Mathematics Department Biennial Reviews

for the years 2016-2017 through 2019-2020

Prepared by Math Department

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Academic Biennial Review Form – Mathematics (MAT)

Year Two of the Program Review Cycle (Written 2018-2019: Covering Years 2016-2017 through 2017-2018)

The Coconino Community College biennial review will consist of two areas: an update to the Program Review Action Plans/Recommendations and a review of program student learning outcomes, results, actions taken, and future actions since either the last program review or biennial review.

Prior to completing the Biennial Review form, the Assessment Coordinator will provide the program with a variety of data: the most recently completed Program Review Actions Plans/Recommendations, Program Assessment Reports with associated assignments and rubrics, and a summary of related Course Assessment Reports. If Year Four, the previous Biennial Review information will be provided as well.

Provide a status update to any of the recommendations. Then analyze the attached student learning assessment data and provide any future actions to be taken based on that data. If Year Four, provide an update on previously stated future actions from the previous biennial report. Attach any department/program minutes or other appropriate documentation that recorded discussion of updates to recommendations or of student learning assessment.

I. ACTION PLAN/RECOMMENDATION UPDATE:

Action Item #: 1 – Hire one additional FT Math Faculty
Anticipated date for completion: unknown
List potential benefits to student success: Full-time faculty have a greater knowledge of the scope and sequence of the courses, and can better assist the students in their progress through the program.
Status Update (Only Update during Biennial Review Reporting) There was a temporary one-year full time math position during the 2018-2019 academic year. We hope to have this position become permanent in the future.
Last reviewed date: September 2017

Action Item #: 2 – Continue and expand the Supplemental Instructor (SI) program.
Anticipated date for completion: ongoing
List potential benefits to student success: Students who utilize the program have experienced greater success in their math classes. ***SI survey versus tutoring results from Spring 2018 shown below.
NAU and CCC have a collaboration on a NOYCE grant. As part of this grant, NAU provides some SI tutors who help students at CCC. The data showing success of this program is not available yet. This grant will end in 2022. At that point we will lose this extra funding for SI tutors. If this extra SI tutoring has proven to be beneficial and should continue, then funding will need to be provided to continue this program.
Status Update (Only Update during Biennial Review Reporting) Continue the program.
Last reviewed date: April 2018

Action Item #: 3 – Build platform in front of board in Room 107.

Anticipated date for completion: Withdraw the goal.
List potential benefits to student success:
Status Update (Only Update during Biennial Review Reporting)
Last reviewed date: September 2017

Action Item #: 4 – Purchase and install more up-to-date SmartBoard in Room 107.
Anticipated date for completion: unknown
List potential benefits to student success: The ease of use will facilitate instructors having more time for classroom instruction.
Status Update (Only Update during Biennial Review Reporting) Requested STEM funds fall 2017 and math department funds in fall 2018. Status unknown.
Last reviewed date: October 2017

Action Item #: 5 – Keep dedicated math classrooms with department technology, materials, and layout.
Anticipated date for completion: Ongoing
List potential benefits to student success: Math instruction requires extensive use of whiteboards and smartboards. Math classrooms should not have the screens covering whiteboards. Smarboards allow instructors to save their instruction for students to use. Math classrooms should be arranged to allow for easy movement around the classroom for group activities.
Status Update (Only Update during Biennial Review Reporting) There was a discussion that math stop using 509 and use 459 instead. To make this change, 459 would need to be reoriented to be useful as a math classroom and move the SmartBoard and extra white boards from 509 into 459. Room 527 has been designated as not a math classroom in future years. Room 504 has been requested as an overflow math classroom if one is needed. Room C3 at the 4th Street campus should have the screen moved so that is not covering the whiteboard. Room C5 on 4th Street that has a pole in the student seating. This room is not conducive to math classes and scheduling in this room should be avoided.
Last reviewed date: Fall 2018

Action Item #: 6 – Build additional computer classroom with required software installed such as MATLAB and R
Anticipated date for completion: Ongoing
List potential benefits to student success: A former COW (Computers on Wheels) cart is being retired and will be put into a math classroom. At least that is what we were told. This will allow more students to utilize the computers for classes such as developmental.
Status Update (Only Update during Biennial Review Reporting) Math classes that should always be scheduled in a computer classroom: Statistics (MAT 160), Differential Equations (MAT 261). Math classes that would be nice to have scheduled in a computer classroom: College Math (MAT 140), Calculus III (MAT 241), and developmental math classes. The math department would like to see laptop computer carts or Chromebook carts in all math classrooms.
Last reviewed date: Fall 2018

Action Item #: 7 – Investigate mobile chair/desks for active classrooms
Anticipated date for completion: Withdraw this goal.
List potential benefits to student success:

Status Update (Only Update during Biennial Review Reporting)
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Anticipated date for completion: ongoing
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Status Update (Only Update during Biennial Review Reporting) Some technology still needs to be updated for full time math faculty. Tablets to be used for grading in Canvas will be ordered in Spring 2019. SmartBoard pens will be ordered in Spring 2019. MathType will need to be renewed when the college updates Microsoft Word because it creates equations that are able to be read by screen readers.
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Action Item #: 9 – A way to offer office hours to web students so that faculty can help multiple classes at the same time
Anticipated date for completion: Goal completed
List potential benefits to student success: This helps students have greater access to their instructors, especially for online courses.
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Action Item #: 10 – Revitalize the MAT 010 course
Anticipated date for completion: Revisit this goal in 2019 or 2020.
List potential benefits to student success: This course could be helpful for developmental students that are in classes that are not currently covered by the SI program. It could be reconfigured with SI's helping the instructor. MAT 010 also provides a curriculum of study skills.
Status Update (Only Update during Biennial Review Reporting) The math department wants to think about bringing this class back as needed in the future.
Last reviewed date: September 2017

II. ASSESSMENT OF STUDENT LEARNING: *Repeat 1-5 for each outcome/measure evaluated. If only one outcome is evaluated, answer 1-5 once.*

Outcome Assessment 1:

1. **Program Outcome/Measure:** Course outcomes from MAT 088, 091, 097

2. **Course(s) Assessment Gathered:** MAT 088, 091, 097 (Developmental Math Courses)

3. **Method of Assessment:** Common final exams in all developmental courses

4. **Semester Information Gathered:** Spring 2018, Fall 2018, Spring 2019

5. Results of Assessment: The Spring 2018 Common Final Exam for MAT 097 was edited for the Fall 2018 semester based on feedback from instructors and results of the individual questions. The instructors will be given data and a graph (*example shown below) that lets them know how their students did in their class and another graph that shows how they did compared to all classes of that same course. The department is working on determining how students are doing on individual course outcomes across sections.

6. Associated Benchmarks: The department will work on using the data from common final exams to address the deficiencies in course outcomes that our students are demonstrating. At this time there is not a particular benchmark level of success that we are expecting from our students.

Outcome Assessment 2:

1. Program Outcome/Measure: Critical thinking general education outcome and communication general education outcome

2. Course(s) Assessment Gathered: MAT 160/BUS 232 (Statistics)

3. Method of Assessment: Common project (**shown below)

4. Semester Information Gathered: Fall 2017 and Spring 2018 for critical thinking and Fall 2018 and Spring 2019 for communication

5. Results of Assessment: Statistics project results: In Spring 2017, the average score on the statistics project was 84%, and 96% of the students met the benchmark for success in critical thinking. In Fall 2017, the average score on the statistics project was 78% and 82% of the students met the benchmark for success in critical thinking. In Spring 2018, the average score on the statistics project was 81% and 89% of the students met the benchmark for success in critical thinking. In Fall 2018, the average score on the statistics project was 80%, and 92% of the students met the benchmark for success in communication. Spring 2019 data will be gathered and compiled at a later date for the communication general education outcome.

6. Associated Benchmarks: 60% or better grade on the statistics project is successful.

Outcome Assessment 3:

1. Program Outcome/Measure: Communication general education outcome

2. Course(s) Assessment Gathered: MAT 220 (Calculus I), 2 sections

3. Method of Assessment: Individual test question: "Your roommate who is not good at math sees your homework and asks you about derivatives. Write a paragraph (using your best grammar and punctuation) explaining the meaning of a derivative and how it can be used in real life."

4. Semester Information Gathered: Spring 2019

5. Results of Assessment: MAT 220 test question results: In Spring 2019, 66% of the students met the benchmark for success in communication.

6. Associated Benchmarks: 75% or better on the question is successful.

Outcome Assessment 4:

1. Program Outcome/Measure: The math department has provided grading requirement documents to all instructors which mandate all classes have a final exam and a particular grading structure.

2. Course(s) Assessment Gathered: All math courses

3. Method of Assessment: Following up with instructors and checking syllabi

4. Semester Information Gathered: Future semesters

5. Results of Assessment: Unknown at this time

6. Associated Benchmarks: Instructors comply with grading requirements.

Outcome Assessment 5:

1. Program Outcome/Measure: Critical thinking general education outcome

2. Course(s) Assessment Gathered:
Spring 2017: MAT 140, 142, 151, 187, 220
Fall 2017: MAT 140, 142, 187, 220, 230
Spring 2018: MAT 088, 140, 142, 187, 220

3. Method of Assessment: Common final exam questions given on final exams across sections

4. Semester Information Gathered: Spring 2017, Fall 2017, Spring 2018

5. Results of Assessment:
Spring 2017: In MAT 140, 142, 187, and 220 60% or more of the students showed success in critical

thinking. The results for MAT 151 showed that only 40% of the students had success in critical thinking. Therefore, more work needs to be done to help support critical thinking in students in MAT 151. However, due to problems with the way the data was collected and reported (****see below), the department does not have information as to what math performance measures are the most in need of support.
Fall 2017: In MAT 140, 142, 87, 220, and 230 60% or more of the students showed success in critical thinking.
Spring 2018: In MAT 088, 140, 142, 187, and 220 60% or more of the students showed success in critical thinking.

6. **Associated Benchmarks:** 60% or better on the five common final exam questions is successful.

Outcome Assessment 6:

1. **Program Outcome/Measure:** Critical thinking general education outcome by teaching modality (in-person versus on-line)

2. **Course(s) Assessment Gathered:** Fall 2017: MAT 140, 142, 187, 220, 230

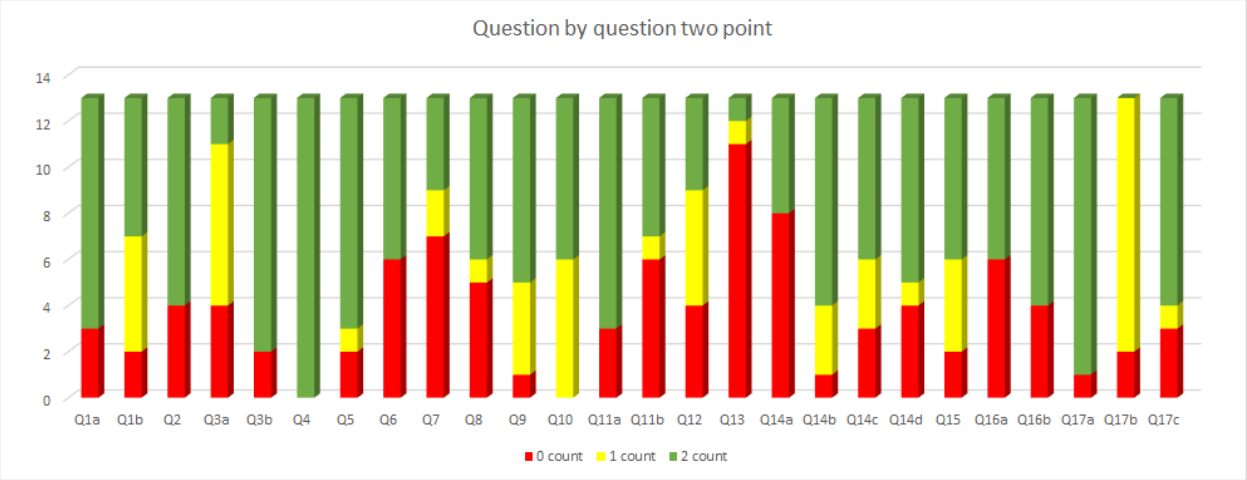
3. **Method of Assessment:** Common final exam questions given on final exams across sections

4. **Semester Information Gathered:** Fall 2017

5. **Results of Assessment:** In Fall 2017, the percentage of students who met the benchmark for the critical thinking outcome were 70% for in-person and 67% for on-line across all math courses.

6. **Associated Benchmarks:** 60% or better on the five common final exam questions is successful.

***Example Graph and Data for Developmental Courses**



Course Outcome	1	2	3	4	5	6	7	8	9	10
Insufficient	27	N/A	21	29	46	N/A	29	19	15	41
Emerging	4	N/A	10	20	19	N/A	23	13	31	21
Proficient	69	N/A	69	51	35	N/A	48	67	54	38

Course outcomes:

1. graph radical, quadratic, exponential, logarithmic, and absolute value functions;

2. solve quadratic and rational inequalities;

3. simplify rational expressions and solve rational equations;

4. simplify radical expressions and solve radical equations;

5. solve quadratic equations using the Zero-Product Property, completing the square, and the quadratic formula;

6. analyze exponential and logarithmic expressions and functions;

7. solve logarithmic and exponential equations;

8. perform function evaluation and identify domain and range;

9. perform operations on functions including finding the inverse;

10. and solve application problems involving concepts taught in the course.

****Common Project for Statistics Classes**

This is an individual project.
1.Think up a hypothesis for a two-sample independent or a paired testfor the difference in means. The test needs to be one-tailed. See Project Ideas page on Canvas home page for ideas.

2.State in words your random variables, populations, samples, and means.

3.Choose an α level for your test. Justify your choice.

4. Collect the data. You need to have exactly 25 data points in each sample if independent test, or exactly 25 pairs if it is a paired test. If that is not possible, please contact me.

5. State the hypotheses, and do all calculations for the hypothesis test, using the technology R. Give both your test statistic and your p-value.
Give the R commands.

6. Interpret the results of the hypothesis test both statistically and in terms of the real world.

7. Make sure you state the assumptions in terms of the problem and check the assumptions. To do the check, what I mean is that for the paired test explain how you took your sample to make sure it was the right type of sample, and perform the assessing normality from chapter 6. For the independent test, explain how you took your samples to make sure they were the right type of samples and perform all parts of the assessing normality from chapter 6.

8. Estimate the difference in means using a confidence interval using technology.
Give the R commands.

9. Interpret the confidence interval both statistically and in terms of real world.

*****SI versus Tutoring Survey Results**

Tutoring Data:

Frequency of attending ***student services*** tutoring	0-5	6-10	11-15	16-20	21-25	>25

	102	14	7	6	2	4

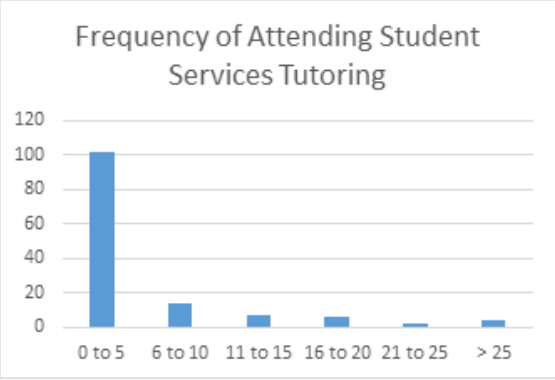
Satisfaction rating of ***SS***	Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
	1	11	73	30	16

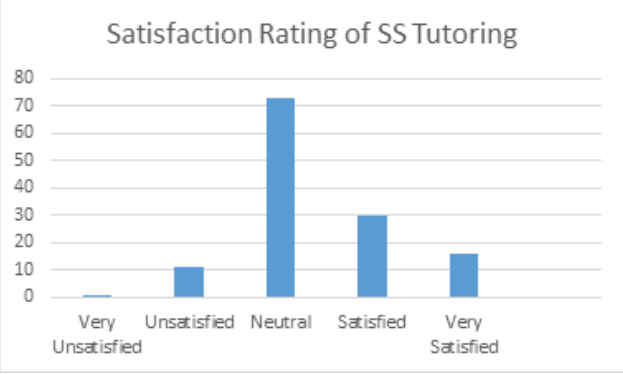
SS **tutors knowledgeable?**	**Never**	**Rarely**	**Sometimes**	**Mostly**	**Always**
	4	**5**	**28**	**47**	**21**

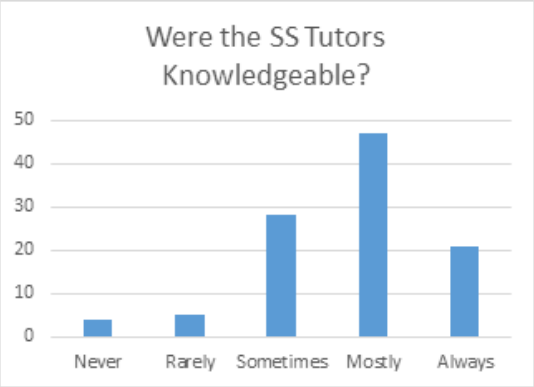
Why did you not utilize *SS*?	**Didn't know**	**Didn't fit schedule**	**Didn't think useful**	**Other**
	7	**58**	**11**	**See below**

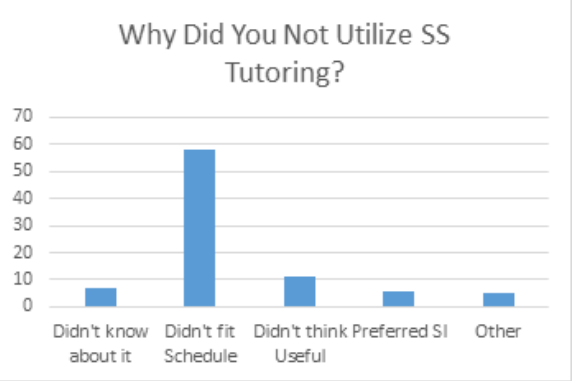
Students' "Other" reasons for not utilizing SS include:

1. **Preferred SI (expressed by 6 students)**
2. **Too Busy**
3. **Tutors helped others first.**
4. **Need more Tutors and more hours**
5. **They couldn't help me**
6. **Couldn't figure out how to find someone to help me.**









SI Data:

Frequency of attending *Supplemental Instruction* tutoring	**0-5**	**6-10**	**11-15**	**16-20**	**21-25**	**>25**
	104	**12**	**3**	**5**	**2**	**10**

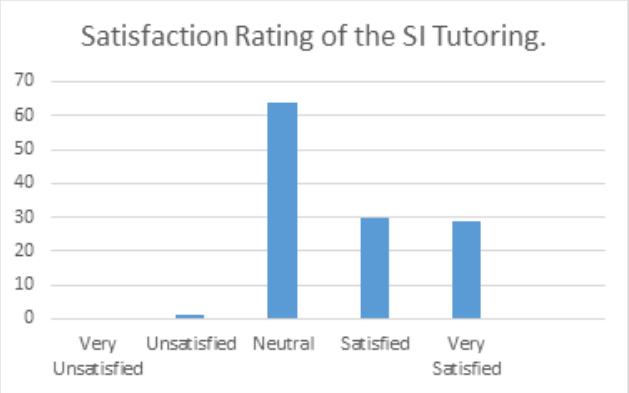
Satisfaction rating of *SI*	**Very unsatisfied**	**Unsatisfied**	**Neutral**	**Satisfied**	**Very satisfied**
	0	**1**	**64**	**30**	**29**

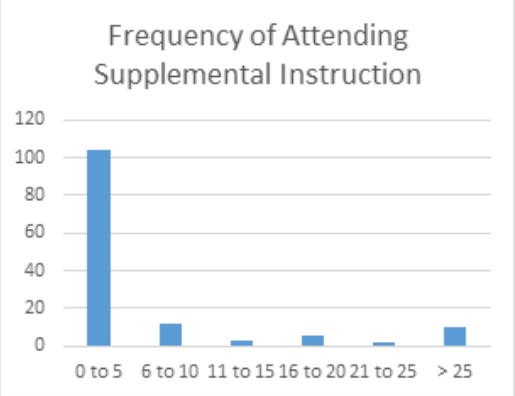
***SI* tutors knowledgeable?**	**Never**	**Rarely**	**Sometimes**	**Mostly**	**Always**
	3	**0**	**35**	**2**	**64**

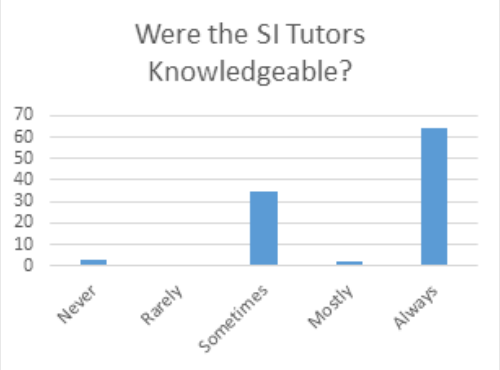
Why did you not utilize *SI*?	**Didn't know**	**Didn't fit schedule**	**Didn't think useful**	**Other**
	12	**72**	**8**	**See below**

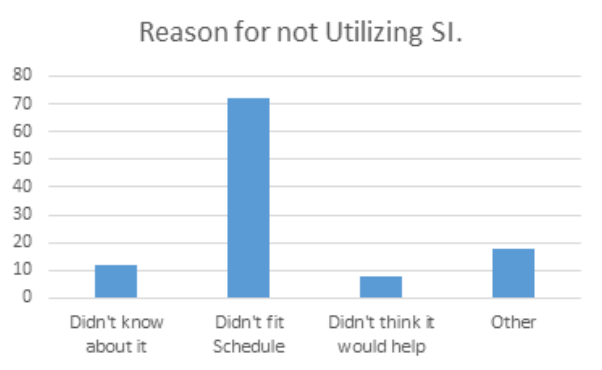
Students' "Other" reasons for not utilizing SI include:

1. **Would like to see morning or more hours (expressed by 9 students)**
2. **Need more tutors (Expressed by 5 students)**
3. **Too proud to go**
4. **Used TRIO tutors instead**
5. **Make it more inviting**
6. **Hard to get there during offered hours**









ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts)**:** Analysis will be done in future semesters.

ALREADY TAKEN/FUTURE ACTIONS: The department wants to work on the following items:

1. Updating grading requirements for all classes
2. Develop sample grading procedures for developmental classes and possibly MAT 140/142
3. Develop master course shells for all classes taught by part-time faculty
4. Placement testing
5. Collaboration with tutoring

UPDATE ON PREVIOUS ACTIONS: See assessments completed above.

****The mathematics department was given results from the general education assessment done during Spring 2017 for the Critical Thinking general education outcome. However, due to the reporting structure of this data, the department cannot further use the data to comment on the math department performance measures because the same exact data from the critical thinking outcome was reported as results for each math performance measure. The department needs more detailed reporting such as instructors reporting the results of each common final exam question in Canvas rather than the aggregate success rate on all five common final exam questions. In the future, we would like to see the reporting rubric to break out each question so that individual math performance measures can be analyzed.

END of Year Two of the Program Review Cycle

Academic Biennial Review Form – Mathematics (MAT)

Year Four of the Program Review Cycle (Written 2020-2021: Covering Years 2018-2019 through 2019-2020)

I. ACTION PLAN/RECOMMENDATION UPDATE **Repeat 1-5 for each Action Item list below.*

1. **Action Item # (# as indicated on last completed program review):** Click or tap here to enter text.
2. **Anticipated date for completion:** Click or tap here to enter text.
3. **List potential benefits to student success:** Click or tap here to enter text.
4. **Status Update (Only Update during Biennial Review Reporting):** Click or tap here to enter text.
5. **Last reviewed date:** Click or tap here to enter text.

I. ACTION PLAN/RECOMMENDATION UPDATE (from 2018-2019 Biennial Review: Updated for 2020-2021 Biennial Review)

Action Item #: 1 – Hire one additional FT Math Faculty
Anticipated date for completion: unknown
List potential benefits to student success: Full-time faculty have a greater knowledge of the scope and sequence of the courses, and can better assist the students in their progress through the program.
Status Update (Only Update during Biennial Review Reporting) 2018 Update: There was a temporary one-year full time math position during the 2018-2019 academic year. We hope to have this position become permanent in the future.
Last reviewed date: September 2017
Status Update (Only Update during Biennial Review Reporting) 2020 Update: We don't need to meet this goal due to enrollment declines due to the global pandemic COVID-19.
Last reviewed date: December 2020

Action Item #: 2 – Continue and expand the Supplemental Instructor (SI) program.
Anticipated date for completion: ongoing
List potential benefits to student success: Students who utilize the program have experienced greater success in their math classes. ***SI survey versus tutoring results from Spring 2018 shown below.

NAU and CCC have a collaboration on a NOYCE grant. As part of this grant, NAU provides some SI tutors who help students at CCC. The data showing success of this program is not available yet. This grant will end in 2022. At that point we will lose this extra funding for SI tutors. If this extra SI tutoring has proven to be beneficial and should continue, then funding will need to be provided to continue this program.
Status Update (Only Update during Biennial Review Reporting) Continue the program.
Last reviewed date: April 2018
Status Update (Only Update during Biennial Review Reporting) We worked with the tutoring department to take over the management of the SI program. The progress on this program was also derailed by COVID-19. We would like to bring back this program as soon as we can, and we have begun discussions to bring it back during the 2020/2021 academic year. It may be called "embedded tutoring," rather than "SI."
Last reviewed date: December 2020

Action Item #: 3 – Build platform in front of board in Room 107.
Anticipated date for completion: Withdraw the goal.
List potential benefits to student success:
Status Update (Only Update during Biennial Review Reporting)
Last reviewed date: September 2017, December 2020

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Anticipated date for completion: unknown
List potential benefits to student success: The ease of use will facilitate instructors having more time for classroom instruction.
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from 509 into 459. Room 527 has been designated as not a math classroom in future years. Room 504 has been requested as an overflow math classroom if one is needed. Room C3 at the 4th Street campus should have the screen moved so that is not covering the whiteboard. Room C5 on 4th Street that has a pole in the student seating. This room is not conducive to math classes and scheduling in this room should be avoided.
Last reviewed date: Fall 2018
Status Update (Only Update during Biennial Review Reporting) Goal complete for Lone Tree. Room 459 was reoriented and created into a math classroom with a new SmartBoard. Room 460 also received a new SmartBoard. Room 509 still has an older SmartBoard that still works. Maybe ask for another SmartBoard for room 509 in a year or two. Goal ongoing for 4th Street. Math department meeting at 4th Street in the future.
Last reviewed date: December 2020

Action Item #: 6 – Build additional computer classroom with required software installed such as MATLAB and R
Anticipated date for completion: Ongoing
List potential benefits to student success: A former COW (Computers on Wheels) cart is being retired and will be put into a math classroom. At least that is what we were told. This will allow more students to utilize the computers for classes such as developmental.
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Last reviewed date: Fall 2018
Status Update (Only Update during Biennial Review Reporting) This goal is ongoing. Same preference as Fall 2018.
Last reviewed date: December 2020

Action Item #: 7 – Investigate mobile chair/desks for active classrooms
Anticipated date for completion: Withdraw this goal.
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List potential benefits to student success: This course could be helpful for developmental students that are in classes that are not currently covered by the SI program. It could be reconfigured with SI's helping the instructor. MAT 010 also provides a curriculum of study skills.
Status Update (Only Update during Biennial Review Reporting) The math department wants to think about bringing this class back as needed in the future.
Last reviewed date: September 2017
Status Update (Only Update during Biennial Review Reporting) We have a goal to support developmental math students, and this could be beneficial. This course was popular and we had data that showed the students who took MAT 010 were more successful than those who didn't. The math department might like to bring it back, but would need to consider the number of credit hours, financial aid, SI, and marketing.
Last reviewed date: December 2020

II. ASSESSMENT OF STUDENT LEARNING *Repeat 1-5 for each outcome/measure evaluated. If only one outcome is evaluated, answer 1-5 once.*

Outcome Assessment 1:

1. **Program Outcome/Measure:** Course outcomes from MAT 088

2. **Course(s) Assessment Gathered:** MAT 088

3. **Method of Assessment:** Common final exam

3. **Semester Information Gathered:** Fall 2018, Spring 2019, Fall 2019, and Spring 2020
(Note: not all common final exam data was gathered for Spring 2020 due to the COVID 19 pandemic. It was decided to not analyze the Spring 2020 final exam data due to faculty using a variety of methods to deter academic dishonesty and the fact that most data was not fully collected and turned in.)

4. **Results of Assessment:** In the following data, the department is looking at the exams of all students who took the common final exam in a given course, measuring the results of each individual question on the common final exam based on all students, and then compiling all of the questions that measure a particular course outcome. The course outcome data is below, but the department may also look at the individual questions to determine whether or not changes to the assessment tool itself need to be made.

MAT 088

Course Outcome 1: Perform addition, subtraction, multiplication, division, and exponentiation on real numbers.

Fall 2018: All students who took the MAT 088 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

Spring 2019: All students who took the MAT 088 common final exam scored an average score of 1.4/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 088 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 2: Use order of operations with real numbers

Fall 2018: All students who took the MAT 088 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Spring 2019: All students who took the MAT 088 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 088 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 3: Simplify and evaluate algebraic expressions

Fall 2018: All students who took the MAT 088 common final exam scored an average score of 1.7/2.0 on the questions measuring this outcome. Outcome met.

Spring 2019: All students who took the MAT 088 common final exam scored an average score of 1.5/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 088 common final exam scored an average score of 0.7/2.0 on the questions measuring this outcome. Outcome not met.

Course Outcome 4: Solve linear equations and check solutions

Fall 2018: All students who took the MAT 088 common final exam scored an average score of 0.8/2.0 on the questions measuring this outcome. Outcome developing.

Spring 2019: All students who took the MAT 088 common final exam scored an average score of 1.2/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 088 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 5: Solve application problems

Fall 2018: All students who took the MAT 088 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Spring 2019: All students who took the MAT 088 common final exam scored an average score of 1.2/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 088 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

5. Associated Benchmarks:

	Average Score (out of two) of Each Student
Outcome Met	**1.2 or Greater (out of 2)**
Outcome Developing	**0.8 to < 1.2 (out of 2)**
Did not Meet Outcome	**Less than 0.8 (out of 2)**

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): The assessment results for MAT 088 in the semesters Fall 2018, Spring 2019, and Fall 2019 show good results. All MAT 088 course outcomes were measured in these semesters and there was only one instance where an outcome was not met by the students in that course across sections. This happened in Fall 2019 when the students' average score did not meet Outcome 3, "simplify and evaluate algebraic expressions." However, in the other semesters, the students did meet that same outcome, so it is not much of a concern. The students' averages for every other course outcome in all three semesters was in either the "outcome met" category or the "outcome developing" category.

IV. UPDATE ON ANY PREVIOUS ACTIONS: None

V. FUTURE ACTIONS: Take a break from measuring outcomes in MAT 088.

Outcome Assessment 2:

1. Program Outcome/Measure: Course outcomes from MAT 091

2. Course(s) Assessment Gathered: MAT 091

3. Method of Assessment: Common final exam

3. Semester Information Gathered: Fall 2018, Spring 2019, Fall 2019, and Spring 2020
(Note: not all common final exam data was gathered for Spring 2020 due to the COVID 19 pandemic. It was decided to not analyze the Spring 2020 final exam data due to faculty using a variety of methods to deter academic dishonesty and the fact that most data was not fully collected and turned in.)

4. Results of Assessment: In the following data, the department is looking at the exams of all students who took the common final exam in a given course, measuring the results of each individual question on the common final exam based on all students, and then compiling all of the questions that measure a particular course outcome. The course outcome data is below, but the department may also look at the individual questions to determine whether or not changes to the assessment tool itself need to be made.

MAT 091

Course Outcome 2: Simplify algebraic expressions

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.9/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 3: Solve linear equations

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 5: Use interval notation to describe solutions to inequalities

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.5/2.0 on the questions measuring this outcome. Outcome not met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 0.7/2.0 on the questions measuring this outcome. Outcome not met.

Course Outcome 7: Graph linear equations in two dimensions

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.2/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 8: Solve systems of equations graphically and algebraically (problem did not cover graphically)

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 9: Simplify exponential expressions

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.6/2.0 on the questions measuring this outcome. Outcome not met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.2/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 10: Perform basic operations on polynomial expressions

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.8/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 11: Factor polynomials by removing the GCF

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.8/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 12: Factor polynomials by grouping

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 13: Factor trinomials using various methods including special forms

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 14: Solve quadratic equations by factoring

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.7/2.0 on the questions measuring this outcome. Outcome not met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 0.7/2.0 on the questions measuring this outcome. Outcome not met.

Course Outcome 15: Solve application problems

Fall 2018: No MAT 091 Data

Spring 2019: All students who took the MAT 091 common final exam scored an average score of 0.4/2.0 on the questions measuring this outcome. Outcome not met.

Fall 2019: All students who took the MAT 091 common final exam scored an average score of 0.2/2.0 on the questions measuring this outcome. Outcome not met.

5. Associated Benchmarks:

	Average Score (out of two) of Each Student
Outcome Met	**1.2 or Greater (out of 2)**
Outcome Developing	**0.8 to < 1.2 (out of 2)**
Did not Meet Outcome	**Less than 0.8 (out of 2)**

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): The assessment results for MAT 091 in the semesters Spring 2019 and Fall 2019 were the worst for all of the three developmental courses measured during that time. There were a few MAT 091 course outcomes that were not measured during these semesters (detailed below). For each semester, Spring 2019 and Fall 2019, there were only two outcomes out of twelve outcomes measured that were in the, “Outcome met” category. The remaining results for course outcomes in both semesters were either in the, “Outcome developing” or “Did not meet outcome” categories. The outcomes that were not met were:

- Outcome 5: Use interval notation to describe solutions of inequalities
- Outcome 9: Simplify exponential expressions
- Outcome 14: Solve quadratic equations by factoring
- Outcome 15: Solve application problems

IV. UPDATE ON ANY PREVIOUS ACTIONS: None

V. FUTURE ACTIONS: Focus on improving MAT 091 courses especially in the areas of the above outcomes that were not met.

Also, MAT 091 Outcomes 1, 4, 6, and part of 8 (shown below), were not on the final exams for Spring 2019 and Fall 2019. We may consider finding a way to assess those outcomes in the future.

- Outcome 1: Perform the four basic operations, absolute values, & exponents on rational numbers.
- Outcome 4: Verify solutions of algebraic equations.
- Outcome 6: Solve and graph linear inequalities.
- Part of Outcome 8: Solve systems of equations **GRAPHICALLY** and algebraically.

The department needs to find and process, if possible, the MAT 091 final exams for Fall 2018. The delay for this was due to the coronavirus pandemic.

Outcome Assessment 3:

1. Program Outcome/Measure: Course outcomes from MAT 097

2. Course(s) Assessment Gathered: MAT 097

3. Method of Assessment: Common final exam

3. Semester Information Gathered: Fall 2018, Spring 2019, Fall 2019, and Spring 2020
(Note: not all common final exam data was gathered for Spring 2020 due to the COVID 19 pandemic. It was decided to not analyze the Spring 2020 final exam data due to faculty using a variety of methods to deter academic dishonesty and the fact that most data was not fully collected and turned in.)

4. Results of Assessment: In the following data, the department is looking at the exams of all students who took the common final exam in a given course, measuring the results of each individual question on the common final exam based on all students, and then compiling all of the questions that measure a particular course outcome. The course outcome data is below, but the department may also look at the individual questions to determine whether or not changes to the assessment tool itself need to be made.

MAT 097

Course Outcome 1: Graph radical, quadratic, exponential, logarithmic, and absolute value functions

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.4/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.4/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 2: Solve quadratic and rational inequalities

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 0.6/2.0 on the questions measuring this outcome. Outcome not met.

Course Outcome 3: Simplify rational expressions and solve rational equations

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 0.9/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 4: Simplify radical expressions and solve radical equations

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 5: Solve quadratic equations using the Zero-Product Property, completing the square, and the quadratic formula

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.1/2.0 on the questions measuring this outcome. Outcome developing.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 7: Solve logarithmic and exponential equations

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 0.6/2.0 on the questions measuring this outcome. Outcome not met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 0.8/2.0 on the questions measuring this outcome. Outcome developing.

Course Outcome 8: Perform function evaluation and identify domain and range

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.6/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.2/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 9: Perform operations on functions including finding the inverse

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.4/2.0 on the questions measuring this outcome. Outcome met.

Course Outcome 10: Solve application problems involving concepts taught in this course

Fall 2018: No MAT 097 Data

Spring 2019: All students who took the MAT 097 common final exam scored an average score of 1.3/2.0 on the questions measuring this outcome. Outcome met.

Fall 2019: All students who took the MAT 097 common final exam scored an average score of 1.0/2.0 on the questions measuring this outcome. Outcome developing.

5. Associated Benchmarks:

	Average Score (out of two) of Each Student
Outcome Met	**1.2 or Greater (out of 2)**
Outcome Developing	**0.8 to < 1.2 (out of 2)**
Did not Meet Outcome	**Less than 0.8 (out of 2)**

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): The assessment results for MAT 097 in the semesters Spring 2019 and Fall 2019 show good results. All MAT 097 course outcomes were measured in these semesters and there was only one instance where an outcome was not met by the students in that course across sections. In Spring 2019 the students' average score did not meet Outcome 7, "solve logarithmic and exponential equations." Also, in Fall 2019 the students' average score did not meet outcome 2, "solve quadratic and rational inequalities." Neither of these results were replicated in the other semester and these outcomes represent more difficult topics for the students to master, so these results are rather predictable. The students' averages for every other course outcome in both semesters was in either the "outcome met" category or the "outcome developing" category.

IV. UPDATE ON ANY PREVIOUS ACTIONS: An item taken out of the final exam between Spring 2019 and Fall 2019 is the topic of variation between two variables. This item is not shown on the MAT 097 course outline.

V. FUTURE ACTIONS: Take a break from assessing course outcomes in MAT 097.

MAT 097 Outcome 6 , "analyze exponential and logarithmic expressions and functions," is not on the final exam in Fall 2018, Spring 2019, and Fall 2019. We may consider finding a way to assess that particular outcome in the future.

We need to find and process the MAT 091 final exams for Fall 2018. The delay for this was due to the coronavirus pandemic.

Outcome Assessment 4:

1. **Program Outcome/Measure:** Course outcomes from MAT 160/BUS 232

2. **Course(s) Assessment Gathered:** MAT 160/BUS 232 (Statistics)

3. **Method of Assessment:** Common final project

3. **Semester Information Gathered:** Fall 2018, Spring 2019, Fall 2019, and Spring 2020
(Note: not all common final exam data gathered for Spring 2020 due to COVID 19)

4. **Results of Assessment:** In the following data, the department is looking at the final projects of all students who completed the project in MAT 160/BUS 232, measuring the results of each individual part of the common project based on all students, and then compiling all of the parts that measure a particular course outcome. A common rubric was used to grade the final projects in Canvas (except in Fall 2018). The course outcome data is below, but the department may also look at the individual parts of the project to determine whether or not changes to the assessment tool itself need to be made.

MAT 160/BUS 232

Course Outcome 1: Use statistical methods to collect, organize, analyze, and interpret numerical data

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 70% and 100% (outcome met) on at least two parts of the project that measure this outcome. In one course section, there were two parts of the common project measuring this outcome that were below 20% (outcome not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 2: Create and interpret graphs of data

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 64% and 93% (outcome met) on at least one part of the project that measures this outcome. There were no parts of the project from any course section that measure this outcome that were below 60% (not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 7: Estimate population parameters for one and two populations

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 73% and 75% (outcome met) on one part of the project that measures this outcome. There were no parts of the project from any course section that measure this outcome that were below 60% (not met). One of the course sections did not have a measurement for this outcome on the rubric for the final project.

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 9: Interpret confidence intervals

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 64% and 97% (outcome met) on five or more parts of the project that measure this outcome. Each course section had one part of the project measuring this outcome that was below 50% (outcome not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 10: Test hypotheses

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 64% and 100% (outcome met) on at least eight parts of the project that measure this outcome. Each course section had one to three parts of the project measuring this outcome that were below 57% (outcome not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 12: Solve application situations using a variety of statistical methods

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 68% and 96% (outcome met) on at least three parts of the project that measures this outcome. There were no parts of the project from any course section that measure this outcome that were below 60% (not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

Course Outcome 13: Use technology to solve a variety of statistical applications

Fall 2018: A common grading rubric was not utilized across all sections of MAT 160/BUS 232. Therefore, the statements below are generalized for each section rather than a compilation of all sections.

In general, the average scores of all students who completed the common project ranged between 73% and 100% (outcome met) on at least two parts of the project that measures this outcome. There were no parts of the project from any course section that measure this outcome that were below 60% (not met).

Spring 2019: Data not analyzed

Fall 2019: Data not analyzed

5. Associated Benchmarks:

	Average Score (out of 100%) of Each Student
Outcome Met	**60% or higher**
Outcome Not Met	**below 60%**

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): The assessment results for MAT 160/BUS 232 in the Fall 2018 semester were the only results analyzed and they were very good. Out of seven measured outcomes, there were only three outcomes (listed below) that showed any criteria at all listed as, "outcome not met." However, for each of these outcomes, the percent of criteria that were in the "outcome not met" category were 18%, 16%, and 17%, respectively. Therefore, these outcomes could not be categorized as "outcome not met." The students' averages for every other course outcome indicated "outcome met."

IV. UPDATE ON ANY PREVIOUS ACTIONS: The rubrics used for the MAT 160/BUS 232 projects during the Fall 2018 semester did not match one another. Subsequently, a change was made to standardize the rubrics for ease of analysis.

V. FUTURE ACTIONS: The MAT 160/BUS 232 assessment data from the Spring 2019 and Fall 2019 semesters still needs to be compiled and analyzed. This should be easier to do since a common rubric was utilized after Fall 2018.

Outcome Assessment 5:

1. Program Outcome/Measure: Critical thinking general education outcome and communication general education outcome

2. Course(s) Assessment Gathered: MAT 160/BUS 232 (Statistics)

3. Method of Assessment: Common final project

3. Semester Information Gathered: Fall 2018, Spring 2019, Fall 2019, and Spring 2020
(Note: not all common final exam data gathered for Spring 2020 due to COVID 19)

4. Results of Assessment:

Fall 2018: The average score on the statistics project was 80% and 92% of the students met the benchmark for success in critical thinking.

Spring 2019: The average score on the statistics project was 79% and 88% of the students met the benchmark for success in critical thinking.

Fall 2019: The average score on the statistics project was 75% and 84% of the students met the benchmark for success in critical thinking.

5. Associated Benchmarks: 60% or better grade on the statistics project is successful.

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): It is obvious that the large majority of students (at least 84%) taking the final statistics project in MAT 160/BUS 232 are easily meeting the benchmark for success in critical thinking and the average score on the project is at least 75% or higher in the various semesters.

IV. UPDATE ON ANY PREVIOUS ACTIONS: None

V. FUTURE ACTIONS: None

Outcome Assessment 6:

1. **Program Outcome/Measure:** Standardized grading practices throughout department
2. **Course(s) Assessment Gathered:** MAT 097
3. **Method of Assessment:** Common final exam
3. **Semester Information Gathered:** Fall 2018
4. **Results of Assessment:**

Instructor	Average of Final Exam %	Average of Course %	Average of 0-1-2 %
Instructor 1	76.2	83.3	56.7
Instructor 2	70.0	75.3	53.5
Instructor 3	70.9	73.6	58.2
Instructor 4	54.0	68.9	45.9
Instructor 5	55.3	58.8	42.8
Instructor 6	71.4	76.9	28.8
Instructor 7	68.8	78.7	45.9
Grand Total	67.8	75.9	46.5
Standard Deviation	8.537	7.935	10.085

Figure 1: The standard deviation amongst seven instructors' averages on the final exams was 8.537%. The standard deviation amongst seven instructors' averages on the course grades was 7.935%. The standard deviation amongst seven department members averages for 0-1-2 grading was 10.085%.

It may be interesting to note that the highest standard deviation is for the 0-1-2 grading. It is good that the smallest standard deviation is for the course grade %.

NAMES	Average Final Exam % - Average 0-1-2 %
Instructor 1	19.5
Instructor 2	16.5
Instructor 3	12.6
Instructor 4	8.1
Instructor 5	12.5
Instructor 6	42.6
Instructor 7	22.9
Difference Across All Sections (%)	21.3
Standard Deviation	11.396

Figure 2: The standard deviation amongst seven differences between the Average Final Exam % and the Average 0-1-2 % was 11.396%.

Instructor	Average Course Grade % - Average 0-1-2 %
Instructor 1	26.7
Instructor 2	21.9
Instructor 3	15.3
Instructor 4	23.0
Instructor 5	16.0
Instructor 6	48.1
Instructor 7	32.8
Difference Across All Sections (%)	29.4
Standard Deviation	11.371

Figure 3: The standard deviation amongst seven differences between the Average Course Grade % and the Average 0-1-2 % was 11.371%.

Overall, the standard deviations of the differences noted were higher than the standard deviations of each item alone.

Problems Noticed While Grading Common Final Exams (Discussion from Math Meeting)

1. Sometimes a point is given even if there is just a number written down that has nothing to do with solving the problem. Also, sometimes only half of the points are taken away even if the work that is being shown does not lead to a solution of the problem.
2. Units not always required for full credit in MAT 088.
3. Work not always required to be shown in MAT 088.
4. Sometimes not sure what instructor or section it was. Maybe put some things on the top of the exam for the instructor to put in their name and class and section number.
5. Instructor rearranged questions or we made a mistake on the numbering.
6. Some finals are photocopied and some are original.

7. Numbering with a, b, c, could be a concern sometimes.
8. For MAT 097 we might want to have two parts of the exam (one part with a calculator and one part without a calculator).
9. Sometimes the handwriting is poor (can't read the names) or the last name wasn't there.

5. Associated Benchmarks: Similar differences across sections between the average final exam grade as graded by the instructor minus the average 0-1-2 grade as graded by the department. Similar differences across sections between the average course grade as assigned by the instructor minus the average 0-1-2 grade as graded by the department.

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): Overall the consistency in grading final exams and assigning final grades is good.

IV. UPDATE ON ANY PREVIOUS ACTIONS: Discussed consistency in grading at a few math department meetings.

V. FUTURE ACTIONS: Examine 0-1-2 grading for instructor 6. Take note of the problems noticed above.

Outcome Assessment 7:

1. Program Outcome/Measure: Critical thinking general education outcome

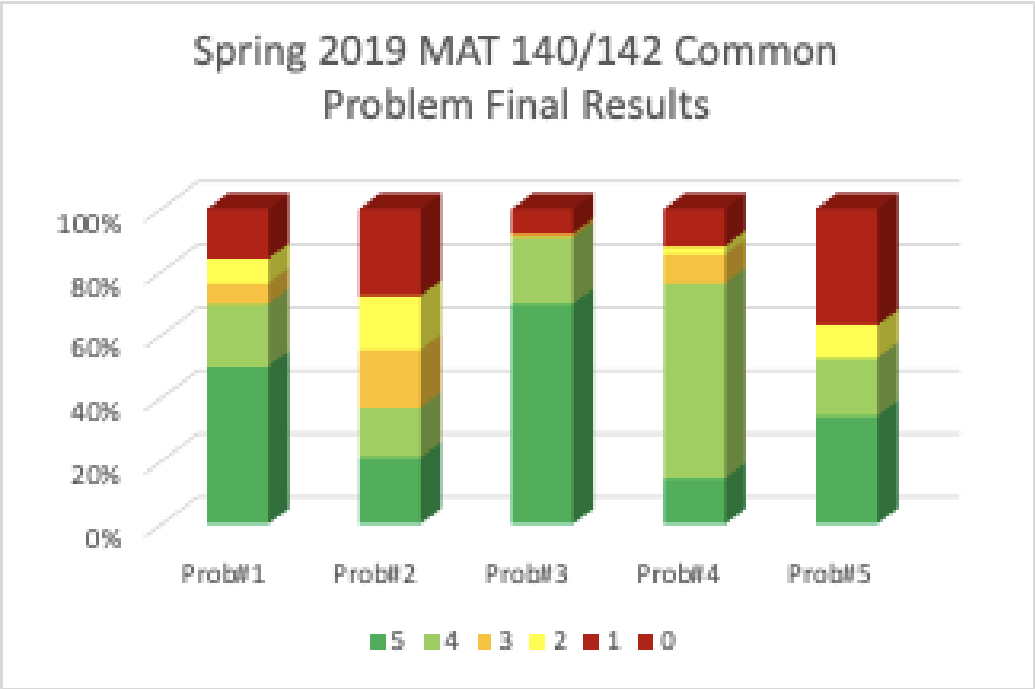
2. Course(s) Assessment Gathered: MAT 142 and MAT 140

3. Method of Assessment: Common final exam questions

3. Semester Information Gathered: Spring 2019

4. Results of Assessment: see below

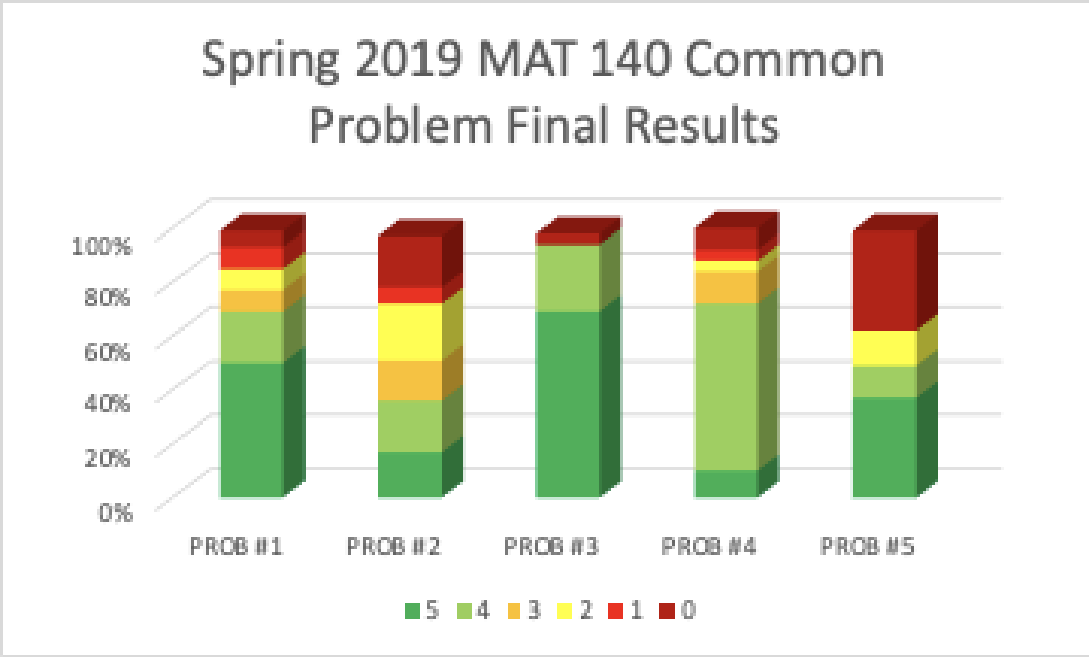
Spring 2019 Results of MAT 140/142 Common Final Rubric



MAT 140/142 Common Final Question Spring 2019 Results

	% of Students Obtaining Score							
	5	4	3	2	1	0	Student N =	Section N =
PROB #1	49%	19%	6%	8%	5%	10%	77	5 of 11
PROB #2	21%	16%	18%	17%	5%	22%	77	5 of 11
PROB #3	69%	21%	1%	0%	3%	5%	77	5 of 11
PROB #4	14%	61%	9%	3%	4%	8%	77	5 of 11
PROB #5	34%	18%	0%	10%	0%	36%	77	5 of 11

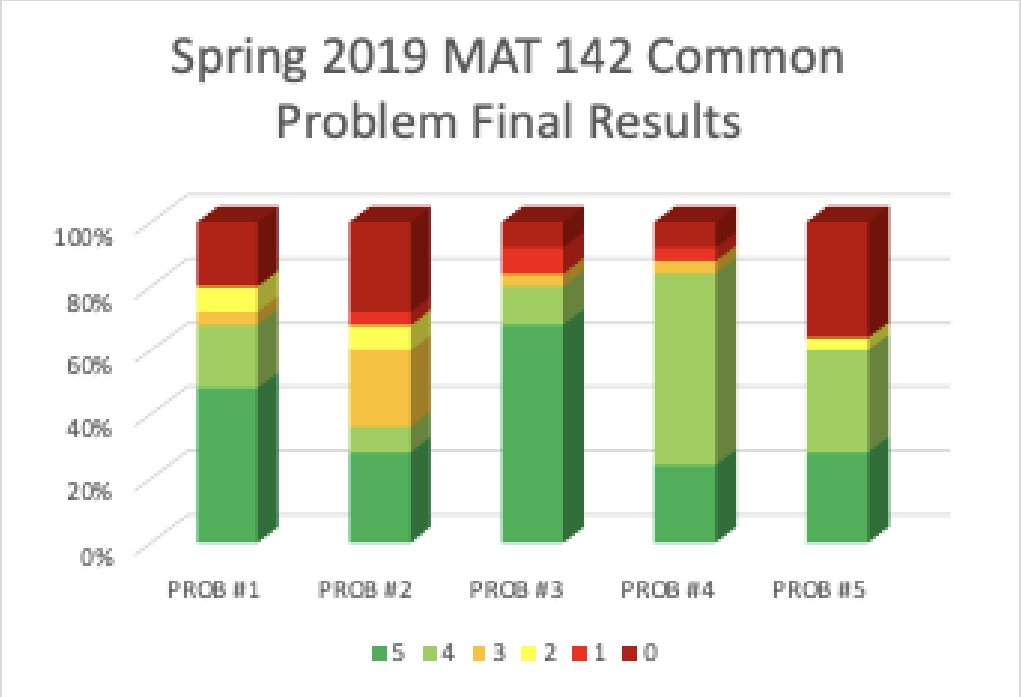
Spring 2019 Results of MAT 140 ONLY Common Final Rubric



MAT 140 Common Final Question Spring 2019 Results

	% of Students Obtaining Score							
	5	4	3	2	1	0	Student N =	Section N =
PROB #1	50%	19%	8%	8%	8%	6%	52	4 of 9
PROB #2	17%	19%	15%	21%	6%	19%	52	4 of 9
PROB #3	69%	25%	0%	0%	0%	4%	52	4 of 9
PROB #4	10%	62%	12%	4%	4%	8%	52	4 of 9
PROB #5	37%	12%	0%	13%	0%	37%	52	4 of 9

Spring 2019 Results of MAT 142 ONLY Common Final Rubric



MAT 142 Common Final Question Spring 2019 Results

	% of Students Obtaining Score							
	5	4	3	2	1	0	Student N =	Section N =
PROB #1	48%	20%	4%	8%	0%	20%	25	1 of 2
PROB #2	28%	8%	24%	8%	4%	28%	25	1 of 2
PROB #3	68%	12%	4%	0%	8%	8%	25	1 of 2
PROB #4	24%	60%	4%	0%	4%	8%	25	1 of 2
PROB #5	28%	32%	0%	4%	0%	36%	25	1 of 2

5. Associated Benchmarks: This data was meant to help with general education reporting. The department doesn't have a specific benchmark for it. However, receiving a 5 or a 4 on a given problem is good.

III. ANALYSIS (Examine the results for evidence of learning, trends, and whether the results inform quality improvement efforts): Overall the results for critical thinking from the MAT 140/142 common final exam questions was good. The percents of students who received a 4 or a 5 on a given problem are shown here:

MAT 140/142 Together:	MAT 140 Only:	MAT 142 Only:
Problem 1: 68%	69%	68%
Problem 2: 37%	36%	36%
Problem 3: 90%	94%	80%
Problem 4: 75%	72%	84%
Problem 5: 52%	49%	60%

IV. UPDATE ON ANY PREVIOUS ACTIONS: None

V. FUTURE ACTIONS: Cannot use data to report on individual performance indicators since the data was aggregated beyond this use, but we can say how we did on critical thinking. Most of the percentages shown above are good, but there is some fluctuation between MAT 140 Only and MAT 142 Only. Also, problem 2 needs to be analyzed for any future use because it is out of accordance with the results of other problems. Ignoring problem 2, we see that students in MAT 140 only performed better on problem 3, while students in MAT 142 only performed better on problems 4 and 5. We should look at the problems to see if there are reasons we can see why this might have happened.

Other Data Gathered by Department during Past Two Years:

Success in Developmental Math by Course Length: 2014 through 2019

SUBJECT	COURSE	WEEKS	ACADEMIC YEAR	PCT OVERALL SUCCEED	PCT TRANSCRIPTED SUCCEED
MAT	088	5	2016-2017	100%	100%
MAT	088	5	2017-2018	67%	67%
MAT	088	8	2016-2017	82%	87%
MAT	088	8	2017-2018	90%	95%
MAT	088	8	2018-2019	79%	79%
MAT	088	12	2018-2019	52%	52%
MAT	088	16	2016-2017	61%	67%
MAT	088	16	2017-2018	68%	71%
MAT	088	16	2018-2019	46%	46%

SUBJECT	COURSE	WEEKS	ACADEMIC YEAR	PCT OVERALL SUCCEED	PCT TRANSCRIPTED SUCCEED
MAT	091	5	2014-2015	66%	66%
MAT	091	5	2015-2016	79%	79%
MAT	091	5	2016-2017	84%	84%
MAT	091	5	2017-2018	82%	82%
MAT	091	5	2018-2019	71%	71%
MAT	091	8	2014-2015	86%	91%
MAT	091	8	2015-2016	71%	74%
MAT	091	8	2016-2017	71%	76%
MAT	091	8	2017-2018	69%	73%
MAT	091	8	2018-2019	74%	74%
MAT	091	16	2014-2015	61%	65%
MAT	091	16	2015-2016	65%	70%
MAT	091	16	2016-2017	59%	65%
MAT	091	16	2017-2018	66%	70%
MAT	091	16	2018-2019	48%	48%

SUBJECT	COURSE	WEEKS	ACADEMIC YEAR	PCT OVERALL SUCCEED	PCT TRANSCRIPTED SUCCEED
MAT	097	5	2018-2019	36%	36%
MAT	097	8	2018-2019	43%	43%
MAT	097	10	2016-2017	33%	33%
MAT	097	10	2017-2018	52%	52%
MAT	097	10	2018-2019	62%	62%
MAT	097	12	2018-2019	38%	38%
MAT	097	16	2016-2017	59%	65%
MAT	097	16	2017-2018	40%	49%
MAT	097	16	2018-2019	38%	38%

Percent Successful of All Developmental by Length of Term

weeks	Beginning Enrolled	# EarlyDrop	# DFW	# Successful	% Successful
5	211		61	150	71.1%
2014-2015	74		26	48	64.9%
2015-2016	64		16	48	75.0%
2016-2017	28		3	25	89.3%
2017-2018	17		4	13	76.5%
2018-2019	28		12	16	57.1%
8	1017	30	244	741	72.9%
2014-2015	159	6	25	128	80.5%
2015-2016	289	11	60	218	75.4%
2016-2017	137	7	35	95	69.3%
2017-2018	123	6	20	97	78.9%
2018-2019	309		104	203	65.7%
10	56		30	27	48.2%
2016-2017	18		13	6	33.3%
2017-2018	25		12	13	52.0%
2018-2019	13		5	8	61.5%
12	33		17	16	48.5%
2018-2019	33		17	16	48.5%
16	3972	283	1370	2322	58.5%
2014-2015	1041	67	298	676	64.9%
2015-2016	869	68	272	530	61.0%
2016-2017	840	73	275	494	58.8%
2017-2018	728	75	242	411	56.5%
2018-2019	494		283	211	42.7%
Grand Total	5289	313	1722	3256	61.6%

Comparison between Four-Day-A-Week Courses and Two-Day-A-Week Courses:

Success rates for MAT classes meeting Monday through Thursday Fall 2018

PART OF TERM	SUBJECT	COURSE	% OVERALL SUCCEED	% TRANSCRIPTED SUCCEED
8A1-Fall/Spring 1st 8 Weeks	MAT	088	92%	92%
12-Fall/Spring 12 Week Term	MAT	088	52%	52%
8A1-Fall/Spring 1st 8 Weeks	MAT	088	83%	83%
8A1-Fall/Spring 1st 8 Weeks	MAT	091	93%	93%
8A1-Fall/Spring 1st 8 Weeks	MAT	091	82%	82%
8B2-Fall/Spring 2nd 8 Weeks	MAT	091	75%	75%
8B2-Fall/Spring 2nd 8 Weeks	MAT	091	68%	68%
8B2-Fall/Spring 2nd 8 Weeks	MAT	097	32%	32%
8B2-Fall/Spring 2nd 8 Weeks	MAT	097	50%	50%
16-Fall/Spring 16 Week Term	MAT	151	47%	47%
16-Fall/Spring 16 Week Term	MAT	187	31%	31%

Success rates for NOT 4-Day/Week MAT classes Fall 2018

PTRM	SUBJECT	COURSE	% OVERALL SUCCEED	% TRANSCRIPTED SUCCEED
16-Fall/Spring 16 Week Term	MAT	088	50%	50%
16-Fall/Spring 16 Week Term	MAT	088	100%	100%
16-Fall/Spring 16 Week Term	MAT	091	73%	73%
16-Fall/Spring 16 Week Term	MAT	091	41%	41%
16-Fall/Spring 16 Week Term	MAT	091	45%	45%
16-Fall/Spring 16 Week Term	MAT	091	69%	69%
16-Fall/Spring 16 Week Term	MAT	097	46%	46%
16-Fall/Spring 16 Week Term	MAT	097	56%	56%
16-Fall/Spring 16 Week Term	MAT	097	54%	54%
16-Fall/Spring 16 Week Term	MAT	097	70%	70%
16-Fall/Spring 16 Week Term	MAT	097	34%	34%
12-Fall/Spring 12 Week Term	MAT	097	38%	38%
16-Fall/Spring 16 Week Term	MAT	151	36%	36%
16-Fall/Spring 16 Week Term	MAT	187	58%	58%
16-Fall/Spring 16 Week Term	MAT	187	60%	60%
16-Fall/Spring 16 Week Term	MAT	187	43%	43%
16-Fall/Spring 16 Week Term	MAT	187	100%	100%

Compare Success in MAT 091 - Before and After Fall 2017

Group	TERM	COURSE	Beginning Enrollment	Early Drops	Grade of DFW	SUCCEED	
GROUP 1	201580	091	214	20	47	147	
GROUP 1	201610	091	175	8	59	108	
GROUP 1	201680	091	223	15	55	154	
GROUP 1	201710	091	174	18	66	90	pct succeed:
		TOTALS	786	61	227	499	63.5%

Group	TERM	COURSE	Beginning Enrollment	Early Drops	Grade of DFW	SUCCEED	
GROUP 2	201780	091	261	15	70	176	
GROUP 2	201810	091	176	11	52	113	
GROUP 2	201880	091	249	0	85	164	
GROUP 2	201910	091	122	0	72	50	pct succeed:
		TOTALS	808	26	279	503	62.3%

Changes to Assessment due to the Coronavirus Pandemic

The coronavirus pandemic caused the math department to make many changes to its assessment practices. The math department had been using common final exams to assess developmental course outcomes and final exam questions to assess college level course outcomes for several years. It was decided in Spring 2020 to suspend these practices for various reasons. One reason for this was that the data would not have been consistent due to instructors using various methods to curb violations of academic integrity. Also, the department was ready to begin developing new methods of collecting assessment data other than using final exams. Therefore, the department decided to take the 2020-2021 academic year to finish analyzing the assessment data shown in this report and to begin with a fresh start for assessment practices in math. The new process will include setting goals for the following year's assessment in the spring of the previous year; asking questions that the department would like to be answered, while still following up on previous assessments; developing new tools for assessing course outcomes, department performance indicators, and general education outcomes as needed; collecting and analyzing data; making decisions or changes based on the data; and following the five-year plan shown below for assessing department performance indicators. For the 2021-2022 academic year, the following goals were stated in spring 2021:

- Work on improving course outcome attainment in MAT 091. Possibly promote active learning in MAT 091 through Impact grant or other means. This goal was decided by analyzing the course outcome data shown above in this report. In past years, much focus was given to helping students achieve MAT 097 course outcomes. However, several semesters of MAT 097 final exam data showed that most of the MAT 097 course outcomes were being met by the students. However, the MAT 091 course outcomes seemed to be lacking in overall attainment by the students. Therefore, it seems that from the data the department should now shift focus to MAT 091.
- Begin following the five-year assessment plan shown below.
- Regrade on the 0-1-2 scale a set of common final exams from instructor six in MAT 097 from the fall 2018 semester. This instructor's 0-1-2 grades versus final exam grades were anomalous as compared to other instructors.
- Re-analyze the common final exams from MAT 097 according to the new spreadsheet that was created in spring 2021. This data had previously been recorded on a different spreadsheet and hence the data doesn't compare well to that of later semesters.
- Find and process the MAT 091 and MAT 097 final exams for Fall 2018. The delay for this was due to the coronavirus pandemic.

- Process the MAT 160/BUS 232 assessment data from the Spring 2019 and Fall 2019 semesters.

Five-Year Math Department Assessment Plan

Performance Indicators	AY 21-22	AY 22-23	AY 23-24	AY 23-24	AY 24-25
Apply mathematics in context using appropriate problem solving skills.	CD	E	IC	CD	E
Choose and manipulate formulas.		CD	E	IC	CD
Create and interpret graphical representation.			CD	E	IC
Perform operations on mathematical structures, which may include real, complex, matrix, function space.				CD	E
Demonstrate an understanding of geometric concepts.					CD
Apply and interpret limits and limit definitions.	CD	E	IC	CD	E
Gain appreciation of the nature and uses of mathematics.		CD	E	IC	CD
Communicate using the language of mathematics			CD	E	IC

KEY

CD = Assess (Collect Data)

E = Evaluate (Review Data)

IC = Changes (Implement Changes)

See Jennifer Jameson for relevant data and statistics.

END of Year Four of the Program Review Cycle