

## **MS Mathematics Education Program Objectives**

### **Commitment to Mathematics Learning of All Students**

Accomplished mathematics teachers acknowledge and value individuality and worth of each student, believe that every student can learn and use mathematics, and use their knowledge of human development and individual students to guide their planning and instructional decisions. Accomplished mathematics teachers are committed to the fair and equitable treatment of all students - especially in their learning of mathematics and understand the impact or prior mathematical knowledge, home life, cultural background, individual learning differences, and student attitudes have on students and their mathematics learning. Upon completion of this program, candidates will/will be:

- 1.1 Base decisions about the teaching of mathematics on the belief that all students can learn
- 1.2 Dedicated to meeting the needs of a diverse student population, promoting academic and social equity and maintaining high expectations for all learners
- 1.3 Use knowledge of learners to determine instruction, building on strengths, interests, and experiences particular students bring to the mathematics classroom
- 1.4 Recognize the variability in student development as they mature, thoughtful of students' needs, and structures instruction so that mathematics content is accessible to all students at all levels
- 1.5 Take into account the individual needs and developmental levels of students when designing instruction.
- 1.6 Motivate students based on their needs, interests, and intrinsic motivation

### **Knowledge of Mathematics**

Accomplished mathematics teachers have a deep and broad knowledge of the concepts, principles, techniques, and reasoning methods of mathematics, and they use this knowledge to inform curricular goals and shape their instruction and assessment. They understand significant connections among mathematical ideas and the applications of these ideas to problem solving in mathematics, in other disciplines, and in the world outside of school. Upon completion of this program, candidates will:

- 2.1 Understand major ideas and core concepts related to Number Theory, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.2 Understand major ideas and core concepts related to functions, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.3 Understand major ideas and core concepts related to Algebra, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.4 Understand major ideas and core concepts related to Euclidean Geometry, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.5 Understand major ideas and core concepts related to non-Euclidean, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.6 Understand major ideas and core concepts related to general geometric constructs, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.7 Understand major ideas and core concepts related to Probability, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.8 Understand major ideas and core concepts related to sampling, descriptive statistics, and other statistical constructs; anticipate connections to mathematics instruction in grades 7-14; and maintain a fundamental knowledge base from which to build student mathematical understanding

- 2.9 Understand major ideas and core concepts related to inference, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.10 Understand major ideas and core concepts related to Calculus, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding
- 2.11 Understand major ideas and core concepts related to problem solving across all content areas, anticipate connections to mathematics instruction in grades 7-14, and maintain a fundamental knowledge base from which to build student mathematical understanding

### **Knowledge of the Practice of Teaching**

Accomplished mathematics teachers use their knowledge of pedagogy along with their knowledge of mathematics and student learning to inform curricular decisions; select, design, and develop instructional strategies and assessment plans; and choose materials and resources for mathematics instruction. Accomplished mathematics teachers stimulate and facilitate student learning by using a wide range of practices. Upon completion of this program, candidates will:

- 3.1 Include teaching strategies and best practices that engage students in exploring, discovering, and using mathematical ideas
- 3.2 Use knowledge of mathematics and students to make decisions as to what to communicate and how to communicate mathematics to students
- 3.3 Demonstrate appropriate use of technology in support of mathematics teaching and learning to advance student understanding in conceptual ways
- 3.4 Modify classroom plans and activities in response to student needs, interests, and unexpected opportunities for learning
- 3.5 Promote meaningful discourse through the well-conceived questions they pose and through the rich tasks they provide

### **Learning Environment**

Accomplished mathematics teachers create environments in which students are active learners, show willingness to take intellectual risks, develop self-confidence, and value mathematics. This environment fosters student learning of mathematics. Upon completion of this program, candidates will:

- 4.1 Use knowledge of how students learn to create a stimulating and productive environment in which students are empowered to do mathematics.
- 4.2 Establish an environment of trust, in which their students feel safe to communicate different points of view, to conduct open-ended explorations, to make mistakes, and to admit confusion or uncertainty in order to learn.

### **Ways of Thinking Mathematically**

Accomplished mathematics teachers develop their own and their students' abilities to reason and think mathematically-to investigate and explore patterns, to discover structures and establish mathematical relationships, to formulate and solve problems, to justify and communicate conclusions, and to question and extend those conclusions. Upon completion of this program, candidates will:

- 5.1 Bring insight about mathematics to students, including new perspectives on standard problems and unexpected connections among different fields
- 5.2 Proficient in not only solving problems, but also in helping student be aware of different strategies for solving a problem, as well as the relative merits of and connections between each
- 5.3 Recognize that mastering mathematical facts and procedures is only a part of what it means to learn mathematics
- 5.4 Recognize the importance of developing students' understanding of and dispositions to do mathematics
- 5.5 Provide students with problems and applications that will allow them to explore new mathematical content, reflect on the problem-solving process, extend and refine their thinking, make generalizations about the procedures they have used, and link those generalizations with what they have learned previously

## **Assessment**

Accomplished mathematics teachers integrate a range of assessment methods into their instruction to promote the learning of all students by designing, selecting, and ethically employing assessments that align with educational goals. They provide opportunities for students to reflect on their strengths and weaknesses in order to revise, support, and extend their individual performance. Upon completion of this program, candidates will:

- 6.1 View ongoing assessment as an integral part of instruction, benefitting both the teacher and the student
- 6.2 Help students develop the ability to self-monitor and evaluate personal progress
- 6.3 Use formative assessment results to modify their lessons and learning opportunities and activities

## **Reflection and Growth**

To improve practice, accomplished mathematics teachers regularly reflect on what they teach, how they teach, and how their teaching impacts student learning. They keep abreast of changes and learn new mathematics and mathematical pedagogy, continually improving their knowledge and practice. Upon completion of the program, candidates will:

- 7.1 Regularly engage in solving problems in which solutions are not obvious
- 7.2 Keep abreast of strategies for improving mathematics learning and teaching through such activities as reading professional journals, dialoguing with peers, attending meetings and conferences, and participating in professional organizations
- 7.3 Constantly reflect on ways to improve curriculum, pedagogy, assessment, and the student learning environment