Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Mathematics	295	MTH 295 09/22/2023-Differential Equations
College	Division	Department
Math, Science and Engineering Tech	Math, Science and Engineering Tech	Math & Engineering Studies
Faculty Preparer		Yin Lu
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?

   Yes

   The course was last assessed Winter 2019.

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

   At least 75% of students assessed scored at least 75% or higher for the questions on each outcome.

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

   The assessment indicated a need for more emphasis on methods of solving differential equations with non-constant coefficients and systems of differential equations.

II. Assessment Results per Student Learning Outcome

Outcome 1: Solve first order and higher order linear and non-linear first order differential equations, both separable and non-separable.

- Assessment Plan
  - Assessment Tool: Outcome-related written exam questions
  - Assessment Date: Winter 2022
  - Course section(s)/other population: All sections

- Number students to be assessed: All students
- How the assessment will be scored: Common written exam questions with a set of standard grading guidelines
- Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome
- Who will score and analyze the data: Current course instructor(s) and course mentor

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)
	2023, 2022	2023, 2022

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

# of students enrolled	# of students assessed
771	60

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.

60 students were randomly selected from the available exams turned in by course instructors.

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.

Students were from face-to-face sections and virtual sections.

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

Every problem is scored on a 10-point scale: 4 points for comprehension (formulas setup and concept), 6 points for skills (being able to work out the correct answers). Each student solved 2 problems for this outcome. If a student scored at least 15 out of the 20 points possible, that would be 75% and therefore that student met the standard. Master syllabus will be updated to students will score 70% or higher in order to be more in line with the 10-point scale.

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
Total 60 students assessed: 40 students met the standard, 20 did not. Success rate is 66.67%. The standard of success was not met.

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

Most students are able to solve 1st ordinary differential equations, but not quite enough are able to do it consistently enough for the standard to have been met.

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.

[1] Students need more practice on solving Exact ODE using partial integration method. [2] Students need more support to learn to tell the difference between general-particular solutions and singular solutions.

Outcome 2: Solve both homogeneous and non-homogeneous differential equations, using undetermined coefficients and variation of parameters methods for the particular integrals.

- Assessment Plan
    - Assessment Tool: Outcome-related written exam questions
    - Assessment Date: Winter 2022
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome
    - Who will score and analyze the data: Current course instructor(s) and course mentor

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)
	2023, 2022	2023, 2022

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

# of students enrolled	# of students assessed
771	60

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.

60 students were randomly selected from the exams turned in by course instructors.

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.

Students were from face-to-face sections and virtual sections.

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

Every problem is scored on a 10-point scale: 4 points for comprehension (formulas setup) , 6 points for skills (being to work out the answers correctly). Each student solved 2 problems for this outcome. If a student scored at least 15 out of the 20 points possible, that would be 75% and therefore that student met the standard. Master syllabus will be updated to students will score 70% or higher in order to be more in line with the 10-point scale.

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
43 students met the standard, 17 did not. Success rate is 72.67%. The standard of success was not met, but with the future change to 70% or higher, the standard would be met.

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

Most students assessed can perform the undetermined coefficient method to solve high-order constant coefficient ordinary differential equations, but we were still just under the current standard.

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 need more emphasis on interpretation of solutions, such as beats, resonance (since most of students taking this class are from engineering majors).

Outcome 3: Solve systems of linear differential equations analytically with real and distinct, complex, and repeated eigenvalues, and analyze non-linear systems using phase plane analysis, and linearization techniques.

- Assessment Plan
    - Assessment Tool: Outcome-related written exam questions
    - Assessment Date: Winter 2022
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome
    - Who will score and analyze the data: Current course instructor(s) and course mentor

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)
	2023, 2022	2023, 2022

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

# of students enrolled	# of students assessed
771	60

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.

60 students were randomly selected form the available exams offered by course instructors.

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.

Students assessed were selected from face-to-face and virtual sections.

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

Every problem is scored on 10-point scale: 4 points for comprehension (formulas and setup), 6 points for skills (being able to complete necessary work to get correct answers). Each student solved 4 problems for this outcome. If a student scored at least 30 out of the 40 points possible, that would be 75% and therefore that student met the standard. Master syllabus will be updated to students will score 70% or higher in order to be more in line with the 10-point scale.

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
35 students met the standard, 25 did not. Success rate is 58.33%. The standard of success was not met.

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

Students with a background in linear algebra did better since the major skills assess in this outcome are eigenvalues and eigenvectors.

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.

A suggestion to course instructors would be to spend some more time covering eigenvalue-eigenvectors in the lecture if possible.

Outcome 4: Solve differential equations IVP's and systems of differential equations IVP's, step functions, Delta and Impulse functions using Laplace Transforms.

- Assessment Plan

- Assessment Tool: Outcome-related written exam questions
- Assessment Date: Winter 2022
- Course section(s)/other population: All sections
- Number students to be assessed: All students
- How the assessment will be scored: Common written exam questions with a set of standard grading guidelines
- Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome
- Who will score and analyze the data: Current course instructor(s) and course mentor

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)
	2023, 2022	2023, 2022

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

# of students enrolled	# of students assessed
771	60

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.

60 students were randomly selected form available exams offered by course instructors.

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.

Students assessed were from face-to-face and virtual sections.

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

Every problem is scored on a 10-point scale: 4 points for comprehension (formulas setup) and skills (being able to work out the correct answers). Each student solved 2 problems for this outcome. If a student scored at least 15 out of the 20 points possible, that would be 75% and therefore that student met the standard. Master

syllabus will be updated to students will score 70% or higher in order to be more in line with the 10-point scale.

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
27 students met the standard, 33 did not. Success rate is 45%. The standard of success was not met.

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

Some students were able to perform basic Laplace Transforms or inverse Laplace Transforms using tables, but only a few students performed well enough to meet the standard.

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 need more practice on ***combination skill***s in performing Laplace Transforms to solve ordinary differential equations, which include solving differential equations and interpretation of solutions.

Outcome 5: Solve and approximate Initial Value Problem using the numerical methods by Euler and Runge-Kutta.

- Assessment Plan
    - Assessment Tool: Outcome-related written exam questions
    - Assessment Date: Winter 2022
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome
    - Who will score and analyze the data: Current course instructor(s) and course mentor

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)
	2023, 2022	2023, 2022

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

# of students enrolled	# of students assessed
771	0

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.

This outcome is removed from 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.

This outcome is removed from course assessment.

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

The Euler and Runge-Kutta methods for solving differential equations have been made obsolete by modern calculators, so this skill is no longer valuable. This outcome will be removed in the next master syllabus update.

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
This outcome is removed from course assessment.

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

This topic is not included in course assessment.

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.

This topic is not included in course assessment.

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.

Yes, I added more emphasis on these materials in my classes and other faculty members did as well. To assess this, I also added more questions to the assessment that were based on non-constant coefficients and systems of differential equations (questions 9 and 10 in the attached list of questions).

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?

Nothing really surprised me. Those students that came into the class with the intent to learn succeeded more compared to those who did not. The course itself does seem to be meeting the needs of students, provided they do the work and strive to learn the material. Still, considering the standards were not met, we need to increase our emphasis on the areas I mentioned in each outcome so we can try to bring those standards up.

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

Any time, after the report is available.

4. Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Outcome Language	Outcome 5 will be removed	The Euler and Runge-Kutta methods for solving differential equations have been made obsolete by modern calculators, so this skill is no longer valuable.	2024
Assessment Tool	Assessment tool will be changed to "75% of students	These are scored out of 10, so this change	2024

	will score 70% or higher"	will make it possible to score 70%.	
Pre-requisite	I'd like to add MTH 192 as a prerequisite.	[1] In order to solve non-coefficient differential equations, students need different skills in solving different types of integrals. [2] In order to solve systems of differential equations, students need skills form Linear Algebra such as Matrix Operations, Finding Eigenvalues-Eigenvectors, interpreting Stability of solutions.	2023
Course Materials (e.g. textbooks, handouts, on-line ancillaries)	Increase emphasis on the concepts as mentioned in the individual sections.	This assessment highlighted which concepts students are generally the most lacking in their understanding. We can try to bring success rates up by increasing emphasis on the following topics: Outcome 1: solving Exact ODE using partial integration method; the difference between general-particular solutions and singular solutions. Outcome 2: interpretation of	2024

		solutions, such as beats, resonance. Outcome 3: eigenvalue-eigenvectors. Outcome 4: combination skills in performing Laplace Transforms to solve ordinary differential equations.	
Other: Assessment population	Increase the number of students assessed, include all sections to the best of my ability.	Not all instructors turn over their assessment data, which has been a longstanding problem. I will increase my efforts in this area and involve the Dean as well. Additionally, new tools being implemented in the C&A process will hopefully help.	2023

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

No.

III. Attached Files

Assessment Problems
Assessment Data

Faculty/Preparer:	Yin Lu	**Date:** 11/28/2023
Department Chair:	Nichole Klemmer	**Date:** 12/15/2023
Dean:	Tracy Schwab	**Date:** 12/19/2023
Assessment Committee Chair:	Jessica Hale	**Date:** 07/07/2025

Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Mathematics	295	MTH 295 05/17/2019-Differential Equations
Division	Department	Faculty Preparer
Math, Science and Engineering Tech	Math & Engineering Studies	Mohammed Abella
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: Solve linear and non-linear first order differential equations, both separable and non-separable.

- Assessment Plan
  - Assessment Tool: Written exam questions.
  - Assessment Date: Winter 2018
  - Course section(s)/other population: All sections
  - Number students to be assessed: All students
  - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.

- Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome.
- Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

All students who took the final exam were assessed. Six students did not take the final. One of those six did not take any test and knew they were failing.

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 sections and all populations were assessed.

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

The final exam had six questions embedded in it for assessment purposes. One of those six questions assessed this outcome. Each student's grade for this question was retrieved for assessment purposes, and the average was obtained as a percentage.

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
76 students out of 80 (95%) scored 75% or better. The average score was 94.9%. This exceeded the standard of success by far. The standard of success states that

"At least 75% of the students will score 75% or higher on the questions for each outcome."

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

The students did very well in this outcome.

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.

We will continue to review and remind the students of the many methods for solving these types of equations that were covered earlier in the semester.

Outcome 2: Solve higher order linear and non-linear differential equations.

- Assessment Plan
    - Assessment Tool: Written exam questions.
    - Assessment Date: Winter 2018
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.
    - Standard of success to be used for this assessment: At least 75 of the students will score 75% or higher on the questions for each outcome.
    - Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

Six students did not take the final. One of them did not take any tests.

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 sections and all populations were assessed.

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

The final had six questions embedded in it for assessment purposes. One of those six questions assessed this outcome. It was graded with the final exam. Each student's grade for this question was retrieved for assessment purposes, and the average was obtained as a percentage.

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
79 out of 80 (98%) students scored 75% of better. The average score was 99.8%. The results of this outcome were excellent. This exceeded the standard of success by far. The standard of success states that "At least 75% of the students will score 75% or higher on the questions for each outcome."

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

The students did very well in this outcome. The average score of 99.8% was near perfect.

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.

Even though the outcome was met with a success rate of 99.8%, we still need to remind the students of the conditions that must be met for the method from this outcome to be used. They still make the mistake of using this method for solving equations with non-constant coefficients and other types of equations. I use a chart for all methods and all outcomes, and it appears to be helpful.

Outcome 3: Solve both homogeneous and non-homogeneous differential equations, using undetermined coefficients and variation of parameters methods.

- Assessment Plan
    - Assessment Tool: Written exam questions.
    - Assessment Date: Winter 2018
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome.
    - Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

Six students did not take the final. One of those six was failing before as they had not taken any tests.

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 sections and all populations were assessed.

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

The final exam had six questions in it embedded for assessment purposes. One of those six questions assessed this outcome. It was graded with the final exam. Each student's grade for this question was retrieved for assessment purposes, and the average was obtained as a percentage.

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
61 students out of 80 (76%) scored 75% or better. The average score was 75.6%. The success percentage for this outcome was above the standard of success, which states that "At least 75% of the students will score 75% or higher on the questions for each outcome."

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

The students did well enough on this outcome. The standard of success was met.

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.

We will put more emphasis on the non-homogeneous types of DE's.

Outcome 4: Solve systems of linear differential equations analytically with real and distinct, complex, and repeated eigenvalues, and analyze non-linear systems using phase plane analysis, and linearization techniques.

- Assessment Plan
    - Assessment Tool: Written exam questions.
    - Assessment Date: Winter 2018
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.

- Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome.
- Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

Six students did not take the final. One of them did not take any tests.

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 sections and all populations were assessed.

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

The final exam had six questions embedded in it for assessment purposes. One of those six questions assessed this outcome. It was graded with the final exam. Each student's grade for this question was retrieved for assessment purposes, and the average was obtained as a percentage.

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
73 students out of 80 (91%) scored 75% or better. The average score was 91%. Very good. This exceeded the standard of success by far. The standard of success states that "At least 75% of the students will score 75% or higher on the questions for each outcome."

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

The standard of success was met. The average was 91%, but there is always room for doing better.

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.

We will spend more time reviewing prerequisites such as eigenvalues and eigenvectors since they need them for systems of DE's.

Outcome 5: Use Laplace Transforms to solve differential equations IVP's and systems of differential equations IVP's, step functions, Delta and Impulse functions.

- Assessment Plan
    - Assessment Tool: Written exam questions.
    - Assessment Date: Winter 2018
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome.
    - Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

Six students did not take the final. One did not take any tests.

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 sections and all populations were assessed.

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

The final exam had six questions embedded in it for assessment purposes. One of those six questions assessed this outcome. Each student's grade for this question was retrieved for assessment purposes, and the average was obtained as a percentage.

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
61 students out of 80 (76%) scored 75% or better. The average score was 75.3%. This is above the standard of success, which states that "At least 75% of the students will score 75% or higher on the questions for this outcome."

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

The students demonstrated they do the different steps of the Laplace Transform method correctly when they do them separately.

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.

We need to put more emphasis on putting all the steps of the Laplace Transform method together.

Outcome 6: Use the numerical methods by Euler and Runge-Kutta to approximate Initial Value Problems.

- Assessment Plan
    - Assessment Tool: Written exam questions.
    - Assessment Date: Winter 2018
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Common written exam questions with a set of standard grading guidelines.
    - Standard of success to be used for this assessment: At least 75% of the students will score 75% or higher on the questions for each outcome.
    - Who will score and analyze the data: Current course instructor(s) and course mentor.

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
86	80

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.

Six students did not take the final. One of those six did not take any tests.

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 sections and all populations were assessed.

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

One very long question with three parts was given in the final exam on the Runge-Kutta and Euler methods for solving DE's numerically. The question was very long and the students were allowed to do take it home and use computer programs for the calculations. It is my estimation that students may take anywhere between

two hours and six hours to solve this question. Each student's grade was retrieved for assessment purposes, and the average was obtained as a percentage.

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

79 students (98%) out of 80 scored 75% or better. The average score for this outcome was 99.4%. Excellent. This exceeded the standard of success by far. The standard of success states that "At least 75% of the students will score 75% or higher on the questions for each outcome."

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

This outcome was excellent.

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.

We need to encourage the students to use powerful programmable graphing calculators and programs like Maple or its equivalent for this outcome, as the calculations can be overwhelming.

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.

The changes were effective.

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?

This is one of our best courses at WCC. Even some U of M advisors are sending students to us. The course is required for engineering and other students.

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

The students are pleased with the course, and a lot of them are from another four-year institution, most from UM. The course covers everything an engineer needs to know when they encounter a differential equation in their professional life.

4.

Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Course Materials (e.g. textbooks, handouts, on-line ancillaries)	More emphasis on the following topics: - Spend more time on several kinds of non-homogeneous types of differential equations, using both the "Variation of Parameters" method and the method of "Undetermined Coefficients" - Spend more time reviewing topics on eigenvalues and eigenvectors (Outcome 4) - Putting all the steps of the Laplace Transform method together (Outcome 5)	In comparison to other areas, these areas were weaker in the current assessment, and additional emphasis will strengthen student understanding and performance in these areas.	2020
Other: Computer aid	Numerical Methods and Initial Value Problems: Encourage students to use the Maple app or other programmable calculators for calculations in	These calculations can be overwhelming, and programmable calculators, as well as computer apps like Maple would enable students to solve these	2020

	questions related to Numerical Methods and Outcome 6.	equations more efficiently.	

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

6.

III. Attached Files

RawData
MTH2

Faculty/Preparer:	Mohammed Abella	**Date:** 08/21/2019
Department Chair:	Lisa Manoukian	**Date:** 09/19/2019
Dean:	Victor Vega	**Date:** 09/27/2019
Assessment Committee Chair:	Shawn Deron	**Date:** 11/22/2019

WASHTENAW COMMUNITY COLLEGE

COURSE ASSESSMENT REPORT

I. Background Information

1. Course assessed:
   Course Discipline Code and Number: MTH295
   Course Title: Differential Equations
   Division/Department Codes: MNB

2. Semester assessment was conducted (check one):
   - ☒ Fall 2006_
   - ☐ Winter 20__
   - ☐ Spring/Summer 20__

3. Assessment tool(s) used: check all that apply.
   - ☐ Portfolio
   - ☐ Standardized test
   - ☐ Other external certification/licensure exam (specify):
   - ☐ Survey
   - ☐ Prompt
   - ☒ Departmental exam
   - ☐ Capstone experience (specify):
   - ☐ Other (specify):

4. Have these tools been used before?
   - ☒ Yes
   - ☐ No

   If yes, have the tools been altered since its last administration? If so, briefly describe changes made.
   No

5. Indicate the number of students assessed/total number of students enrolled in the course.
   16/16

6. Describe how students were selected for the assessment.
   ALL

II. Results

1. Briefly describe the changes that were implemented in the course as a result of the previous assessment.
   Practical applications were emphasized more, and covered in a more concentrated manner, rather than in a scattered fashion.

2. State each outcome (verbatim) from the master syllabus for the course that was assessed.
   ALL (see attached)

3. Briefly describe assessment results based on data collected during the course assessment, demonstrating the extent to which students are achieving each of the learning outcomes listed above. ***Please attach a summary of the data collected.***
   The tests were scored on a 50 point scale. The results were: 50, 31, 47, 49, 47, 43, 49, 47, 36, 47, 41, 48, 34, 47, 21, 47.

4. For each outcome assessed, indicate the standard of success used, and the percentage of students who achieved that level of success. ***Please attach the rubric/scoring guide used for the assessment.***
   The standard was 70% of all students meet 70% of all learning outcomes. There were 7 questions worth 7 points each except for the first one which was worth 8 points.

COURSE ASSESSMENT REPORT

5. Describe the areas of strength and weakness in students' achievement of the learning outcomes shown in assessment results.

   Strengths: The students accomplished all the common outcomes of the course. The students met all instructional objectives of the course.

   Weaknesses: The students' main weakness is in solving story problems. However there was a marked improvement in that area since the last time the course was assessed.

III. Changes influenced by assessment results

1. If weaknesses were found (see above) or students did not meet expectations, describe the action that will be taken to address these weaknesses.

2. Identify intended changes that will be instituted based on results of this assessment activity (check all that apply). Please describe changes and give rationale for change.

   a. ☐ Outcomes/Assessments on the Master Syllabus
   Change/rationale:

   b. ☐ Objectives/Evaluation on the Master Syllabus
   Change/rationale:

   c. ☐ Course pre-requisites on the Master Syllabus
   Change/rationale:

   d. ☐ 1st Day Handouts
   Change/rationale:

   e. ☐ Course assignments
   Change/rationale:

   f. ☐ Course materials (check all that apply)
   ☐ Textbook
   ☐ Handouts
   ☐ Other:

   g. ☐ Instructional methods
   Change/rationale:

   h. ☐ Individual lessons & activities
   Change/rationale:

3. What is the timeline for implementing these actions?

IV. Future plans

1. Describe the extent to which the assessment tools used were effective in measuring student achievement of learning outcomes for this course.
   Continue to stress the importance of all outcomes. Continue to stress the importance of practical applications.
2. If the assessment tools were not effective, describe the changes that will be made for future assessments.

3. Which outcomes from the master syllabus have been addressed in this report?
   All __X___ Selected _____
   If "All", provide the report date for the next full review: 2009 Fall

_____.

If "Selected", provide the report date for remaining outcomes: _____.

COURSE ASSESSMENT REPORT

Submitted by:
Mohammed Abella and Hanan Wahab
Print/Signature Date: 01/03/2007

Department Chair: _____ Date: _____
Print/Signature

Dean: Martha A. Shawalter M. Shawalter Date: JAN 17 2006
Print/Signature

COURSE ASSESSMENT REPORT

Background Information

I. Course assessed:

Course Discipline Code and Number: MTH 295

Course Title: Differential Equations

Division Code: MNB Department Code: MTH

II. Semester assessment was administered (check one):

- ☐ Fall 20__
- ☐ Winter 20_06_
- ☐ Spring/Summer 20__

III. Assessment tool used (check one):
Please attach a copy of the tool and scoring rubric used.

- ☐ Portfolio
- ☐ Standardized test
- ☐ Other external certification/licensure exam (please describe):_____
- ☐ Survey
- ☐ Prompt
- X Departmental exam
- ☐ Capstone experience (please describe):_____
- ☐ Other (please describe):_____

Has this tool been used before?
No

If yes, has this tool been altered since its last administration? If so, briefly describe changes made.

_____

IV. Please list the section(s) in which this tool was administered:

Section 02

V. How many students were assessed? ALL (14)

Results

I. Briefly describe assessment results based on data collected for the course assessed, demonstrating to what extent students are achieving the learning outcomes as found in the master syllabus (see attached).
Please attach any data collected.

The tests were scored out of 50 points. The results were: 46, 44, 25, 41, 42, 49, 40, 40, 47, 48, 50, 49, 48, 50.

II. Based on the outcomes outlined in the master syllabus for the course assessed, did students meet expectations of the learning outcomes of that course?
Yes

Percentage of students meeting outcomes: 93 %

III. What areas of strength and weakness in students' achievement of the learning outcomes of the assessed course (as stated in the master syllabus) did assessment results show?

Strengths: The students accomplished all the common outcomes in all sections of the course.

The students met all instructional objectives in the course.

Weaknesses: Some of the points were lost in one practical applications of the course. This was a minor weakness. The application was Simple Harmonic Motion

Changes influenced by assessment results

I. If weaknesses were found (see III above) or students did not meet expectations, what action will be taken to address this?

Set two sessions aside to cover spring-mass systems and other Simple harmonic Motion types of applications. Go over these applications in detail. In the textbook that is currently in use, they go over spring-mass systems, but in a scattered fashion in more than one chapter.

II. Identify any other intended changes that will be instituted based on results of this assessment activity (check all that apply). Please describe changes and give rationale for change.

☐ Master syllabus
Description and rationale: _____

☐ Curriculum
Description and rationale: _____

☐ Course syllabus
Description and rationale: _____

☐ Course assignments
Description and rationale: _____

☐ Course materials (check all that apply)
- ☐ Textbook
- ☐ Handouts
- ☐ Other: _____

Description and rationale: _____

☐ Teaching methodology
Description and rationale: _____

☐ Other: _____

Description and rationale: _____

Future plans

I. Was the assessment tool used effective in measuring student achievement of learning objectives for this course? If not, why?

Yes it was effective

II. If the assessment tool was not effective, what changes will be made in future assessments?

Submitted by:

Name: Mohammed Abella Date: 05/11/2006

Department Chair: [signature] Date: 6.15.06

Dean: [signature] Date: 6/15/06

Please return completed form to the Office of Curriculum & Assessment, SC 247.