

Assessment Plan

Western Michigan University

Mathematics

Outcome: 1. Knowledge of Mathematical Content

Students demonstrate facility with and understanding of skills, procedures, and concepts of the field of mathematics.

Outcome Status: Active

Means of Assessment			
Assessment Method	Criterion	Schedule	Active
<p>Each semester the instructors assigned to teach linear algebra will agree upon a set of questions that will be embedded into quizzes and exams. These questions will focus on the use of function in linear algebra. The questions will require students to write a relatively simple proof and explain their reasoning. This assessment addresses desired outcomes 1, 3, and 4 for all undergraduate majors. Data will be collected each semester the course is taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
<p>As part of the normal course work, students in MATH 4020/5070 will be given a project. The results of portions of this project will be used to assess the student learning objective regarding the development of models to solve applied problems. This assessment addresses desired outcomes 1-4 for the applied track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
<p>As part of the normal course work, students in MATH 5700 will be given homework questions requiring them to solve a problem related to functions and write a proof of an unfamiliar theorem in advanced calculus. The results of this homework assignment will be used to assess the student learning objectives regarding the use of proof in mathematics and their ability to solve problems in the context of advanced calculus. This assessment addresses desired outcomes 1-4 for the general track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
<p>In this assignment, teacher candidates are to solve an optimization problem. They are given a scenario in which they are to determine the dimensions of an object so it will have maximal volume. Teacher candidates are to employ technology</p>			Yes

Means of Assessment

Assessment Method	Criterion	Schedule	Active
<p>as a tool to solve the problem and to use multiple representations to view the solution of the problem. For each method, they are to provide an argument to justify and explain their findings. This project is an assessment of the teacher candidates' mathematical knowledge and of their pedagogical knowledge. This assessment addresses all five desired outcomes for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			
<p>This assessment surveys students on their attitudes about mathematics and the learning of mathematics. It also gathers baseline data on students' abilities to communicate their mathematical understanding and to write mathematical proofs. This assessment addresses desired outcomes 1, 3, and 5 for all departmental programs. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will return the completed surveys to the Assessment Committee.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			No
<p>Michigan Teacher Test for Certification (MTTC)</p> <p>Assessment Method Category: Exam-Licensure</p>	<p>All secondary mathematics teaching majors and minors must successfully pass the MTTC in mathematics.</p>	<p>Test is given four times a year by the State. Students may choose when they will take the test.</p>	Yes
<p>Comprehensive examination in Algebra. All Ph.D. students in the Mathematics and Collegiate Mathematics Education must take the Algebra comprehensive exam at the first available offering upon completing the supporting coursework (MATH 6300 and MATH 6310).</p> <p>Assessment Method Category: Exam-Comprehensive</p>	<p>50% of students will pass on the first attempt and a cumulative of 75% of students will pass after a second attempt.</p>		Yes
<p>Comprehensive examination in Graph Theory. Ph.D. students in the Mathematics and Collegiate Mathematics Education may elect to take the Graph Theory comprehensive exam at the first available offering upon completing the supporting coursework (MATH 6400 and MATH 6410).</p> <p>Assessment Method Category: Exam-Comprehensive</p>	<p>50% of students will pass on the first attempt and a cumulative of 75% of students will pass after a second attempt.</p>		Yes
<p>Comprehensive examination in Analysis. All Ph.D. students in the Mathematics must take and Collegiate Mathematics Education may elect to take the Analysis comprehensive exam at the first available offering upon completing the supporting coursework (MATH 6700 and MATH 6710).</p> <p>Assessment Method Category: Exam-Comprehensive</p>	<p>50% of students will pass on the first attempt and a cumulative of 75% of students will pass after a second attempt.</p>		Yes
<p>Comprehensive examination in Topology. All Ph.D. students in the Mathematics and Collegiate Mathematics Education may elect to take the Topology comprehensive exam at the first available offering upon completing the supporting coursework (MATH 621, 6240, MATH 6250 and MATH 6260).</p>	<p>50% of students will pass on the first attempt and a cumulative of 75% of students will pass after a second attempt.</p>		Yes

Means of Assessment

Assessment Method	Criterion	Schedule	Active
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Assessment Method Category:

Exam-Comprehensive

Related Courses

- * MATH 1220 - Calculus I
- * MATH 1230 - Calculus II
- * MATH 1450 - Discrete Mathematical Structures
- * MATH 2300 - Elementary Linear Algebra
- * MATH 2720 - Vector & Multivariate Calculus
- * MATH 3140 - Mathematical Proof
- * Math 3300 - Modern Algebra I
- * Math 3400 - Modern Geometry
- * MATH 3500 - Teaching Middle School Mathematics
- * MATH 3510 - Computing Technology in Secondary School Mathematics
- * MATH 3740 - Intro to Linear Algebra & Diff. Eq.
- * Math 4020 - Mathematical Modeling
- * Math 4300 - Modern Algebra II
- * Math 4400 - Graphs and Mathematical Models
- * MATH 4500 - Teaching Secondary School Mathematics
- * Math 5100 - Applied Matrix Algebra
- * Math 5270 - Differential Geometry of Curves and Surfaces
- * Math 5300 - Linear Algebra
- * MATH 5700 - Advanced Calculus I
- * Math 6110 - Mathematical Applications
- * MATH 6540 - Topics in Secondary School Mathematics Curricula
- * Math 6880 - Research Tools in the Mathematical Sciences
- * Math6120 - Data Analysis
- * Math6150 - Intermediate Analysis
- * Math6160 - Survey of Algebra
- * Math6210 - Algebraic topology - Fundamental Group
- * Math6240 - Algebraic Topology
- * Math6250 - Differential Topology
- * Math6260 - Algebraic Topology - Homotopy Theory
- * Math6290 - Studies in Topology
- * Math6300 - Abstract Algebra I
- * Math6310 - Abstract Algebra II
- * Math6330 - Topics in Group Theory
- * Math6370 - Numerical Linear Algebra
- * Math6400 - Graph Theory
- * Math6410 - Graph Theory II
- * Math6490 - Studies in Geometry
- * Math6570 - Issues and Trends in Mathematical Education
- * Math6580 - Psychology of Learning Mathematics
- * Math6590 - Research in Mathematics Education
- * Math6700 - Real Analysis I

- * Math6710 - Real Analysis II
- * Math6760 - Complex Analysis
- * Math6780 - Introduction to Functional Analysis

Outcome: 2. Mathematical Problem Solving

Students are capable of applying the process of mathematical problem solving to mathematical and non-mathematical situations. For graduate students, the desired learning outcome includes the extension of the field of mathematics and mathematics education through original research.

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<p>As part of the normal course work, students in MATH 4020/5070 will be given a project. The results of portions of this project will be used to assess the student learning objective regarding the development of models to solve applied problems. This assessment addresses desired outcomes 1-4 for the applied track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
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<p>In this assignment, teacher candidates are to solve an optimization problem. They are given a scenario in which they are to determine the dimensions of an object so it will have maximal volume. Teacher candidates are to employ technology as a tool to solve the problem and to use multiple representations to view the solution of the problem. For each method, they are to provide an argument to justify and explain their findings. This project is an assessment of the teacher candidates' mathematical knowledge and of their pedagogical knowledge. This assessment addresses all five desired outcomes for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes

Means of Assessment			
Assessment Method	Criterion	Schedule	Active

Outcome: 3. Reasoning/Proof and Critical Thinking Skills

Candidates develop an ability to think critically about mathematical and non-mathematical problems and to reason, to construct and to evaluate mathematical arguments. For graduate students, the desired learning outcome includes the extension of the field of mathematics and mathematics education through original research.

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<p>This assessment surveys students on their attitudes about mathematics and the learning of mathematics. It also gathers baseline data on students' abilities to communicate their mathematical understanding and to write mathematical proofs. This assessment addresses desired outcomes 1, 3, and 5 for all departmental programs. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will return the completed surveys to the Assessment Committee.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes

Outcome: 4. Mathematical Communication

Students are capable of reading mathematical documents with understanding and can communicate their mathematical thinking orally and in writing to peers, faculty, and others.

Means of Assessment			
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<p>Each semester the instructors assigned to teach linear algebra will agree upon a set of questions that will be embedded into quizzes and exams. These questions will focus on the use of function in linear algebra. The questions will require students to write a relatively simple proof and explain their reasoning. This assessment addresses desired outcomes 1, 3, and 4 for all undergraduate majors. Data will be collected each semester the course is taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
<p>As part of the normal course work, students in MATH 4020/5070 will be given a project. The results of portions of this project will be used to assess the student learning objective regarding the development of models to solve applied problems. This assessment addresses desired outcomes 1-4 for the applied track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without</p>			Yes

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Assessment Method Category:

Course-Embedded Measure

As part of the normal course work, students in MATH 5700 will be given homework questions requiring them to solve a problem related to functions and write a proof of an unfamiliar theorem in advanced calculus. The results of this homework assignment will be used to assess the student learning objectives regarding the use of proof in mathematics and their ability to solve problems in the context of advanced calculus. This assessment addresses desired outcomes 1-4 for the general track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.

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Assessment Method Category:

Course-Embedded Measure

The unit plan is a capstone project for the Mathematics ? Secondary Teaching program. Students choose a unit topic from one of the NCTM grades 9-12 content standards. The unit must include lessons, parallel text to guide the teaching of the unit, and assessments. This assessment requires teacher candidates to demonstrate their abilities to work cooperatively with peers and to communication with each other, teachers who may use the materials developed in the plan, and secondary students who may use the materials in their mathematics classroom. This assessment addresses all five desired outcomes for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment. A copy of the assessment and the rubric appears in Appendix C.

Yes

Assessment Method Category:

Course-Embedded Measure

In this assignment, teacher candidates are to solve an optimization problem. They are given a scenario in which they are to determine the dimensions of an object so it will have maximal volume. Teacher candidates are to employ technology as a tool to solve the problem and to use multiple representations to view the solution of the problem. For each method, they are to provide an argument to justify and explain their findings. This project is an assessment of the teacher candidates' mathematical knowledge and of their pedagogical knowledge. This assessment addresses all five desired outcomes for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to

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<p>the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			
<p>This assessment is a measure of the teacher candidates' attitudes and beliefs about teaching and learning mathematics. During the MATH 3500 course, teacher candidates are given a writing assignment in which they document their mathematical history. These assignments are placed in a portfolio in the department and held until they revisit this autobiography in the MATH 4500 course. Teacher candidates are asked to critically examine their experiences with mathematics and in school mathematics with an eye toward what it means to teach and to learn. Given the perspective of time and additional training in mathematics and mathematics education, the teacher candidates reflect on their previously expressed attitudes and beliefs to determine the changes in these attitudes as a result of that training. This assessment addresses desired outcomes 4 and 5 for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment. A copy of the assessment and the rubric appear in Appendix C.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes

Outcome: 5. Dispositions

Students demonstrate a positive disposition toward mathematical processes and mathematical learning

Means of Assessment			
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<p>In this assignment, teacher candidates are to solve an optimization problem. They are given a scenario in which they are to determine the dimensions of an object so it will have maximal volume. Teacher candidates are to employ technology as a tool to solve the problem and to use multiple representations to view the solution of the problem. For each method, they are to provide an argument to justify and explain their findings. This project is an assessment of the teacher candidates' mathematical knowledge and of their pedagogical knowledge. This assessment addresses all five desired outcomes for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes

Means of Assessment

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<p>This assessment is a measure of the teacher candidates' attitudes and beliefs about teaching and learning mathematics. During the MATH 3500 course, teacher candidates are given a writing assignment in which they document their mathematical history. These assignments are placed in a portfolio in the department and held until they revisit this autobiography in the MATH 4500 course. Teacher candidates are asked to critically examine their experiences with mathematics and in school mathematics with an eye toward what it means to teach and to learn. Given the perspective of time and additional training in mathematics and mathematics education, the teacher candidates reflect on their previously expressed attitudes and beliefs to determine the changes in these attitudes as a result of that training. This assessment addresses desired outcomes 4 and 5 for the secondary teaching track. Data will be collected each semester the courses are taught from all sections and all students enrolled. The course instructor will provide copies of student responses without grading marks to the Assessment Committee. The members of the Assessment Committee, the current instructors, and faculty members who have taught the course in the past will meet to mark the assessment. A copy of the assessment and the rubric appear in Appendix C.</p> <p>Assessment Method Category: Course-Embedded Measure</p>			Yes
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