

# PAGE: MATHEMATICS (X.MATH)

## **X.MATH-400 Developing Mathematical Ideas: Building a System of Tens** *Fall. Credits: 2*

Participants will explore the base-ten structure of the number system, consider how that structure is exploited in multi-digit computational procedures, and examine how basic concepts of whole numbers reappear when working with decimals. They will study the various ways children naturally tend to think about separating and combining numbers and what children must understand in order to work with numbers in these ways.

*Applies to requirement(s): Meets No Distribution Requirement*  
*N. Dupre-Edelman, T. Jemison*

*Restrictions: This course is offered for graduate students only.*

## **X.MATH-401 Developing Mathematical Ideas: Making Meaning for Operations**

*Fall. Credits: 2*

This course provides opportunities for participants to examine the actions and situations modeled by the four basic operations. The course will begin with a view of young children's counting strategies as they encounter word problems, moves to an examination of the four basic operations on whole numbers, and revisits the operations in the context of rational numbers.

*Applies to requirement(s): Meets No Distribution Requirement*  
*D. Peart, S. Rozko*

*Restrictions: This course is offered for graduate students only.*

## **X.MATH-402 Developing Mathematical Ideas: Examining Features of Shape**

*Credits: 2*

Participants examine aspects of two-dimensional and three-dimensional shapes, develop geometric vocabulary, and explore both definitions and properties of geometric objects. The seminar includes a study of angle, similarity, congruence, and the relationships between three-dimensional objects and their two-dimensional representations. Participants examine how students develop these concepts through analyzing print and video cases as well as reading and discussing research articles.

*Applies to requirement(s): Meets No Distribution Requirement*  
*K. Schweitzer*

## **X.MATH-404 Developing Mathematical Ideas: Modeling With Data**

*Not Scheduled for This Year. Credits: 2*

Participants will work with the collection, representation, description, and interpretation of data. They will learn what various graphs and statistical measures show about features of the data, study how to summarize data when comparing groups, and consider whether the data provides insight into the questions that led to data collection.

*Applies to requirement(s): Meets No Distribution Requirement*  
*S. Hedgepeth*

## **X.MATH-405 Developing Mathematical Ideas: Measuring Space in One, Two, and Three Dimensions**

*Credits: 2*

Participants will examine different aspects of size, develop facility in composing and decomposing shapes, and apply these skills to make sense of formulas for area and volume. They will also explore conceptual issues of length, area, and volume, as well as their complex interrelationships.

*Applies to requirement(s): Meets No Distribution Requirement*  
*K. John, K. Schweitzer*

## **X.MATH-406 Developing Mathematical Ideas: Patterns, Functions, and Change**

*Not Scheduled for This Year. Credits: 2*

Participants discover how the study of repeating patterns and number sequences can lead to ideas of functions, learn how to read tables and graphs to interpret phenomena of change, and use algebraic notation to write function rules. With a particular emphasis on linear functions, participants also explore quadratic and exponential functions and examine how various features of a function are seen in graphs, tables, or rules. Participants examine how students develop these concepts through analyzing print and video cases as well as reading and discussing research articles.

*Applies to requirement(s): Meets No Distribution Requirement*  
*The department*

*Advisory: Intended for practicing teachers.*

## **X.MATH-407 Developing Mathematical Ideas: Reasoning Algebraically About Operations**

*Fall and Spring. Credits: 2*

Participants examine generalizations at the heart of the study of operations in the elementary grades. They express these generalizations in common language and in algebraic notation, develop arguments based on representations of the operations, study what it means to prove a generalization, and extend their generalizations and arguments when the domain under consideration expands from whole numbers to integers.

*Applies to requirement(s): Meets No Distribution Requirement*  
*K. Schweitzer*

## **X.MATH-415 Early Numeracy Assessment and Instruction I**

*Spring. Credits: 2*

This course helps teachers identify and address challenges students are having with K-2 math skills. Interview assessments that help teachers develop strategies to monitor and support progress in number words and numerals, structuring numbers, and addition and subtraction are learned and put into practice. Through assessments, data and teaching tools, teachers will recognize their students' current levels of numeracy and make data-driven instructional decisions. This course supports Pk-2 educators with core instruction, and Pk-8 educators working with students who haven't yet learned the Pk-2 standards. This course provides a certificate of completion from the US Math Recovery Council.

*Applies to requirement(s): Meets No Distribution Requirement*  
*M. Carrington*

*Restrictions: This course is offered for graduate students only.*

*Notes: Materials fee: \$150*

## **X.MATH-417 Data Informed Tiered II Numeracy Instruction**

*Credits: 1*

This course will support participants as they implement math interview assessments and instructional techniques learned in the X.MATH-415 Early Numeracy I course or Add+VantageMR Course 1 Professional Development course. Participants will unpack a learning trajectory that best fits their students' needs. Then, participants will analyze data from interview assessments and receive support as they implement and design strengths-based instruction for their students. Participants will receive, share, and provide feedback to each other as they try new instructional and assessment techniques in their classroom.

*Applies to requirement(s): Meets No Distribution Requirement*  
*M. Carrington*

*Prereq: X.MATH-415.*

*Advisory: Students who completed Add+VantageMR Course 1 Professional Development can provide a certificate of completion if they haven't taken X.MATH-415.*

### **X.MATH-424 Developing Mathematical Reasoning**

*Spring. Credits: 4*

Developing Mathematical Reasoning (DMR) builds on and extends the work of Connecting Arithmetic to Algebra. Participants will work with a five-phase model for instruction in mathematical argument: Noticing, Articulating, Representing Specific Instances, Creating Mathematical Argument, and Comparing and Contrasting Operations. They will examine and implement a set of lessons designed to engage their own students with generalizations about the operations using these phases of instruction. DMR investigates how this approach to mathematics thinking supports a range of mathematics learners including those who have difficulty with grade-level mathematics and those who need additional challenge.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, J.Szymaszek*

*Restrictions: This course is offered for graduate students only.*

*Advisory: X.MATH-460 Connecting Arithmetic to Algebra.*

### **X.MATH-426 Rational Numbers Assessment and Instruction**

*Fall. Credits: 3*

Rational Numbers Assessment and Instruction focuses on how students working with whole numbers can more meaningfully understand fractions. In this course we explore fractions as relationships between the whole and the parts, as measures, and as unique numbers with meaning. Educators will learn how to observe their students' mathematical thinking through activities, and strategies for engaging students. Throughout the semester educators will be asked to implement strategies with students in a classroom setting, and share and explore what they found together.

*Applies to requirement(s): Meets No Distribution Requirement*

*The department*

*Notes: Materials fee: \$150*

### **X.MATH-460 Connecting Arithmetic to Algebra**

*Fall. Credits: 4*

Connecting Arithmetic to Algebra (CAA) is a year-long professional development experience in which teachers consider generalizations that arise from the study of number and operations in grades 1 through 7. They examine cases of students who are engaged in the process of articulating general claims, working to understand those claims, and learning how to prove them. The course also focuses on how this approach to mathematical thinking supports a range of mathematics learners, including those who have difficulty with grade-level mathematics and those who need additional challenge.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, K. Scott*

*Restrictions: This course is offered for graduate students only.*