Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Mathematics	094	MTH 094 07/12/2019-Pathways to Math Literacy
Division	Department	Faculty Preparer
Math, Science and Engineering Tech	Math & Engineering Studies	Leslie Gilbert
Date of Last Filed Assessment Report		

I. Review previous assessment reports submitted for this course and provide the following information.

1. Was this course previously assessed and if so, when?

   No

2. Briefly describe the results of previous assessment report(s).

   3.

4. Briefly describe the Action Plan/Intended Changes from the previous report(s), when and how changes were implemented.

   5.

II. Assessment Results per Student Learning Outcome

Outcome 1: Analyze numbers and patterns in numbers including estimation, addition, subtraction, multiplication, division, exponents, and percentages in applied context.

- Assessment Plan
  - Assessment Tool: Final Exam
  - Assessment Date: Winter 2019
  - Course section(s)/other population: At least 2/3 of the sections - randomly selected
  - Number students to be assessed: All students
  - How the assessment will be scored: Departmentally-developed rubric

- Standard of success to be used for this assessment: 75% of the students will earn 75% of the points or higher on each question
- Who will score and analyze the data: Math faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2019	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
169	58

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

At the end of the Winter 2019 semester, the course mentor received a total of 130 final exams. Hand-grading 130 exams would be an overly cumbersome task to get a reasonably accurate picture of the success rate of all MTH094 students, particularly given the long-form questions for this course. In consultation with a member of the math faculty well versed in statistics it was determined that for this group size approximately 30% to 40% of the tests should be blind-graded in order to get a reasonably accurate view of the success rate of this population at the 95% confidence value. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All final exams received (130 in total) were given a unique number. Each course section was counted. Using a random number generator, approximately 45% of each section was randomly selected. The 58 resulting tests matching the random numbers were then blind graded by the course mentor. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

A common final exam was used to assess all outcomes. Question 1 was used to assess outcome #1. This question was scored using the Mathematics Department rubric (attached).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
47 of the 58 randomly selected students (approximately 81%) achieved an average score of 75% or better on outcome #1. This exceeds the proposed standard of 75% of students scoring 70% or higher. In order to meet this standard students had to correctly complete an application problem involving multiple steps. In assessing this outcome the majority of students showed their ability to use addition, multiplication, and division in an applied context. Although 81% of students met the standard for success which exceeds the standard for this outcome, an improvement could be made. Several students missed a detail of the question that a beverage was consumed twice a day, rather than once. More emphasis on this detail of the question would help clarify how many students demonstrate mastery of the topic.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

Students showed strong ability to navigate a problem that required multiple different operations and decision-making about when each operation was needed.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Although 81% of students met the standard for success which exceeds the standard for this outcome, an improvement could be made. Several students missed a detail of the question that a beverage was consumed twice a day, rather than once. More emphasis on this detail of the question would help clarify how many students demonstrate mastery of the topic.

Outcome 2: Analyze relationships between numbers, and develop building blocks for functions, as well as basic probability; develop the idea of a variable in applied context.

- Assessment Plan
    - Assessment Tool: Final Exam
    - Assessment Date: Winter 2019

- Course section(s)/other population: At least 2/3 of the sections - randomly selected
- Number students to be assessed: All students
- How the assessment will be scored: Departmentally-developed rubric
- Standard of success to be used for this assessment: 75% of the students will earn 75% of the points or higher on each question
- Who will score and analyze the data: Math faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2019	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
169	58

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

At the end of the Winter 2019 semester, the course mentor received a total of 130 final exams. Hand-grading 130 exams would be an overly cumbersome task to get a reasonably accurate picture of the success rate of all MTH094 students, particularly given the long-form questions for this course. In consultation with a member of the math faculty well versed in statistics it was determined that for this group size approximately 30% to 40% of the tests should be blind-graded in order to get a reasonably accurate view of the success rate of this population at the 95% confidence value. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All final exams received (130 in total) were given a unique number. Each course section was counted. Using a random number generator, approximately 45% of each section was randomly selected. The 58 resulting tests matching the random numbers were then blind-graded by the course mentor. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

A common final exam was used to assess all outcomes. Questions 2 and 3 were used to assess outcome #2. These questions were scored using the Mathematics Department rubric (attached).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
44 of the 58 randomly selected students (approximately 76%) achieved an average score of 70% or better on outcome #2. This exceeds the standard of 75% of students scoring 75% or higher. This outcome involves two quite different topics: probability and variables/formulas. This organization stems from the book organization, not a logical grouping of learning outcomes. I propose re-organizing the master syllabus to group probability and statistics topics together in one outcome. The outcome was assessed with one question on probability (Q2- where students scored an average of 69%) and one question on formula use (Q3 - where students scored an average of 89%).

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

Students are showing strong understanding (89% success) of the meaning of a variable and how to use formulas to answer questions.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Though the success standard was exceeded overall, students are struggling to answer questions relating to probability (69% success). That information indicates that the probability study in the course should be improved. We currently spend approximately 1-2 course hours on this topic. I will propose changes to this time frame and focus in the action plan at the end of this report.

Outcome 3: Apply the concepts involved in linear relationships including slope as a rate of change, and solving problems with linear equations and systems in applied context.

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    - Standard of success to be used for this assessment: 75% of the students will earn 75% of the points or higher on each question
    - Who will score and analyze the data: Math faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
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2. Provide assessment sample size data in the table below.

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3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

At the end of the Winter 2019 semester, the course mentor received a total of 130 final exams. Hand-grading 130 exams would be an overly cumbersome task to get a reasonably accurate picture of the success rate of all MTH094 students, particularly given the long-form questions for this course. In consultation with a member of the math faculty well versed in statistics it was determined that for this group size approximately 30% to 40% of the tests should be blind-graded in order to get a reasonably accurate view of the success rate of this population at the 95% confidence value. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All final exams received (130 in total) were given a unique number. Each course section was counted. Using a random number generator, approximately 45% of

each section was randomly selected. The 58 resulting tests matching the random numbers were then blind-graded by the course mentor. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

A common final exam was used to assess all outcomes. Questions 4, 5, and 6 were used to assess outcome #3. These questions were scored using the Mathematics Department rubric (attached).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes

49 of the 58 randomly selected students (approximately 84%) achieved an average score of 75% or better on outcome #3. This exceeds the proposed standard of 75% of students scoring 75% or higher. In order to meet this standard students had to demonstrate understanding linear relationships, including the concepts of slope and y-intercepts and how to write and use linear equations in applied contexts.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

Students demonstrated a strong understanding of the meaning of slope and y-intercepts, linear numerical patterns in data tables, and graphing lines. Students successfully wrote linear equations to represent real-world situations.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Students demonstrated difficulty in how to algebraically solve a system of equations, but were able to solve from a table and interpret the results. I plan to revisit the master syllabus as well as the courses requiring MTH 094 to determine the need for this topic in the course. If it is necessary to keep, the topic should get more time and support materials. If this topic is not needed, I will eliminate it from the master syllabus.

Outcome 4: Apply the concepts of nonlinear relationships including normally distributed data, the Pythagorean Theorem and the distance formula. Develop other nonlinear relationships including quadratic in applied context.

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    - Standard of success to be used for this assessment: 75% of the students will earn 75% of the points or higher on each question
    - Who will score and analyze the data: Math faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

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3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

At the end of the Winter 2019 semester, the course mentor received a total of 130 final exams. Hand-grading 130 exams would be an overly cumbersome task to get a reasonably accurate picture of the success rate of all MTH094 students, particularly given the long-form questions for this course. In consultation with a member of the math faculty well versed in statistics it was determined that for this group size approximately 30% to 40% of the tests should be blind-graded in order to get a reasonably accurate view of the success rate of this population at the 95% confidence value. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All final exams received (130 in total) were given a unique number. Each course section was counted. Using a random number generator, approximately 45% of

each section was randomly selected. The 58 resulting tests matching the random numbers were then blind-graded by the course mentor. Changes will be made to the master syllabus to indicate the change in sampling required for assessment.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

A common final exam was used to assess all outcomes. Questions 7, 8, 9, and 10 were used to assess outcome #4. These questions were scored using the Mathematics Department rubric (attached).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: No

29 of the 58 randomly selected students (approximately 50%) achieved an average score of 75% or better on outcome #4. These students were able to correctly label and use the empirical rule for the normal distribution (Q7), solve an applied problem using the Pythagorean Theorem (Q8), analyze a quadratic graph (Q9), and use the quadratic formula and the vertex formula to answer questions in an applied context (Q10).

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

Students performed very well on question 9 (Q9), with 90% successfully analyzing a quadratic graph, interpreting the meaning of intercepts and using the maximum value to answer questions.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Students struggled to work with the empirical rule in Q7, with 61% average success on the problem. Much like the probability topic, this subject needs more time and focus in the course and should be organized in the master syllabus as an outcome aligned with other statistics topics. I will propose changes to this time-frame and focus in the action plan at the end of this report.

Students struggled to use the Pythagorean theorem to solve a problem in Q8, with 63% average success on the problem. In an effort to make the course less "crammed" and allow space for topics that prepare students for MTH 125 and MTH 160, I plan to revisit the master syllabus as well as the courses requiring MTH 094 to determine the need for this topic in the course. If it is necessary to

keep, the topic should get more time and support materials. If this topic is not needed, I will eliminate it from the master syllabus.

Students struggled to correctly use the quadratic and vertex formulas in Q10, with 53% average success on the problem. This subject needs more time and focus in the course, as well as more support for students using complex formulas and correctly using their calculators. I will propose changes to this time-frame and focus in the action plan at the end of this report.

III. Course Summary and Intended Changes Based on Assessment Results

1. Based on the previous report's Intended Change(s) identified in Section I above, please discuss how effective the changes were in improving student learning.

Not applicable because this is the first course assessment.

2. Describe your overall impression of how this course is meeting the needs of students. Did the assessment process bring to light anything about student achievement of learning outcomes that surprised you?

MTH 094 is not preparing students well to advance to MTH 125 and MTH 160. The course is successfully meeting many of the goals in the master syllabus, but the master syllabus needs changes in focus and topics. This course should prepare students for MTH 125 and MTH 160. However, the required teaching of Excel and the half semester focus on linear, quadratic, and exponential functions makes it difficult to give students a solid foundation for the probability and statistics aspects of MTH 125 and MTH 160 and the set theory aspects of MTH 125. The master syllabus appears to be modeled after the first edition of the selected book, not the goals for the course.

3. Describe when and how this information, including the action plan, was or will be shared with Departmental Faculty.

MTH 094 has already been discussed at the math department meeting in April 2019. The department agreed to a pilot to change the structure of the course in Fall 2019 to topics and focus more fitting the needs of students headed to MTH 125 and MTH 160. The assessment results and action plan for the master syllabus and plan for the pilot will be shared by the course mentor with both full-time and part-time faculty during Fall 2019 in-service meetings.

4. Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date

Outcome Language	The outcomes will be changed to eliminate topics that will not prepare students for MTH 125 and MTH 160 or other courses requiring MTH 094. In addition, outcomes will be grouped together by mathematical content, not location in text. Outcomes will be grouped together by mathematical content, not location in text. For example, topics relating to probability and statistics will be grouped together in a single outcome, rather than scattered through the various outcomes.	The master syllabus appears to be modeled after the first edition of the selected book, not the goals for the course. This adds topics that are not necessary to the course and creates a strange grouping of topics under each outcome. By organizing outcomes by mathematical content rather than book organization, we can better use assessment tools to determine the strengths and weaknesses of the class. By eliminating topics that are not necessary to preparation for MTH 125 and 160, we free up space for deeper work on topics that are necessary. The course is currently quite crammed with content. More time available to work with key topics will better enable students to meet the outcomes for the course.	2020

Objectives	The objectives will be changed to eliminate topics such as how to algebraically solve a system of equations (Outcome 3) and using Pythagorean theorem to solve problems (Outcome 4), that will not prepare students for MTH 125 and MTH 160 or other courses requiring MTH 094.	By eliminating topics that are not necessary to preparation for MTH 125 and 160, we free up space for deeper work on topics that are necessary, such as probability, empirical rule, quadratic formula and vertex formula. The course is currently quite crammed with content. More time available to work with key topics will better enable students to meet the outcomes for the course.	2020
Other: Change Course Description (Topics/Excel)	Currently, the course description reads: In this course, students will learn about data, numbers and patterns, unit conversions, basic probability, dimensional analysis, algebraic equations as a problem-solving tool, linear and non-linear relationships, standard deviations and the normal curve. Pythagorean Theorem and the distance formula are also covered.	The goal of this course is to prepare students for MTH 125 and MTH 160, neither of which have an Excel component. Microsoft Excel can be used to enhance class time and for extra credit per instructor discretion, but will no longer be a required focus for the course. Adding this requirement to the course takes time away from the outcomes of the course that meet course goals.	2020

	Microsoft Excel is used as a tool for data analysis, calculation and display. It is structured in a non-lecture format. Group work and participation will be required each day of class with problem solving and applications. Short technology assignments will be aligned with each lesson. Successful completion of this course with a minimum grade of "C" will raise your Academic Math level to 3. This course is not intended for those students planning to go on to the precalculus/calculus sequence. Those students should take MTH 097 instead." We propose to update the description of the course to align with the proposed changes in the outcomes for the course, as well and removing the requirement for Microsoft Excel to be used for the course.		

Other: Course material	Emphasize details in questions.	Several students missed a detail in a question for Outcome 1. Additional emphasis on the details of questions would clarify students' mastery of Outcome 1.	2020

5. Is there anything that you would like to mention that was not already captured?

6.

III. Attached Files

Math Department Scoring
Assessment Questions Winter 2019

Faculty/Preparer:	Leslie Gilbert	**Date:** 07/12/2019
Department Chair:	Lisa Manoukian	**Date:** 08/12/2019
Dean:	Victor Vega	**Date:** 09/26/2019
Assessment Committee Chair:	Shawn Deron	**Date:** 11/08/2019