parallel program designed to meet the requirements of the first two years of a Bachelor of Arts or Bachelor of Science degree. The requirements for university-parallel programs are outlined in Area III of the articulation agreement between the Alabama Community College System and Alabama public four-year institutions. Some examples of specific programs supported at 4-year universities are Applied Mathematics, Chemistry, Engineering, Geology, Laboratory Services, and Physics. The courses taught during 2019-2022 to fulfill Area III requirements were: Astronomy - AST 220; Chemistry - CHM 104, 105, 111, 112, 221, 222; Mathematics - MTH 110, 112, 113, 120, 125S, 126S, 227, 237, 238, 265; Physical Science - PHS 111, 112; and Physics - PHY 201, 213S, 214S. Some of these courses, also, fulfill requirements for Area V of the articulation agreement.

Two other supported groups are students seeking the Associate in Applied Science degree where students meet the requirements of a specific career or professional program and students meeting certain certificate requirements. CTE programs supported by MEP courses can be found in Table 3 under Goal #3.

The most common math courses taken by CTE students or students transferring to a 4-year university are MTH 100, MTH 110, and MTH 112. Even though there are placement scores to place students in a higher level of math than these, the chart below is the beginning point of placement beyond MTH 098 and MTH 116 in the math curriculum. It should be noted that many other MEP courses have admission requirements that require a prerequisite course.

Course	ACT	ACCUPLACER
MTH 100 Intermediate Algebra or MTH 110 Finite Mathematics	18 Math sub score	QAS score 253 or higher

MTH 112 Precalculus Algebra	ACT Math sub score of 20 or higher AND "C" or higher in high school Algebra 2 or Precalculus or Calculus OR 24-25 Math sub score	QAS score 267 or higher Or AAF 250 or higher
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Nanette Easterling, a faculty member at the Clanton Campus, was on the Executive Board of The Alabama Mathematical Association of Two Year Colleges (AlaMATYC), which provides a forum for improvement in the instruction of Mathematics in the first two years of college. She served as secretary of the state organization from April 2019 to April 2022 and was elected President-Elect in April 2022.

Jamie Holley, MEP Dept. Chair at the Shelby Campus, is Co-chair of the Quality Enhancement Plan (QEP) for the college. He has played an integral part in developing and writing a plan to implement Guided Pathways principles by redesigning the current freshman orientation course. The new course, ORI 110, focuses on helping students identify a college and career path, helps them stay on that path, and gives them the support that they need to successfully complete a degree at JSCC or successfully transfer to a four-year university.

Louise Fall, MEP Dept. Chairman at the Jefferson Campus, chartered a chapter of Mu Alpha Theta in Fall 2021. Mu Alpha Theta is an organization dedicated to promoting scholarship in mathematics and establishing math as an integral part of high school and junior college education.

Brandon Darby, a faculty member at the Shelby Campus, is the Mu Alpha Theta club sponsor. He organized the founding members of the chapter and held the first initiation of members in Spring 2022.

Table 1. Program Demographics

Category	Student Totals (3yrs)	Percentage (of total students)
Total Students	14,908	100%
Number of Male	5,978	40%
Number of Female	8,927	60%
Age 18-25	10,866	73%
Age 26-40	3,168	21%
Age 41+	712	5%
African American Students	3,250	17%
Asian Students	408	3%
Caucasian Students	9,753	65%
Hispanic Students	465	3%

Table 1-A

2019-2022 3-Year Data by Discipline						
Category	AST	CHM	MTH	PHS	PHY	TOTAL
Total Students	1,059	1,394	11,181	908	366	14,908
Number of Male	418	492	4,404	405	259	5,978
Number of Female	641	902	6,775	503	106	8,927
Age 18-25	787	925	8,266	629	259	10,866
Age 26-40	208	404	2,251	210	95	3,168
Age 41+	50	61	531	59	11	712
African American Students	185	328	2,491	192	54	3,250
Asian Students	39	43	287	22	17	408
Caucasian Students	723	890	7,279	604	257	9,753
Hispanic Students	36	37	364	22	6	465

A review of the three-year demographic data for AST, CHM, MTH, PHS, and PHY reveals a significant change in demographics that is due to the COVID-19 pandemic beginning in March 2020.

-The number of total students is down by approximately 4000 from the last three-year cycle with the decrease being closely split between the males and the females.

-The percentage breakdown based on this three-year cycle closely mirrors the percentages from the last cycle. The only significant change is the percentage of African American students; the current cycle is down by 6% from the last.

-In the age category, the largest enrollment continues to be Age 18-25. In the ethnicity category, the largest enrollment continues to be Caucasian Students.

-All subject areas have greater female than male enrollment except physics where male enrollment is predominant.

Mode of Delivery:

Table 2:

	2019-20 (Total Sections -314)	2020-21 (Total Sections-296)	2021-22 (Total Sections-298)
Traditional	199 / 63%	59 / 20%	143 / 48%
Internet	107 / 34%	233 / 79%	153 / 51%
Hybrid	0 / 0%	4 / 1%	2 / 1%
Video Conference	8 / 3%	0 / 0%	0 / 0%

The MEP Dept. offers courses in many different formats: traditional classroom instruction (100% of instruction on campus), internet (80% or more of instruction online), hybrid/blended (regularly scheduled on-campus class meetings with 50% of instruction online). The hybrid format is mainly utilized with courses requiring a laboratory component such as chemistry and physics. Due to the increased use

and development of internet courses, there was no longer a need for video conference classes after 2020.

When Covid hit in March 2020, instruction modes greatly changed, and all classes switched to virtual with a limited number of on-campus classes through Summer 2021. By the end of Summer 2021, the number of on-campus classes grew; however, it is not expected that they will return to the same numbers as before the pandemic. As a population, students learned how to navigate online instruction, and by the end of 2021-22, online instruction has maintained close to 50% of the course offerings. The department will continue to offer courses based on student needs and enrollment patterns.

Program/Department Goals: Please list your program/department goals below:

1. Provide freshman- and sophomore-level courses in chemistry, mathematics, physics, physical sciences, and astronomy with emphasis on critical thinking and analytical ability that are transferable to public institutions of higher learning.
2. Offer an appropriate developmental mathematics program accommodating various skill levels.
3. Develop and provide courses relevant to the career and professional degree programs of the college.

Program/Department Outcomes Achievement:

Goal 1: Provide freshman- and sophomore-level courses in chemistry, mathematics, physics, physical sciences, and astronomy with emphasis on critical thinking and analytical ability that are transferable to public institutions of higher learning.

The MEP Dept. offers many classes that meet the requirements for Area III of the articulation agreement between the Alabama Community College System and Alabama public four-year institutions. The courses that fall under Area III Mathematics include the following: MTH 110, 112, 113, 120, 125S, 126S, 227, 237, 238. With the addition of MTH 231, MTH 232, and MTH 265, all the courses fall under Area V as well as Area III.

A review of the three-year academic cycle reveals the following about student progress and performance for the freshman- and sophomore-level math courses:

MTH 110 -

	Level 2 or Higher Success Rates		
	/2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	87/94 92.6%	97/109 89%	Not using
Objective 2	79/94 84%	89/109 81.7%	73/93 78.5%
Objective 3	67/94 71.3%	67/109 61.5%	Not using
Objective 4	81/94 86.2%	85/109 78%	Not using

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 90.6%. This success rate is very high and is well above the goal of 70%. However, it is important to note that the success

rate a declined over the past few years. This could be due to the pandemic and students not getting that in the classroom help they need. The extra emphasis placed on this objective through additional instructional videos and additional practice seems to have paid off. MTH 110 instructors will continue to provide these tools to students.

Objective 2 Use of Results: The success rate for this objective is high at 81.4% with 241/296 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle has decreased. 83.6% of students scored at Level 2 or higher from 2016-2019. Additional study and learning tools were provided for this objective in the form of tutorial videos and additional practice opportunities so it is unclear why this percentage decreased as it did. It could, perhaps, be explained in the context of student performance during the COVID19 pandemic.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 66% (134/203). This percentage is up from the last 3-year cycle when 54.7% of students performed at or above Level 2. Students have been given additional learning tools and additional opportunities to practice this concept were provided. It seems that the students are using the tools provided because the scores have increased. MTH 110 instructors will review student use of the additional tools to ensure that students are taking advantage of these resources.

Objective 4 Use of Results: For Objective 4, the percentage of students who scored at level 2 or higher was 81.6% (166/203). This percentage has increased from 2016-2019 (77.4%). This success rate is well above the goal of 70%. Students seem to be using the tools provided to have the success rate of 81.6%. MTH 100 instructors will continue to provide these tools to students.

MTH 112 –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	351/435 80.7%	486/501 97%	505/576 87.7%
Objective 2	342/435 78.6%	485/501 96.8%	502/576 87.2%
Objective 3	349/435 80.2%	492/501 98.2%	498/576 86.5%
Objective 4	389/435 89.4%	478/501 95.4%	500/576 86.8%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 88.8% (1342/1512). This success rate is well above the goal of 70%. However, it is important to note that the spike in the 2020 - 2021 success rate is abnormal. With 97.8% of the 2020 – 2021 students enrolled in online classes due to the Covid19 pandemic, it is unclear if those students are properly monitored during testing. With the implementation of Honorlock remote proctoring for various online classes and the addition of numerous video tutorials and lectures, the success rate from 2021-2022 appears to reflect a more accurate count. MTH 112 instructors will continue to use Honorlock or in-person testing in their online classes while providing video resources to students enrolled in both online and in-person classes.

Objective 2 Use of Results: The success rate for this objective is high at 87.9% with 1329/1512 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The three-year success rate was a large increase from the previous three-year cycle, where only 67.3% of students scored at Level 2 or higher from 2016-2019. Once again, this increase was notably caused by the 2020-2021 numbers (96.8% success rate). MTH 112 instructors will continue to use Honorlock as well as in-person testing in their online classes while providing resources such as video examples and additional video lessons to students enrolled in both online and in-person classes. The success rate from the next three-year cycle should provide a better view of the effectiveness of these resources.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 88.6% (1339/1512). This percentage is again a large increase from the last three-year cycle when only 69.01% of students performed at or above Level 2. Notably, the Level 4 percentage has greatly increased from the last three-year cycle. From 2016-2019, only 29.4% (423/1439) of students scored at Level 4 while from 2019-2022, 62.4% (943/1512) of students scored at Level 4, more than doubling the success rate from the 2016-2019 three-year cycle. Again, this increase is highly unusual and alarming. MTH 112 instructors will continue to use Honorlock as well as in-person testing in their online classes while providing resources such as video examples and additional video lessons to students enrolled in both online and in-person classes. The success rate from the next three-year cycle should be closely monitored to determine the effectiveness of these resources.

Objective 4 Use of Results: The success rate for this objective is high at 90.4% with 1367/1512 students scoring at level 2 or higher. This greatly exceeds the target success rate of 70%. Unlike Objective 1 – 3, this is only a moderate increase from the previous three-year cycle where 84.79% of students scored at Level 2 or higher from 2016-2019. This objective was one that students have consistently demonstrated mastery so it will no longer be included in the next three-year cycle.

MTH 113 –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	112/123 91.1%	152/165 91.1%	196/204 96.1%
Objective 2	119/123 96.7%	163/165 98.8%	199/204 97.5%
Objective 3	119/123 96.7%	162/165 98.2%	201/204 98.5%
Objective 4	113/123 91.9%	158/165 95.8%	189/204 92.6%
Objective 5	111/123 90.2%	156/165 94.5%	197/204 96.6%

Prior to 2019-20, MTH 113 was not taught online. It is now taught each semester online as well as on campus. Beginning in 2020-2021, MTH 113 was offered as a dual enrollment college course in local high schools. Both factors, online and dual enrollment courses, accounted for the overall increase in enrollment. Regardless of the instructional format, all percentages were well above the 70% benchmark for success. Across the three-year span, the percentages have

not varied greatly; they have been fairly consistent per objective. Overall, none have fallen below 90%, and all have increased from the 2016-2019 report.

Objective 1 Use of Results: From 2019-2022, the Level 2 or higher success rate was 93.5% (460/492). This was an increase of 9.9% from the last 3-year cycle. This increase was due in part to additional worksheets and practice given to the students.

Objective 2 Use of Results: For this objective, the percentage of students who scored at a Level 2 or higher was 97.8% (481/492). This was a slight increase from the 2016-2019 cycle where 92.6% of the students performed at Level 2 or higher. Objective 2 was reinforced by the implementation of a special project to emphasize finding the values for trigonometric functions using a right triangle.

Objective 3 Use of Results: This objective had the largest percentage of student success at 98.0% (482/492) of the students attaining a Level 2 or higher. Again, there is a slight increase from the previous three-year data, which was 91.8%. Videos of performing algebraic operations on vectors helped students to have a better understanding of the concept.

Objective 4 Use of Results: The largest increase in success from the 2016-2019 report was seen by this objective. The success rate in the 2016-2019 report was 49.8% of students who scored at Level 2 or higher compared to the current report where the percentage is 93.5% (460/492). The increase was 43.7%. Videos were presented to give more practice on the material. The only other possible factor to explain the increase was that the format for most students was online.

Objective 5 Use of Results: Even though the success percentages were fairly consistent per objective, this one had the greatest swing in percentages. From 2019-2020 to 2021-2022, the percentages went from 90.2% to 96.6% with the overall percentage at 94.3% (464/492). Also, there was a significant increase, 26.6%, from the last three-year cycle. Several strategies contributed to these increases. Step-by-step worksheets were used to emphasize converting an equation from polar form to rectangular form. In addition, interactive activities were included such as “Polar Coordinates and Cardioid Microphones.”

MTH 120 –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	50/51 98.0%	104/108 96.3%	95/97 97.9%
Objective 2	50/51 98.0%	91/108 84/3%	97/97 100%
Objective 3	50/51 98%	105/108 97.2%	96/97 99.0%
Objective 4	50/51 98%	103/108 95.3%	93/97 95.9%
Objective 5	50/51 98%	95/108 88.0%	76/97 78.4%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 97.3% (249/256). This success rate is well above the goal of 70%. However, it was noted that 23% (58/256) of the students were unable to achieve level 4 success. With the addition of video capture technology along with the ease of its use and accessibility, MTH 120 instructors recommend also adding example videos for assignment problems to help more students achieve level 4 success.

Objective 2 Use of Results: The success rate for this objective is high at 93.0% over the three-year cycle with 238/256 students scoring at level 2 or higher. This exceeds the target success rate of 70%. Furthermore, 100% of students were able to achieve the targeted 70% success rate by 2021-2022 academic year. MTH 120 instructors recommend removing this objective in the next 3-year cycle.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 98.0% (251/256). Although overall success rate is high, it is worth noting that 29% (74/256) of the students failed to achieve level 4 success. In addition to the lecture videos, MTH 120 instructors recommend also adding example videos for assignment problems to help more students learn this objective and achieve level 4 success.

Objective 4 Use of Results: The success rate for this objective is high at 96.1% with 246/256 students scoring at level 2 or higher. This greatly exceeds the target success rate of 70%. This objective was one that students have consistently demonstrated mastery of, so the MTH 120 instructors recommend it no longer be included in the next three-year cycle.

Objective 5 Use of Results: The percentage of students who scored at Level 2 or higher was 86.3% (221/256). Although the success rate exceeded the target goal of 70%, this objective continues to be challenging for the students. However, it is unclear which of the two problems within this objective the students most struggled with. MTH 120 instructors recommend decreasing the number of problems to just one in the next three-year cycle to better pinpoint and address students' difficulties. Furthermore, additional example videos for assignment problems should be included to help more students achieve level 4 success.

MTH 125S –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	137/142 96.5%	212/212 100%	209/213 98.1%
Objective 2	137/142 96.5%	212/212 100%	211/213 99.1%
Objective 3	137/142 96.5%	210/212 99.0%	212/213 99.5%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 98.4% (558/567). This success rate is very high and is well above the goal of 70%. The supplemental videos, notes, applets, and problems appear to aid in keeping student learning consistently high. It is important to note that students at this level will drop the course before receiving a failing grade. We are analyzing the drop rate for this course to see how the data appears to interplay with those numbers.

Objective 2 Use of Results: The success rate for this objective is high at 98.8% with 560/567 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The supplemental videos, notes, applets, and problems appear to aid in keeping student learning consistently high. It is important to note that students at this level will drop the course before receiving a failing grade. We are analyzing the drop rate for this course to see how the data appears to interplay with those numbers.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 98.6% (559/567). This exceeds the target success rate of 70%. The supplemental videos, notes, applets, and problems appear to aid in keeping student learning consistently high. It is important to note that students at this level will drop the course before receiving a failing grade. We are analyzing the drop rate for this course to see how the data appears to interplay with those numbers.

MTH 126S –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	109/110 99.1%	150/151 99.3%	133/133 100%
Objective 2	108/110 98.2%	151/151 100%	133/133 100%
Objective 3	110/110 100%	146/151 96.7%	133/133 100%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 99.5% (392/394). This success rate is very high and is well above the goal of 70%. At this level of mathematics, students are usually pretty comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

Objective 2 Use of Results: The success rate for this objective is high at 99.5% with 392/394 students scoring at level 2 or higher. This exceeds the target success rate of 70%. At this level of mathematics, students are usually pretty comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 98.7% (389/394). This success rate is very high and is well above the goal of 70%. At this level of mathematics, students are usually pretty comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

MTH 227 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	33/34	81/82	64/64
	97.1%	98.8%	100%
Objective 2	32/34	82/82	64/64
	94.1%	100%	100%
Objective 3	32/34	81/82	64/64
	94.1%	98.8%	100%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 98.9% (178/180). This success rate is very high and is well above the goal of 70%. At this level of mathematics, students are usually pretty comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

Objective 2 Use of Results: The success rate for this objective is high at 88.9% with 178/180 students scoring at level 2 or higher. This exceeds the target success rate of 70%. At this level of mathematics, students are usually comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 98.3% (177/180). This success rate is very high and is well above the goal of 70%. At this level of mathematics, students are usually pretty comfortable with the subject and use the given resources well. It does appear that the additional resources are supporting and increasing student learning. Most students at this level will drop the course before receiving a failing grade. It is important to analyze the drop data for rates of change.

MTH 238 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	25/25	35/35	37/38
	100%	100%	97%
Objective 2	25/25	33/35	37/38
	100%	94%	97%
Objective 3	24/25	32/35	36/38
	96%	91%	95%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 92% with 95/98 students scoring at level 2 or higher. This success rate is very high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is flat. During the previous 3-year cycle,

success rate was also 92%. The additional tools provided to students may have helped to balance the difficulties caused by the shift to online learning necessitated by the covid-19 pandemic. The tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students overcome them.

Objective 2 Use of Results: The success rate for this objective is high at 97% with 93/98 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is significantly improved. During the previous 3-year cycle, success rate was only 92%. The additional tools provided to students seems to have had a beneficial effect so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 94% (92/98). This success rate is very high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly improved. During the previous 3-year cycle, success rate was also 92%. The additional tools provided to students may have helped to balance the difficulties caused by the shift to online learning necessitated by the covid-19 pandemic and still help the students overcome difficulties encountered by students during the previous 3-year cycle. Since the tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas.

MTH 231 –

3-Year Summary 2019-2022

The MTH 231 course began being offered again at Jefferson State during the 2017-2018 academic year. Only one section was offered, and enrollment was low. As enrollment increased over the next several years, SLOs were developed and voted on by the mathematics faculty. Fall semester of 2021 was the first semester data was collected. The data for Fall 2021 is shown below and is the only set of data collected to date. The instructor was asked to consider collecting data using a different approach. Students were given a series of questions on a pre-test, mid-test, and final test. For the pre-test they were instructed to attempt the questions, without using any outside resources (students were online students). For the mid-test, the questions were included in a regular chapter exam where the material had been presented, and then for the final test, the same questions were included on the final exam. Students answering the question correctly received a Level 3 score; if they attempted the problem but answered incorrectly, they received a Level 2 score, and finally, if they did not attempt the problem, they received a Level 1 score.

When comparing the number of students performing at Level 3 Pre-test versus Level 3 Final-test on each objective the number increased significantly. For objective 1, the percent performing at Level 3 increased from 55% to 80%. For objective 2, the percent increased from 18% to 60%, and for Objective 3, the percent increased from 15% to 63%. Keep in mind, Level 3 means correct solution, no errors. Clearly, as students receive instruction on the content, they are able to better perform at a higher level. It is interesting to note that for both Objectives 1 and 2, more students performed at Level 3 Mid-test, than Final-test. The results from Objective 3, do not follow this pattern and should be noted that this could likely be since the material in Objective 3 is taught at the end of the semester. Retention of

material is definitely an issue and the instructor will develop strategies to help improve student retention moving forward.

Assessment of Objective 1 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	18	26	24
Level 2	15	7	5
Level 1	0	0	1

Assessment of Objective 2 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	6	25	18
Level 2	19	4	10
Level 1	8	0	2

Assessment of Objective 3 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	5	2	19
Level 2	15	19	8
Level 1	13	7	3

MTH 232 –

3-Year Summary 2019-2022

The MTH 232 course began being offered again at Jefferson State during the 2017-2018 academic year. Only one section was offered, and enrollment was low. As enrollment increased over the next several years, SLOs were developed and voted on by the mathematics faculty. Spring semester of 2022 was the first semester data was collected. Data from both Spring of 22 and Summer of 22 is included below.

The instructor was asked to consider collecting data using a different approach. Students were given a series of questions on a Pre-test, Mid-test, and Final-test. For the Pre-test they were instructed to attempt the questions, without using any outside resources (students were online students). For the Mid-test, the questions were included in a regular chapter exam where the material had been presented, and then for the Final-test, the same questions were included on the final exam. Students answering the question correctly received a Level 3 score; if they attempted the problem but answered incorrectly, they received a Level 2 score, and finally, if they did not attempt the problem, they received a Level 1 score.

For Spring of 2022, the percentage of students performing at Level 3 on each objective increased significantly from Pre-test to Final-test. For Objective 1, the increase was from 16% to 81%, Objective 2, 11% to 57% and the same for Objective 3, 11% to 57%. Please note that Level 3 is a correct solution. For Summer of 2022, we see a similar occurrence in data. For Objective 1, the percentage of students performing at Level 3 rose from 44% to 100% (from Pre-test to Final-test), Objective 2, 22% to 33%, and Objective 3, 11% to 78%. It seems that the issue with Objective 2 was primarily due to rounding and not following directions. The question required students to use 3.14 for pi and round to one decimal place. Many students did not follow directions; therefore, the solution was incorrect. Regardless, improvement was made from Pre-test to Final-test for each objective.

SPRING 2022

Assessment of Objective 1 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	3	12	17
Level 2	15	9	4
Level 1	1	0	0

Assessment of Objective 2 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	2	6	12
Level 2	16	15	8
Level 1	1	0	1

Assessment of Objective 3 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	2	10	12
Level 2	9	9	8
Level 1	8	2	1

SUMMER 2022

Assessment of Objective 1 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	4	8	9
Level 2	5	1	0
Level 1	0	0	0

Assessment of Objective 2 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	2	2	3
Level 2	5	7	6
Level 1	2	0	0

Assessment of Objective 3 –

Number of students who demonstrated learning at

	Pre N =	Mid N =	Final N =
Level 3	1	3	7
Level 2	7	5	2
Level 1	1	2	0

MTH 265 -

Level 2 or Higher Success Rates

	2019-2020	2020-2021	2021-2022
Objective 1	153/153 100%	173/177 97.7%	155/158 98%
Objective 2	152/153 99.3%	171/177 96.6%	150/158 95%
Objective 3	150/153 98%	165/177 93.2%	154/158 97.5%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019 to 2022 is 98.57%. This success rate is very high and is well above the goal of 70%. During this time, 7/488 (1.4%) students scored below a level two. Instructors will continue using the same strategies of creating EdPuzzle videos and using various websites like “MathisFun” to educate students on this objective.

Objective 2 Use of Results: The Level 2 or higher success rate from 2019 to 2022 is 96.97%. This success rate is very high and is well above the goal of 70%. During this time, 15/488 (3.1%) students scored below a level two. A difference of 1.7% of students scored lower on this level than level one. Instructors will apply a statistical applet, from the website https://digitalfirst.bfwpub.com/stats_applet/stats_applet_4_ci.html to allow students to demonstrate changing the confidence level and sample size on their own. It will show a visual representation and help students understand how confidence intervals look graphically, with respect to the normal distribution.

Objective 3 Use of Results: The Level 2 or higher success rate from 2019 to 2022 is 96.23%. This success rate is very high and is well above the goal of 70%. During this time, 19/488 (3.9%) students scored below a level two. A difference of 2.5% of students scored lower on this level than level one and 0.8% lower than level two. Instructors will use additional study tools, such as a study guide and online assignments, to allow students to physically work out problems. Instructors will provide feedback to make sure students understand this objective.

The courses that fall under Area III Natural Sciences include the following: AST 220; CHM 104, 105, 111, 112; PHS 111, 112; PHY 201, 202, 213S, 214S. With the addition of CHM 221 and CHM 222, all the courses fall under Area V as well. CHM 104 and CHM 105 are survey courses not intended for science or engineering majors. There are two two-sequence offerings in physics: PHY 201 and PHY 202, which are trigonometry-based, and PHY 213S and PHY 214S, which are calculus-based. Due to low or no enrollment, three courses were archived and will be removed from the 2022-23 catalog: CHM 220 Quantitative Analysis, MTH 118 Technical Mathematics, and PHS 230 Introduction to Meteorology. A review of the three-year academic cycle reveals the following about student progress and performance for the freshman- and sophomore-level courses:

AST 220 –

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	191/222 86%	359/425 84%	271/372 81%
Objective 2	178/222 80%	353/425 83%	279/372 75%
Objective 3	179/222 81%	343/425 81%	277/372 86%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 81% with 821/1019 students scoring at Level 3 or higher. This success rate is high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly down. During the previous 3-year cycle, the success rate was 85%. The additional tools provided to students may have helped to balance the difficulties caused by the shift to online learning necessitated by the covid-19 pandemic. The tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students overcome them.

Objective 2 Use of Results: The success rate for this objective is high at 79% with 810/1019 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is slightly down. During the previous 3-year cycle, the success rate was only 83%. The new tools provided to students seem to have had a beneficial effect so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 78% (799/1019). This success rate is very high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly down. During the previous 3-year cycle, the success rate was also 81%. The tools provided to students may have helped to offset the difficulties caused by the covid-19 pandemic and still help the students overcome difficulties encountered by students during the previous 3-year cycle. Since the tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas.

CHM 104-

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	63/72 88%	92/105 88%	72/89 81%
Objective 2	75/74 101%	92/105 88%	67/89 75%
Objective 3	62/79 78%	78/105 74%	60/89 67%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 85% with 227/266 students scoring at level 2 or higher. This success rate is a considerable percentage above the goal of 70%. This rate is somewhat higher than the previous 3-year cycle (79%). It should be noted that the total number of students tested per objective in 2019-2020 varies because the three objectives were tested at different times. The instructor responsible for this data has retired. A full-time instructor is responsible for the SLO's for the next 3-year cycle.

Objective 2 Use of Results: The success rate for this objective is 87% with 234/268 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is up from 84%. It should be noted that the total number of students tested per objective in 2019-2020 varies because the three objectives were tested at different times. It should, also, be noted that there is likely an error in the data for 2019-2020. The instructor responsible for this data has retired. A full-time instructor is responsible for the SLO's for the next 3-year cycle.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 73% (200/273). Even though this percentage is slightly above the 70% mark, it is considerably greater than 55% from the 2016-2019 3-year cycle. It should be noted that the total number of students tested per objective in 2019-2020 varies because the three objectives were tested at different times. The instructor responsible for this data has retired. A full-time instructor is responsible for the SLO's for the next 3-year cycle.

CHM 105-

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	20/20 100%	14/16 88%	
Objective 2	14/20 70%	14/16 88%	
Objective 3	18/20 90%	14/16 88%	

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 was 94%, 34/36. This success rate is very high and is well above the goal of 70%. This rate is a slight decrease from the previous 3-year cycle (98%).

Objective 2 Use of Results: The success rate for this objective was 78% with 28/36 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is somewhat lower. 82% of students scored at Level 2 or higher from 2016-2019.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 89% with 32/36 students scoring 70% or better. This percentage is an increase from the last 3-year cycle when 82% of students performed at or above Level 2.

This course only makes a couple of times during a three-year cycle.

CHM 111-

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 - 2022
Objective 1	121/123 98%	109/114 96%	69/77 90%
Objective 2	109/123 89%	85/114 75 %	66/77 86%
Objective 3	112/123 91%	99/114 87 %	66/77 86%
Objective 4	117/123 96%	106/114 93%	70/77 91%
Objective 5	117/123 98%	92/114 81 %	62/77 81%
Objective 6	111/123 90%	104/114 91%	70/77 91%
Objective 7	100/123 81%	88/114 77 %	69/77 90%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 95% with 299/314 students scoring at level 2 or higher. This success rate is very high and is well above the goal of 70%. This rate is relatively the same as for the previous 3-year cycle (96%). 87% of students were able to complete this problem correctly which is an increase from the 2016-2019 period where 79% of the students were able to complete the problem correctly. This indicates that the students are generally able to do this problem. This problem is directly covered in a hands-on lab activity, and a similar question appears in quizzes, exams, and laboratory quizzes.

Objective 2 Use of Results: The success rate for this objective is high at 84% with 260/314 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is somewhat lower. 89% of students scored at Level 2 or higher from 2016-2019. Over the three-year cycle, only 44% of the students get the problem completely correct. This is somewhat lower than previous cycles where 53% get the problem completely correct. Additional study and learning tools were provided for this objective in the form of tutorial videos and additional practice opportunities.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 88% (277/314). This percentage is down from the last 3-year cycle when 91% of students performed at or above Level 2. Just as with SLO 2, the Level 4 percentage has somewhat decreased from the last three-year cycle. From 2016-2019, 63% of students scored at Level 4 while from 2019-2022 only 50% of students scored at Level 4. Again, additional learning tools and additional opportunities to practice this concept were provided during the 2019-22 assessment period, but students may be joining the classes with various levels of math preparedness, particularly after the pandemic.

Objective 4 Use of Results: For Objective 4, the percentage of students who scored at Level 2 or higher was 93% (293/314) From 2016-2019, 73% of students scored at Level 4 while from 2019-2022, 71% of students scored at Level 4. This shows basically no change.

Objective 5 Use of Results: For Objective 5, the percentage of students who scored at Level 2 or higher was 88% (293/314). This percentage is lower than the last 3-year cycle when 96% of students performed at or above Level 2. From 2016-2019, 79% of students scored at Level 4 while from 2019-2022, 72% of students scored at Level 4. This shows that a similar percentage of students were able to complete the problem correctly, but of those who did not, the errors were of a more significant nature. CHM 111 instructors will continue to spend more time on this topic in class while continuing to provide the additional learning materials (videos and extra homework problems)

Objective 6 Use of Results: For Objective 6, the percentage of students who scored at Level 2 or higher was 91% (285/314). This percentage is higher than the last 3-year cycle when 87% of students performed at or above Level 2. From 2016-2019, 57% of students scored at Level 4 while from 2019-2022, 71% of students scored at Level 4. This shows that more students were able to complete the problem correctly. CHM 111 instructors will continue to provide the additional learning materials (videos and extra homework problems).

Objective 7 Use of Results: For Objective 6, the percentage of students who scored at Level 2 or higher was 82% (257/314). This percentage is similar to the last 3-year cycle when 84% of students performed at or above Level 2. From 2016-2019, 53% of students scored at Level 4 while from 2019-2022, 61% of students scored at Level 4. This shows that more students were able to complete the problem correctly. CHM 111 instructors will continue to provide the additional learning materials (videos and extra homework problems) and use the laboratory exercise.

In the upcoming three-year cycle, the number of assessed questions will be reduced to focus on stoichiometry and titration (and if 3 are required, gas density). In addition, our scoring rubric will only be two levels: either completely correct or not. This means that our success criteria will be more rigorous.

For instructional videos (lectures and problem solution videos), students have expressed that they like having the instructor recorded live in the video and are able to relate better. Notably, a hearing-impaired student commented that they are able to follow the captions better if they could see the instructor's face. As new videos are generated, we will encourage instructors to include videos of themselves.

CHM 112 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	69/77 90%	55/57 96 %	52/55 95 %
Objective 2	70/77 91 %	52/57 91%	52/55 95 %
Objective 3	67/77 87%	52/57 91%	49/55 89 %
Objective 4	67/77 87 %	45/57 79 %	48/55 87 %

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 93% with 176/189 students scoring at level 2 or higher. This success rate is very high and is well above the goal of 70%. This rate is somewhat higher than the previous 3-year cycle (89%). 69% of students were able to complete this problem correctly which is an increase from the 2016-2019 period where 60% of the students were able to complete the problem correctly. The main error that the students make is a misunderstanding of the effects of catalysts and temperature on equilibria. Going forward, an exercise will be added to the equilibrium lab to reinforce this topic.

Objective 2 Use of Results: The success rate for this objective is high at 92% with 174/189 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is much the same. 91% of students scored at Level 2 or higher from 2016-2019. Over the three-year cycle, only 69% of the students get the problem completely correct. This is somewhat higher than previous cycles where 61% get the problem completely correct. Most incorrect answers involve flipping the sign convention, or inadvertent misinterpretations. Additional study and learning tools were provided for this objective in the form of tutorial videos and additional practice opportunities.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 89% (168/189). This percentage is the same as the last 3-year cycle when 89% of students performed at or above Level 2. From 2016-2019, 65% of students scored at Level 4 while from 2019-2022 65% of students scored at Level 4. Most errors involved getting a portion of the question correct, but then making an error in a subsequent calculation. Other students made clear transcription errors. Again, additional learning tools and additional opportunities to practice this concept were provided during the 2019-22 assessment period.

Objective 4 Use of Results: For Objective 4, the percentage of students who scored at Level 2 or higher was 88% (160/189), which is a slight increase from the 2016-2019 assessment period (86%). From 2016-2019, 63% of students scored at Level 4, and from 2019-2022, 63% of students scored at Level 4. This shows no change. This topic is reinforced with a new laboratory activity introduced in the 2021-2022 year.

In the upcoming three-year cycle, the number of assessed questions will be reduced to focus on Arrhenius Equations and Acid-Base Equilibrium (question unchanged), and if 3 are required, quantitative equilibrium calculations). In addition, our scoring rubric will only be two levels: either completely correct or not. This means that our success criteria will be more rigorous.

In 2021-2022, we purchased additional laboratory equipment to expand the number of labs that involved quantitative measurement. Also, we purchased sufficient equipment that instead of working in groups of four, students now work in pairs. This will allow more of the students to participate fully in the labs.

As in CHM 111, for instructional videos (lectures and problem solution videos), students expressed that they liked seeing the instructor recorded live in the video and can relate better to the material. As new videos are generated, we will encourage instructors to include videos of themselves.

CHM 221-

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 - 2022
Objective 1	6/6 100%		
Objective 2	5/6 83%		
Objective 3	6/6 100%		

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 was 100%. This success rate is very high and is well above the goal of 70%. This rate is relatively the same as for the previous 3-year cycle (96%).

Objective 2 Use of Results: The success rate for this objective was 83% with 5/6 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is somewhat lower. 86% of students scored at Level 2 or higher from 2016-2019.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 100%. This percentage is the same as the last 3-year cycle when 100% of students performed at or above Level 2.

There are seldom enough students for this course to make as is indicative of the low enrollment and the course offering only at one time in three years.

CHM 222 - There was insufficient data for the CHM 222 SLOs for the 3-year 2019-2022 because this course did not make.

PHS 111 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	225/240 94%	108/111 97%	108/114 95%
Objective 2	213/246 87%	104/111 94%	104/114 91%
Objective 3	32/39 82%		

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 was 95%, 441/465. This success rate is very high and is well above the goal of 70%. This rate is an increase from the previous 3-year cycle, which was 85%. It should be noted that there is likely an error in the data for 2020-2021 and 2021-2022. The instructor responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

Objective 2 Use of Results: The success rate for this objective was 89% with 421/471 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is relatively the same at 87%. It should be noted that there is likely an error in the data for 2020-2021 and 2021-2022. The instructor responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 82%. This percentage is a decrease from the last 3-year cycle when 94% of students performed at or above Level 2. It should be noted that this objective was not tested in 2020-2021 and 2021-2022. Therefore, the data does not give a true picture of the performance of the students. The instructor responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

PHS 112 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	109/141 77%	53/64 83%	31/42 74%
Objective 2	92/141 65%	45/64 70%	26/42 62%
Objective 3	104/141 74%	47/64 73%	32/42 76%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 was 78%, 193/247. This success rate is above the goal of 70%. There is no 2016-2019 data for comparison. The instructor

responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

Objective 2 Use of Results: The success rate for this objective was 66% with 163/247 students scoring at level 2 or higher. This does not exceed the target success rate of 70%. There is no 2016-2019 data for comparison. The instructor responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 74%, 183/247. There is no 2016-2019 data for comparison. The instructor responsible for this data has retired. A full-time instructor is reworking the entire course including SLO's for the next 3-year cycle.

PHY 201 - There was insufficient data is for the PHY 201 SLOs for the 3-year 2019-2022 because this course was not offered regularly and when it was offered the SLO data was not provided.

PHY 202 - There was insufficient data is for the PHY 202 SLOs for the 3-year 2019-2022 because this course was not offered regularly and when it was offered the SLO data was not provided.

PHY 213S-

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 - 2022
Objective 1	43/56 77%	38/52 73%	38/42 90%
Objective 2	46/56 82%	47/52 90%	40/42 95%
Objective 3	31/56 69%	46/52 88%	40/42 95%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 79% with 119/150 students scoring at Level 2 or higher. This success rate is good and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly improved. During the previous 3-year cycle, the success rate was 73%. The tools provided to students may have helped offset the difficulties caused by the covid-19 pandemic and still help the students overcome difficulties encountered by students during the previous 3-year cycle. Since the tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas.

Objective 2 Use of Results: The success rate for this objective is high at 89% with 133/150 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is significantly improved. During the previous 3-year cycle, the success rate was only 79%. The additional tools provided to students may have helped to balance the difficulties caused by the shift to online learning necessitated by the covid-19 pandemic. The tools seem to have

been beneficial so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students overcome them.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 78% (117/150). This success rate is also good and is significantly above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly decreased. During the previous 3-year cycle, success rate was also 81%. The new tools provided to students seems to have had a beneficial effect so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students.

PHY 214S-

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	28/28 100%	16/21 76%	24/28 86%
Objective 2	28/28 100%	20/21 95%	26/28 93%
Objective 3	28/28 100%	20/21 95%	26/28 93%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 88% with 68/77 students scoring at level 2 or higher. This success rate is high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly down. During the previous 3-year cycle, success rate was also 92%. The additional tools provided to students may have helped to balance the difficulties caused by the shift to online learning necessitated by the covid-19 pandemic. The tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students overcome them.

Objective 2 Use of Results: The success rate for this objective is high at 96% with 74/77 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is significantly improved. During the previous 3-year cycle, success rate was only 92%. The new tools provided to students seems to have had a beneficial effect so they will continue to be provided while we continue to identify other potential problem areas and propose measures to help the students.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 96% (74/77). This success rate is very high and is well above the goal of 70%. The success rate as compared to the previous three-year cycle is slightly improved. During the previous 3-year cycle, success rate was also 92%. The addition resourses provided to students may have helped to off-set the difficulties caused by the covid-19 pandemic and still help the students overcome difficulties encountered by students during the previous 3-year cycle. Since the tools seem to have been beneficial so they will continue to be provided while we continue to identify other potential problem areas.

Goal 2: Offer an appropriate developmental mathematics program accommodating various skill levels.

All colleges within the Alabama Community College system are required to provide developmental courses to students who need additional academic preparation before enrolling in college-level courses. The ACCS developed standardized plans of instruction for developmental courses. The Math department offers one developmental course, MTH 098. For students who obtained assessment scores that placed them in MTH 098 but are on the cusp of the next upper-level math course, MTH 100, they were given the opportunity to enroll in the upper-level math course along with a required co-requisite math course, MTH 099. The same is true for students on the cusp of placement in MTH 110 and MTH 112. The required co-requisite for these upper-level courses is MTH 109S and MTH 111S, respectively, and were implemented in Spring 2020. The co-requisite courses MTH 099, MTH 109S, and MTH 111S are considered developmental and allow students to receive targeted instruction with the goal of successfully passing the upper-level courses.

With the event of increased online instruction, the Virtual Math Lab was designed and set up to help the students in need of tutoring. Through the virtual lab, students had the option of uploading an assignment for a tutor to review, chatting with a tutor, or linking to an interactive program for face-to-face tutoring. There were three part-time faculty members, Sharon Stricklin, Roya Yazdi, and Susan Bates, who staffed the lab at various times throughout the week. To service students taking classes on campus, two of these tutors provided on-campus tutoring: Roya Yazdi at the Shelby Campus and Susan Bates at the Jefferson Campus.

MTH 098 -

	Level 2 or Higher Success Rates		
	2019 - 2020	2020 - 2021	2021 - 2022
Objective 1	193/200 = 96.5%	235/252= 93.3%	405/424 = 95.5%
Objective 2	191/200 = 95.5%	234/252= 92.9%	401/424 = 94.6%
Objective 3	165/200 = 82.5%	227/252= 90.1%	385/424 = 90.8%
Objective 4	120/200 = 60%	214/252= 84.9%	328/424 = 77.4%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 95.1%. This success rate is very high and is well above the goal of 70%. It should also be noted that this is a significant increase from the previous 3 year report (2016-2019) where on average 85% of the student were performing at level 2 or higher. The MTH 098 instructors will continue using the strategies that are in place.

Objective 2 Use of Results: The success rate for this objective is high at 94.3%. When comparing this rate to the previous 3 year cycle, one must take into account that Objective 2 was changed in 2018. For

the 2018-19 year, 89% of students were performing at level 2 or higher for the new Objective 2. The rate of 94.3% is higher and is due to continued reinforcement of this topic with MTH 098 instructors.

Objective 3 Use of Results: The Level 2 or higher success rate from 2019-2022 is 88.7%. This success rate is high and is well above the goal of 70%. It should also be noted that this is a significant increase from the previous 3 year report (2016-2019) where on average 76% of the student were performing at level 2 or higher. The MTH 098 instructors will continue using the strategies that are in place.

Objective 4 Use of Results: The success rate for this objective is at 75.6%. When comparing this rate to the previous 3 year cycle, one must take into account that Objective 4 was changed in 2018. For the 2018-19 year, 65% of students were performing at level 2 or higher for the new Objective 4. The rate of 75.6% is higher and is due to continued reinforcement of this topic with MTH 098 instructors.

Goal 3: Develop and provide courses relevant to the career and professional degree programs of the college.

One or more of CHM 104, PHS 112, PHY 115, MTH 100, and MTH 116 are courses required for career and professional degree programs, certificates, and short-term certificates. The Histologic Technician Degree and Medical Laboratory Technology Degree are the only two degrees requiring CHM 104. PHY 115 is required for the Construction and Building Science Technology Degrees. PHY 112 or PHY 115 is required for the Manufacturing and Technology Degrees, the Manufacturing and Technology Automotive/Automated Manufacturing Option certificate, the Manufacturing and Technology Electronics Option certificate, and the Manufacturing and Technology Automotive/Automated Manufacturing Option short-term certificate.

All career and certificate programs require three credit hours of mathematics from MTH 100 or MTH 116 or higher. Approximately half of the short-term certificate programs require the same.

Table 3

Career Degree Programs, Certificates, Short Term Certificates (2021-2022 Catalog)						
Degree	CHM 104	PHS 112	PHY 115	MTH 100	MTH 116	Or Higher MTH
Business Management						
Banking and Finance Option				x or	x	or higher
Business Management Option				x or	x	or higher
Entrepreneurship Option				x or	x	or higher
Child Development						MTH 110 recommended for transfer
Educarer Track				x or	x	or higher

Administrator Track				x or	x	or higher
Afterschool Track				x or	x	or higher
Computer Information Systems Technology						
Computer Programming Option				x or		
Cybersecurity Option				x or		
Networking Option				x or		
Web Technologies Option				x or		
Construction and Building Science Technology						
Architectural/Civil Design Technology Option			x	x		
Construction Management Technology Option			x	x		
Emergency Medical Services						
Paramedic				x		
Funeral Service Education				x or	x	or higher
Hospitality Management						
Culinary Apprentice Option				x or	x	or higher
Hotel/Restaurant Management Option				x or	x	or higher
Culinary/Nutrition Science Management Option				x or	x	or higher
Baking/Pastry Option				x or	x	or higher
Law Enforcement				x or	x	or higher
Manufacturing and Technology						
Automotive/Automated Manufacturing Option		x or	x	x		or higher
Biomedical Equipment Technology Option		x or	x	x		or higher
Computer Aided Drafting/Design Option		x or	x	x		or higher
Electronics Option		x or	x	x		or higher
Industrial Maintenance Technology Option		x or	x	x		or higher
Manufacturing Systems Technology Option		x or	x	x		or higher
Welding Technology Option		x or	x	x		or higher
Clinical Laboratory Sciences						
Histologic Technician	x			x or	x	or higher
Medical Laboratory Technology	x			x or	x	or higher
Nursing Education						
Nursing				x		
Office Administration Technology						
Medical Support Specialist Track				x or	x	or higher
Accounting Support Specialist Track				x or	x	or higher
Administrative Office Applications Specialist Track				x or	x	or higher
Physical Therapist Assistant				x		or higher
Radiologic Technology				x		
Respiratory Therapy				x		or higher
Veterinary Technology				x or	x	or higher
Certificate	CHM 104	PHS 112	PHY 115	MTH 100	MTH 116	Or Higher MTH
Business Management Certificate						

Banking and Finance Option				x		
Business Management Option				x or	x	or higher
Entrepreneurship Option				x or	x	or higher
Child Development Certificate						
Educarer Track				x or	x	or higher
Administrator Track				x or	x	or higher
Afterschool Track				x or	x	or higher
Computer Information Systems Technology Certificate						
Computer Programming Option				x		
Cybersecurity Option				x		
Networking Option				x		
Web Technologies Option				x		
Construction and Building Science Technology						
Architectural/Civil Design Technology Option				x		
Construction Management Technology Option				x		
Funeral Service Education				x or	x	or higher
Hospitality Management						
Hotel/Restaurant Management Option				x or	x	or higher
Culinary/Nutrition Science Management Option				x or	x	or higher
Baking/Pastry Option				x or	x	or higher
Law Enforcement				x or	x	or higher
Manufacturing and Technology						
Automotive/Automated Manufacturing Option		x or	x	x		or higher
Biomedical Equipment Technology Option				x		or higher
Computer Aided Drafting/Design Option				x		or higher
Electronics Option		x or	x	x		or higher
Industrial Maintenance Technology Option				x		or higher
Manufacturing Systems Technology Option				x		or higher
Welding Technology Option				x		or higher
Office Administration Technology						
Medical Office Assistant Track				x or	x	or higher
Accounting Assistant Track				x or	x	or higher
Office Applications Assistant Track				x or	x	or higher
Short Term Certificates	CHM 104	PHS 112	PHY 115	MTH 100	MTH 116	Or Higher MTH
Business Management						
Banking and Finance Option						
Business Management Option				x or	x	or higher
Entrepreneurship Option						
Child Development						
Educarer Track				x or	x	or higher
Administrator Track				x or	x	or higher

Afterschool Track				x or	x	or higher
Basic						
Computer Information Systems Technology						
Computer Programming Option						
Cybersecurity Option						
Networking Option						
Web Technologies Option						
Swift App Development						
Construction and Building Science Technology						
Architectural/Civil Design Technology Option				x		
Construction Management Technology Option				x		
Emergency Medical Services						
Emergency Medical Services Technician						
Advanced Emergency Medical Services Technician						
Funeral Service Education				x or	x	or higher
Hospitality Management						
Hotel/Restaurant Management Option						
Culinary/Nutrition Science Management Option						
Baking/Pastry Option						
Law Enforcement				x or	x	or higher
Manufacturing and Technology						
Automotive/Automated Manufacturing Option		x or	x	x		or higher
Biomedical Equipment Technology Option				x		or higher
Computer Aided Drafting/Design Option				x		or higher
Electronics Option				x		or higher
Industrial Maintenance Technology Option				x		or higher
Manufacturing Systems Technology Option				x		or higher
Welding Technology Option				x		or higher
Welding Technology - NCCER Level 1				x		or higher
Medical Laboratory Technology						
Phlebotomy						

MTH 100 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	574/678 84.7%	621/667 93.1%	770/946 81.4%
Objective 2	574/678 84.7%	623/667 93.4%	787/946 83.1%
Objective 3	483/678 71.2%	612/667 91.8%	753/946 79.6%
Objective 4	545/678 80.3%	605/667 90.7%	804/946 84.9%
Objective 5	600/678 88.5%	627/667 94.0%	824/946 87.1%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 85.8%. This success rate is very high and is well above the goal of 70%. However, it is important to note that this objective will be removed in the next cycle. MTH 100 Instructors recommend removing this objective going forward since the department voted to reduce the number of objectives to only 3 for each course.

Objective 2 Use of Results: The success rate for this objective is high at 86.6% with 1964/2291 students scoring at level 2 or higher. This exceeds the target success rate of 70%. This objective changed during the previous 3-year cycle, making it hard to compare the data. Additional study and learning tools were provided for this objective in the form of tutorial videos and additional practice opportunities, which appears to have helped bolster student success.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 80.7% (1848/2291). This exceeds the target success rate of 70%. This percentage is up from the last 3-year cycle when 75.1% of students performed at or above Level 2. It appears that the supplemental videos, notes, and work are increasing student learning.

Objective 4 Use of Results: For Objective 4, the percentage of students who scored at Level 2 or higher was 85.3% (1954/2291). This exceeds the target success rate of 70%. This percentage is up from the last 3-year cycle when 77.5% of students performed at or above Level 2. MTH 100 Instructors recommend removing this objective going forward since the department voted to reduce the number of objectives to only 3 for each course.

Objective 5 Use of Results: For Objective 4, the percentage of students who scored at Level 2 or higher was 89.5% (2051/2291). This greatly exceeds the target success rate of 70%. This percentage is up a little from the last 3-year cycle when 87.9% of students performed at or above Level 2. It appears that the supplemental videos, notes, and work are increasing student learning.

MTH 116 –

Level 2 or Higher Success Rates			
	2019 - 2020	2020 - 2021	2021 – 2022
Objective 1	73/78 93.6%	127/130 97.7%	99/104 95.2%
Objective 2	68/78 87.2%	113/130 86.9%	88/104 84.6%
Objective 3	69/78 88.5%	116/130 89.2%	79/104 76%

Objective 1 Use of Results: The Level 2 or higher success rate from 2019-2022 is 95.8%. This success rate is very high and is well above the goal of 70%. However, it is important to note that 19.6% (61/312) of students couldn't produce a correct answer. This is down from the last three-year report when 34.6% of students couldn't produce a correct answer. The extra emphasis placed on this objective through additional instructional videos and additional practice seems to have paid off. MTH 116 instructors will continue to provide these tools to students.

Objective 2 Use of Results: The success rate for this objective is high at 86.2% with 269/312 students scoring at level 2 or higher. This exceeds the target success rate of 70%. The success rate as compared to the previous three-year cycle is flat. 87.8% of students scored at Level 2 or higher from 2016-2019. However, we have seen a drastic decrease in the percentage of students who scored at Level 4. Only 30.4% of students scored at Level 4 from 19-22 while 59% of students scored at Level 4 from 16-19. Additional study and learning tools were provided for this objective in the form of tutorial videos and additional practice opportunities so it is unclear why this percentage decreased as drastically as it did. It could, perhaps, be explained in the context of student performance during the COVID19 pandemic.

Objective 3 Use of Results: For Objective 3, the percentage of students who scored at Level 2 or higher was 84.6% (264/312). This percentage is down from the last 3-year cycle when 88.9% of students performed at or above Level 2. Just as with SLO 2, the Level 4 percentage has greatly decreased from the last three-year cycle. From 2016-2019, 57.5% of students scored at Level 4 while from 2019-2022 only 47.1% of students scored at Level 4. Again, this is perplexing given that additional learning tools and additional opportunities to practice this concept were provided. MTH 116 instructors will review student use of the additional tools to ensure that students are taking advantage of these resources. If use is low, the use of these resources going forward could be tied to an opportunity for the students to earn additional points in the class. Assigning a point value to these "assignments" could increase student use.

PHY 115 – Technical Physics – This course was designed to target specific Career Degree Programs, Certificates, and Short Term Certificates. It is required in the Construction and Building Science Technology Degree Programs and is a choice in the Manufacturing and Technology Degree Programs. In the Certificate Programs, PHY 115 is an option for two different certificates in the Manufacturing and Technology Program: Automotive/Automated Manufacturing and Electronic. PHY 115 is, also, an option in the Short Term Certificate Program Manufacturing and Technology – Automotive/Automated Manufacturing. We are not required to collect SLO data on this course.

Part 2: Program/Department Change

Program/Department Goal Changes: No changes to Program/Department goals are warranted at this time.

Course Student Learning Outcome Changes:

Grading Rubric Modification

The pandemic forced an elemental change to the grading rubric when all courses had to be shifted to an online format. Offering courses strictly in an online format limited instructor access to student work. As a result, instructors were only able to grade based on three criteria. Either the student produced a correct solution, produced an incorrect solution, or did not attempt a solution. This change forced us to take a hard look at the way we were measuring our student success rates across the board for our on-campus classes and our online classes.

In reviewing our data from past three-year cycles, we concluded that the existing 5-scale rubric caused an unusually high rate of success across the board for all courses and student learning objectives. Success was defined as 70% or more of students learning at a rubric level of 2 or higher. Level 2 success was defined as follows: *Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.* A Level 2 solution, which we considered a success, still allowed students to produce an incorrect solution that contained errors that were deemed significant. This contributed to higher than expected success rates. The department agreed that a 2-scale rubric would be used for the next three-year cycle. Both the old 5-scale rubric and the new 2-scale rubric are below.

Rubric for 2019 – 2022 Three-Year Cycle

Level 4: Student provides a complete and correct solution process that is well organized, with no errors.

Level 3: Student provides a complete solution process that is well organized but contains minor errors.

Level 2: Student demonstrates understanding of methods required to produce a correct solution, but the solution process lacks expected organization and/or contains errors deemed more significant.

Level 1: Student attempts a solution but demonstrates little understanding of methods required to produce a correct solution with expected organization.

Level 0: Student does not attempt a solution.

Rubric for 2022 – 2025 Three-Year Cycle

Level 1: Student provides correct response.

Level 0: Student provides no response or an incorrect response.

Going forward, success will be defined as a student providing a correct response (Level 1). We believe that requiring students to produce a correct response is more in line with departmental standards and expectations and limits the ambiguity of grading on a multiple-scale system. While this change will certainly cause success rates to drop dramatically from the 19-22 cycle to the 22-25 cycle, we believe that the new success rates for each student learning outcome will be more accurately represented and will help us to better identify the areas in which we need to improve our instruction at the departmental level.

Changes to Evaluated Course Objectives and Number of Objectives Per Course

Taking a deeper look at our rubric also encouraged us to review our current student learning outcomes for each course. Faculty were tasked with reviewing the student learning outcomes for each course and were asked to provide feedback and recommendations for improvement. The faculty identified three areas for improvement.

1. In some cases, the problem used to measure an outcome tested additional concepts not related to the stated outcome.
2. Several SLO problems required multiple answers, which would make grading nearly impossible using the new rubric.
3. Discrepancies in the number of outcomes tested for each course.

Based on these observations, recommendations were made to update the objectives and/or problems for many of the courses. Changes were made to ensure that each problem tested only the concept outlined in the Evaluated Course Objectives and that each problem only required a single solution (answer). Faculty, also, noted that some courses tested five outcomes while others only tested three. It was agreed upon that learning in each course could adequately be measured using no more than three outcomes per course. As a result, every outcome for each course was reviewed and only outcomes deemed to be foundational to each course will be measured in the 2022-2025 three-year cycle. Each course in the department will measure three foundational learning outcomes going forward.

Part 3: Evidence of Staff Participation in Program Review

Faculty/staff participation: Describe the faculty and/or staff who participated in this program review and the role they played. Include specific dates for meetings held or activities conducted.

Select faculty are assigned to collect and analyze the data for specific courses. However, all faculty in the Math, Engineering, and Physical Science Department participate in the evaluation of the results and assist in making recommendations. The department met periodically throughout the three-year period to discuss the data.

Subj	Course	Title	Instructor
AST	220	Introduction to Astronomy	Robert Wallace
CHM	104	Introduction to Inorganic Chemistry	Ann Lyons
CHM	105	Introduction to Organic Chemistry	Lisa Nagy
CHM	111	College Chemistry I	Lisa Nagy
CHM	112	College Chemistry II	Lisa Nagy
CHM	221	Organic Chemistry I	Lisa Nagy
CHM	222	Organic Chemistry II	Lisa Nagy

MTH	098	Elementary Algebra	Nanette Easterling/Jarrold Cunningham
MTH	099/100	Intermediate College Algebra	Brandon Darby/Leah Compton
MTH	110	Finite Mathematics	Sam White
MTH	112	Precalculus Algebra	Yu-Ing Hargett
MTH	113	Precalculus Trigonometry	Louise Fall
MTH	116	Mathematical Applications	Jamie Holley
MTH	120	Calculus and its Applications	Vicki Adams/Yu-ing Hargett
MTH	125S	Calculus I	Brandon Darby
MTH	126S	Calculus II	Brandon Darby
MTH	227	Calculus III	Brandon Darby
MTH	231	Math for Elementary Teachers I	Nanette Easterling
MTH	232	Math for Elementary Teachers II	Nanette Easterling
MTH	238	Applied Differential Equations I	Robert Wallace
MTH	265	Elementary Statistics	Sabrina Moore
PHS	111	Physical Science I	Ann Lyons
PHS	112	Physical Science II	Ann Lyons
PHY	201	General Physics I-Trig Based	Robert Wallace
PHY	202	General Physics II Trig-Based	Robert Wallace
PHY	213S	General Physics with Calculus I	Robert Wallace
PHY	214S	General Physics with Calculus II	Robert Wallace