

**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% or 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
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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)	<p>More emphasis on the following topics:</p> <ul style="list-style-type: none"> - 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) 	<p>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.</p>	2020
Other: Computer aid	<p>Numerical Methods and Initial Value Problems: Encourage students to use the Maple app or other programmable calculators for calculations in</p>	<p>These calculations can be overwhelming, and programmable calculators, as well as computer apps like Maple would enable students to solve these</p>	2020

	questions related to Numerical Methods and Outcome 6.	equations more efficiently.	
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5. Is there anything that you would like to mention that was not already captured?

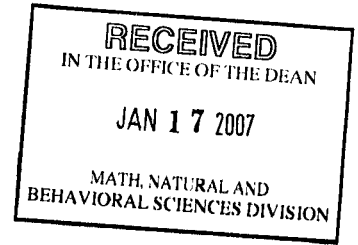
6.

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

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

Date: 01/03/2007

Print/Signature

Department Chair:

Print/Signature

Date:

Dean:

Print/Signature

Martha A. Shawalter *M. Shawalter*

Date: JAN 17 2006

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
- 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)

COURSE ASSESSMENT REPORT

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

COURSE ASSESSMENT REPORT

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: _____

COURSE ASSESSMENT REPORT

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COURSE ASSESSMENT REPORT

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: *Mustafa Ghad* Date: 6.15.06

Dean: *M. S. ...* Date: 6/15/06

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