

Standards for the Preparation of Teachers of

Mathematics–Secondary (EX)



Approved by the State Board of Education 2000

List required courses and provide additional narrative to explain how standards are met. If electives are included, they should be clearly indicated.

1.0 MATHEMATICS PREPARATION

- 1.1 Problem Solving: Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to mature in their problem solving ability. What evidence indicates that this is being accomplished?
- 1.2 Reasoning: Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to make and evaluate mathematical conjectures, arguments, and to validate their own mathematical thinking. What evidence indicates that this is being accomplished?
- 1.3 Communication:
Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to use both oral and written discourse between teacher and candidates and among candidates to develop and extend candidates' mathematical understanding. What evidence indicates that this is being accomplished?
- 1.4 Connections:
Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to demonstrate an understanding of mathematical relationships across disciplines and connections within mathematics. What evidence indicates that this is being accomplished?
- 1.5 Programs prepare prospective teachers who can:
 - 1.5.1 apply concepts of number, number theory, and number systems;
 - 1.5.2 apply numerical computation and estimation techniques and extend them to algebraic expressions;
 - 1.5.3 apply the process of measurement to two- and three-dimensional objects using non-standard, customary and metric units;
 - 1.5.4 use geometric concepts and relationships to describe and model mathematical ideas and real-world constructs;
 - 1.5.5 understand the major concepts of Euclidean geometry from a variety of perspectives including coordinate and transformational;
 - 1.5.6 use both descriptive and inferential statistics to analyze data, make predictions, and make decisions;
 - 1.5.7 understand the concepts of random variable, distribution functions, and theoretical versus experimental probability and apply them to real-world situations;
 - 1.5.8 use algebra to describe patterns, relations, and functions, and to model and solve problems;
 - 1.5.9 understand the role of axiomatic systems and understand the use of proofs in different branches of mathematics, such as algebra and

- geometry;
- 1.5.10 have a firm conceptual grasp of limit, continuity, differentiation and integration, and a thorough background in the techniques and application of calculus;
- 1.5.11 have a knowledge of discrete mathematics and its concepts and applications of graph theory, recurrence relations, linear programming, difference equations, matrices, and combinatorics;
- 1.5.12 use mathematical modeling to solve problems from fields such as natural sciences, social sciences, business, and engineering; and
- 1.5.13 (Not applicable at this level)
- 1.5.14 understand and apply the concepts of linear and nonlinear algebra, and the major concepts of abstract algebra.

1.6 Programs prepare prospective teachers who have a knowledge of historical development in mathematics that includes the contributions of under- represented groups and diverse cultures.

2.0 TEACHING PREPARATION

2.1 Diverse Learner

Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to develop and use their knowledge of student diversity to affirm and support full participation and continued study of mathematics by all students. This diversity includes gender, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles.

2.2 Technology

Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to use appropriate technology to support the learning of mathematics. This technology includes, but is not limited to, computers and computer software, calculators, interactive

2.3 Assessment

Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to use:

- 2.3.1 formative and summative methods to determine students' understanding of mathematics and to monitor their own teaching effectiveness. How do you ensure that teacher candidates can carefully align their instructional and assessment practices?
- 2.3.2 formative assessment to monitor student learning and to adjust instructional strategies and activities. Formative assessment includes, but is not limited to, questioning strategies, student writing, student products, and student performance.
- 2.3.3 summative assessment to determine student achievement and to evaluate the mathematics program. Summative assessment includes, but is not limited to, teacher-designed tests, criterion-referenced tests, norm-referenced tests, portfolios, projects, and other open-ended student products.

- 2.4 Programs prepare prospective teachers who can identify, teach, and model problem solving in grades 6-12. How do you ensure that teacher candidates can do this effectively?
- 2.5 Programs prepare prospective teachers who use a variety of physical and visual materials for exploration and development of mathematical concepts in grades 6-12 (see Michigan Curriculum Framework, 1996, pages 46-62, and its successor documents). How is this evaluated?
- 2.6 Programs prepare prospective teachers who use a variety of print and electronic resources (e.g. calculators and computers).
- 2.7 Programs prepare prospective teachers who know when and how to use student groupings such as collaborative groups, cooperative learning, and peer teaching.
- 2.8 Programs prepare prospective teachers who use instructional strategies based on current research as well as national, state (i.e. Teaching and Learning Standards from Chapter 4 of Michigan Curriculum Framework, 1996, and its successor documents), and local standards relating to mathematics instruction.
- 2.9 Programs prepare prospective teachers who can work on an interdisciplinary team and in an interdisciplinary environment.
- 2.10 Programs introduce and involve prospective teachers in the professional community of mathematics educators.
- 2.11 Programs prepare prospective teachers to understand, use, and evaluate district mathematics curricula and to deliver the curriculum to each student.

3.0 FIELD-BASED EXPERIENCES

- 3.1 Programs provide prospective teachers with a sequence of planned opportunities prior to student teaching to observe and participate in 6-12 mathematics classrooms with qualified teachers. Experiences include observing, tutoring, mini-teaching, and planning mathematics activities and lessons for different mathematics courses and levels.
- 3.2 Programs provide prospective teachers with a full-time student teaching experience in 6-12 mathematics that is supervised by a qualified teacher and a university or college supervisor with 6-12 teaching experience and is knowledgeable regarding 6-12 mathematics.
- 3.3 Programs provide prospective teachers with time to confer with the supervising teacher and to do instructional planning.