Academic Bi-Annual Review Form – Mathematics (MAT)

Years Two and Four of the Program Review Cycle

The Coconino Community College bi-annual 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 bi-annual review.

Prior to completing the Bi-Annual 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 Bi-Annual 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 bi-annual 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 Bi-annual 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 Bi-annual 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 Bi-annual 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 Bi-annual 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 Bi-annual 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 Bi-annual 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 Bi-annual Review Reporting)
Last reviewed date: September 2017

Action Item #: 8 – Adequate tools such as tablet pens, dual monitors, etc in FT faculty offices
Anticipated date for completion: ongoing

List potential benefits to student success: Having adequate materials allow math faculty to create videos for their classes, and grading of materials.
Status Update (Only Update during Bi-annual 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.
Last reviewed date: Fall 2018

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.
Status Update (Only Update during Bi-annual Review Reporting) The college is using Zoom for this type of meeting.
Last reviewed date: Fall 2018

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 Bi-annual Review Reporting) The math department wants to think about bringing this class back as needed in the future.
Last reviewed date: September 2017

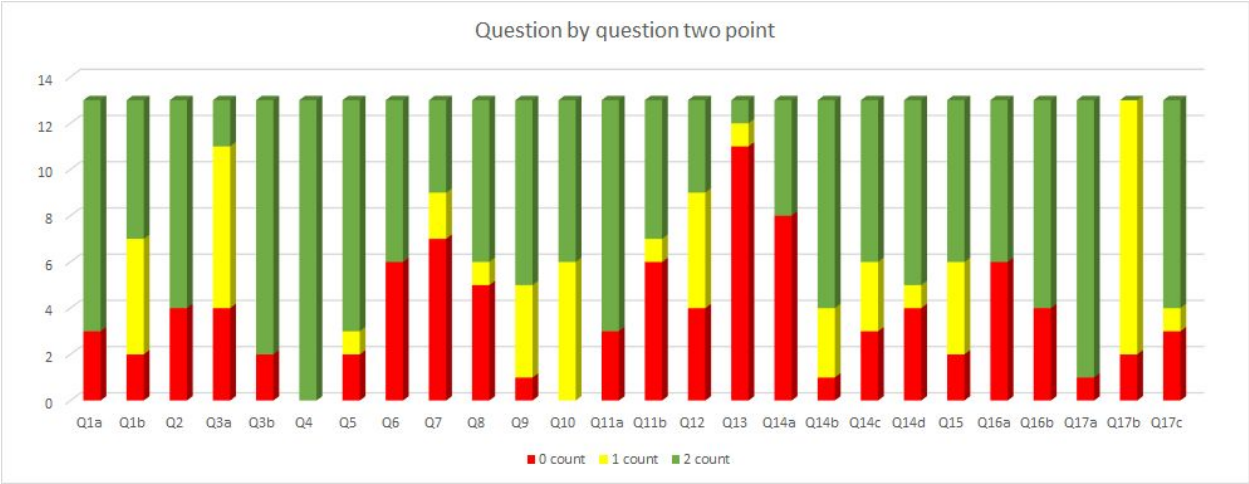
II. ASSESSMENT OF STUDENT LEARNING

PROGRAM OUTCOME/MEASURE	COURSE(S) ASSESSMENT GATHERED	METHOD OF ASSESSMENT
1. Course outcomes from MAT 088, 091, 097 2. Critical thinking general education outcome and communication general education outcome 3. Communication general education outcome 4. The math department has provided grading requirement documents to all instructors which mandate all classes have a final exam and mandate grading structure.	1.MAT 088, 091, 097 (Developmental Math Courses) 2. MAT 160/BUS 232 (Statistics) 3. MAT 220 (Calculus I), 2 sections 4. All math courses 5. Spring 2017: MAT 140, 142, 151, 187, 220 Fall 2017: MAT 140, 142, 187, 220, 230 Spring 2018: MAT 088, 140, 142, 187, 220 6. Fall 2017: MAT 140, 142, 187, 220, 230	1.Common final exams 2.Common project (**shown below) 3.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.Following up with instructors and checking syllabi

5. Critical thinking general education outcome 6. Critical thinking general education outcome by teaching modality (in-person versus on-line)		5. Common final exam questions given on final exams across sections 6. Common final exam questions given on final exams across sections
SEMESTER INFORMATION GATHERED	**RESULTS OF ASSESSMENT**	**ASSOCIATED BENCHMARKS**
1. Spring 2018, Fall 2018, Spring 2019 2. Fall 2017 and Spring 2018 for critical thinking and Fall 2018 and Spring 2019 for communication 3. Spring 2019 4. Future semesters 5. Spring 2017, Fall 2017, Spring 2018 6. Fall 2017	1.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. 2. 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	1.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. 2.60% or better on the statistics project is successful. 3.75% or better on the question is successful. 4. Instructors comply with grading requirements. 5. 60% or better on the five common final exam questions is successful. 6. 60% or better on the five common final exam questions is successful.

	compiled at a later date for the communication general education outcome. 3. MAT 220 test question results: In Spring 2019, 66% of the students met the benchmark for success in communication. 4. Unknown at this time 5. 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. 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.	

*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

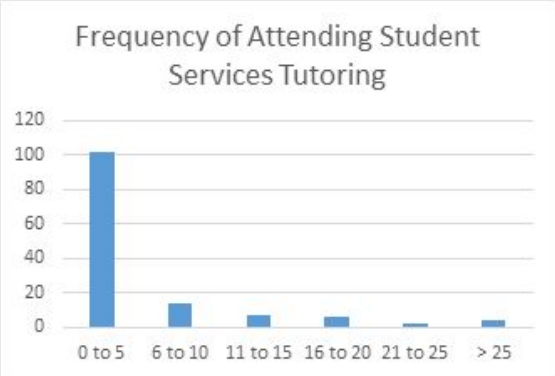
Satisfaction rating of ***SS***	Very unsatisfied	Unsatisfied	Neutral	Satisfied	Very satisfied
	1	11	73	30	16

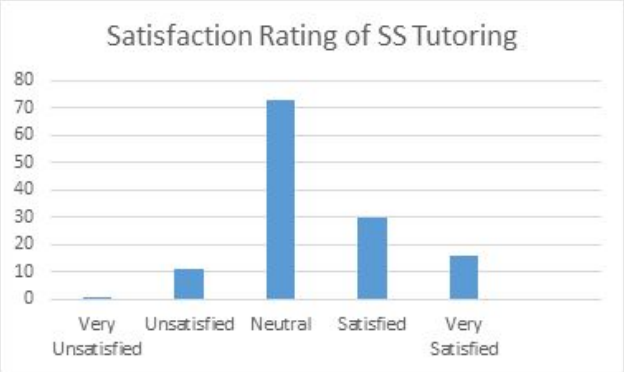
SS **tutors knowledgeable?**	**Never**	**Rarely**	**Sometimes**	**Mostly**	**Always**
	4	**5**	**28**	**47**	**21**

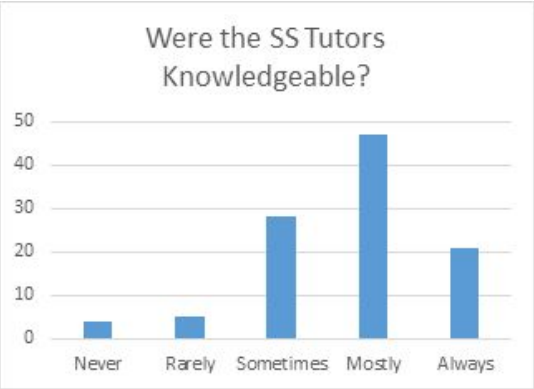
Why did you not utilize *SS*?	**Didn't know**	**Didn't fit schedule**	**Didn't think useful**	**Other**
	7	**58**	**11**	**See below**

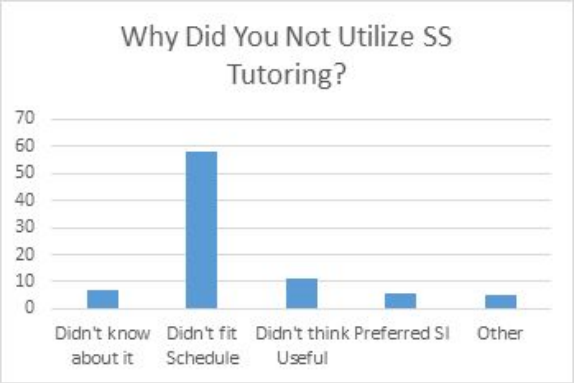
Students' "Other" reasons for not utilizing SS include:

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**

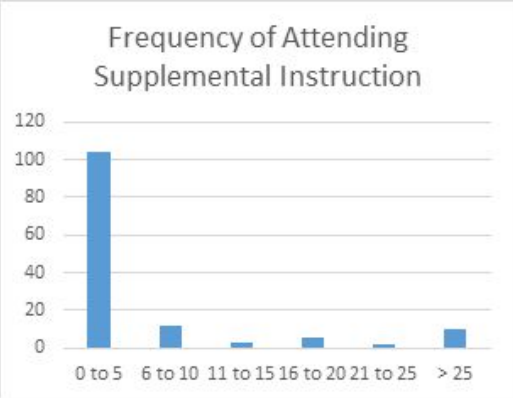
Satisfaction rating of *SI*	**Very unsatisfied**	**Unsatisfied**	**Neutral**	**Satisfied**	**Very satisfied**
	0	**1**	**64**	**30**	**29**

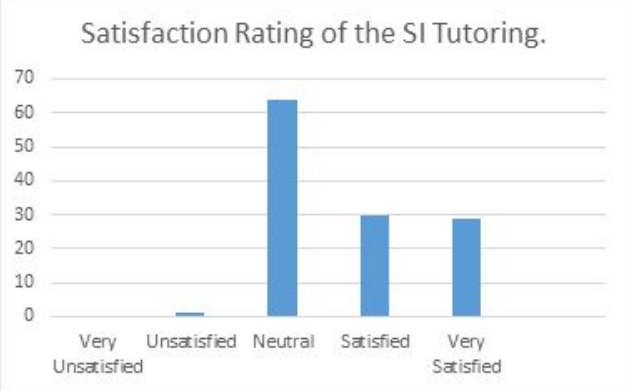
***SI* tutors knowledgeable?**	**Never**	**Rarely**	**Sometimes**	**Mostly**	**Always**
	3	**0**	**35**	**2**	**64**

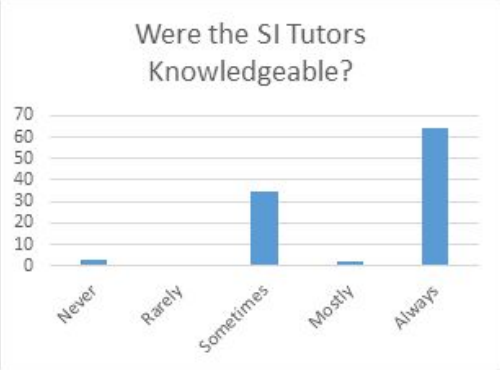
Why did you not utilize *SI*?	**Didn't know**	**Didn't fit schedule**	**Didn't think useful**	**Other**
	12	**72**	**8**	**See below**

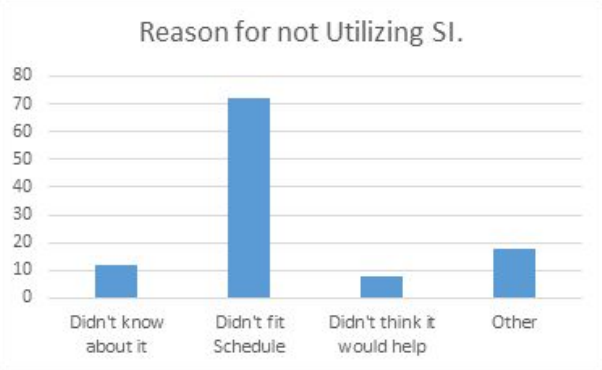
Students' "Other" reasons for not utilizing SI include:

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 grid 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 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 measure can be analyzed.