

# Master of Arts in Education

Mathematics  
Education Specialist  
Grades 1-6

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2014 Handbook

Lindenwood University

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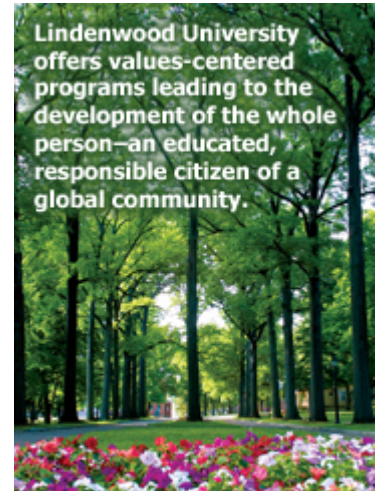
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# Welcome to Lindenwood University School of Education!

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**Welcome! Lindenwood University is a thriving institution with a variety of undergraduate and graduate programs with locations across Missouri and Illinois, in addition to online offerings.**

The School of Education is one of the largest schools at this institution and in the state of Missouri. However, here at Lindenwood, we pride ourselves on our student-centered approach, advising by actual faculty members, and our open door policy so you never feel like a number. The faculty not only has the appropriate academic credentials, but also extensive experience in a wide variety of schools as teachers, counselors, principals, librarians, and leaders at all levels. The faculty is truly vested in providing the best opportunity for all students to succeed.



Lindenwood University prides itself in providing a support network for students who need extra assistance in attaining their goals. Lindenwood provides assistance to students through the Student and Academic Support Services (SASS). SASS supports the Lindenwood University student community through academic engagement, problem resolution, service learning opportunities, and provision of resources. We are committed to a student-centered environment reinforcing retention and persistence to graduation by encouraging academic and individual development, along with social responsibility.

Do you already have a master’s degree but still want an additional certification? That is also an option at Lindenwood University.

**The Master of Arts in Education programs offer opportunities for teachers and professionals to improve their practice in many different areas of study including:**

Teaching English to Speakers of Other Languages (TESOL)

Library Media

Special Reading K-12

Gifted Education Certification

Special Education K-12



Character Education

Autism Spectrum Disorders K-12

Early Interventions in Autism and Sensory Impairments

Educational Technology

Mathematics Education Specialist 1-6

School Administration

## Program Overview

**The Master of Arts in Education with an emphasis in Mathematics Specialist Grades 1-6, is designed to train teacher leaders to provide support for elementary classroom teachers.**

Students will study mathematics concepts, teaching pedagogy, and leadership strategies in a program focused on four major content strands: Numbers and Operations; Geometry and Measurement; Algebraic Reasoning; and Data, Statistics and Probability. The program will also provide valuable leadership training for the emphasis in Grades 1-6 Mathematics Education.

*Note: The program is open to educators certified in the areas of early childhood (B-3), elementary (1-6), middle school (5-9), secondary (9-12), or a K-12 subject content area.*

A minimum of 10 hours of prerequisite coursework is required in the area of mathematics is expected for admission to the program from the areas of Basic Statistics, College Algebra, Pre-Calculus, Elementary Functions, Survey of Calculus, and Computer Science.

To obtain certification as a Mathematics Education Specialist, Grades 1-6, through Missouri State Department of Elementary and Secondary Education (MODESE), candidates will need to complete the designated assessment and show evidence of a minimum of two years of mathematics teaching experience. Please, contact MODESE for details. The master's degree can be earned by students who do not seek the state certification.

Twelve hours of core coursework is required for the degree from the following areas: Analysis of Teaching & Learning, Conceptualization of Education, Educational Research, and Curriculum Analysis & Design. Sixteen hours of core conceptual mathematics coursework and seminar/internship study is required in the areas of Numbers and Operations; Geometry and Measurement; Algebraic Reasoning; and Data, Statistics and Probability. Nine hours of coursework in mathematics leadership is a required part of the program of study.

The program is designed to pair each core conceptual mathematics course with a seminar and internship course to provide student connections to mathematics application, leadership skills, and research in the area of mathematics education.



## Aligned Course Goals and Objectives

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- Students will identify strategies to establish and sustain professional communities of learners that promote the identified vision of learning established by the district.
- Students will examine the importance of a vision of learning that promotes the success of all students based upon building and district goals.
- Students will identify strategies to establish and sustain professional communities of learners.
- Students will examine the importance of a vision of learning to guide instructional strategies.
- The student designs and implements individualized instruction for students based on their prior experience, learning styles, strengths, and needs.
- The student knows the discipline applicable to the certification area(s) as defined by Subject Competencies for Beginning Teachers in Missouri;
- The student selects and creates learning experiences that are appropriate for curriculum goals, relevant to learners, and based upon principles of effective instruction.
- Students will examine learning processes utilized by young and adult learners of mathematics.
- Students will identify additional communication strategies for use within the school setting.
- Students will identify strategies to establish and sustain professional communities of learners (students and/or educators).
- Students will examine the importance of awareness of and contribution to policy formation and professional organizations in the areas of teaching and learning mathematics.
- The student knows theories of learning.

Instructional programs from prekindergarten through grade 6 should enable all students to promote in their colleagues the ability to —

- Organize and consolidate their mathematical thinking through communication; Communicate their mathematical thinking coherently and clearly to peers, teachers, and others; Analyze and evaluate the mathematical thinking and strategies of others; Use the language of mathematics to express mathematical ideas precisely (NCTM).
- Recognize and use connections among mathematical ideas; Understand how mathematical ideas interconnect and build on one another to produce a coherent whole; Recognize and apply mathematics in contexts outside of mathematics (NCTM).
- Create and use representations to organize, record, and communicate mathematical ideas; Select, apply, and translate among mathematical representations to solve problems; Use representations to model and interpret physical, social, and mathematical phenomena (NCTM).

# Program Admission

## Admission Standards

Lindenwood University consciously seeks a diverse student body and welcomes applicants from all socioeconomic, religious, and ethnic backgrounds. The University also values geographic diversity and welcomes international students. Admission to graduate programs is granted to students who demonstrate academic preparedness and the potential for academic excellence. Applications for admission to Lindenwood University graduate programs will be reviewed by the Director of Evening Admissions and Dr. Sherrie Wisdom.

## Application Procedures

Apply by visiting the Office of Evening and Graduate Admissions at the Lindenwood University Welcome Center on the St. Charles campus, any of the extension centers, or online at the following address: <https://applylu.lindenwood.edu/login.asp>

To be considered for admission to the University, an applicant’s file must include each of the following documents:

- Electronic or paper application, along with a non-refundable \$30 application fee.
- Current resume.
- An official undergraduate transcript as well as official transcript(s) from any graduate school(s) attended if transfer credit is desired.
- A copy of applicant’s valid teaching certificate.

## Model II Specialty Area: Mathematics Education Specialist Elementary K-6

Model II programs do not lead to additional certification. These programs allow the student to develop extensive expertise in a specific content area. The student and the faculty advisor will design a comprehensive program in the content area. The program includes four core courses required of all graduate students in education. The remaining credit hours will be selected by the student in consultation with the advisor from existing graduate courses to meet individual needs.

For the Mathematics Education Specialist, Grades 1-6, the incoming student should possess a bachelor’s degree, with minimum GPA of 3.0. Education of the Exceptional Child is a prerequisite to the master’s degree program. Applicants must hold a valid teaching certification. For certification purposes, completion of two successful years of teaching mathematics is expected. Students should contact MODESE for specific information concerning certification requirements, including the certification assessment expected.



"Teaching and Leading as an Art and a Science"

## Lindenwood University School of Education Program Planning Worksheet MASTER OF ARTS in EDUCATION With an emphasis in Mathematics Specialist (Grades 1-6)

Name:		ID:	
Phone:		Lionmail:	
Certification Area:		Sem Start at LU:	
Degree Area Verified:		Emphasis Verified:	
Advisor:		Advisor:	

**For maximum program success, all students must initial to demonstrate he/she understands each item:**

To complete the Master of Arts in Education all students must:

1. \_\_\_\_\_ Possess a baccalaureate degree from an accredited college or university with a minimum GPA of 3.0 on a 4.0 scale.
2. \_\_\_\_\_ Complete application procedures for admission to the university, pay required fees, and be approved by the Dean.
3. \_\_\_\_\_ Applicants must hold a valid teaching certificate. For certification, must have completed two successful years teaching mathematics. Contact DESE for current certification status and requirements.
4. \_\_\_\_\_ Program Prerequisites: Teacher certification with a minimum of 10 hours of mathematics from the following: MTH 134, MTH 135, MTH 141, MTH 151, MTH 152, MTH 170, CSC 100. (Substitution may be made with advanced mathematics coursework in the same subject areas.)
5. \_\_\_\_\_ Complete the 12 hours of core course work and 25 semester hours of graduate course work from the content specialty list to earn the Master of Arts in Education.  
Contact DESE for current certification requirements. At the time of course development, this is only a PROPOSED certification area. If approved as a certification area by DESE, additional requirements may be required by DESE; such as PRAXIS exam.
6. \_\_\_\_\_ Maintain a GPA of 3.0 or higher.
7. \_\_\_\_\_ Education of the Exceptional Child is a prerequisite for the Master of Arts in Education degree.
8. \_\_\_\_\_ Select the Master of Arts Project (EDU 60000) OR Curriculum Analysis and Design (EDU 52000) to fulfill final degree requirements.
9. \_\_\_\_\_ Complete the degree requirements within five calendar years from the first day of the first term in which program commenced.  
candidacy for the degree.
10. \_\_\_\_\_ Graduation application submitted by deadline.

\* Transfer and Workshop Credit:

11. \_\_\_\_\_ No more than 9 semester hours from other accredited institutions approved by the Dean and Registrar.
12. \_\_\_\_\_ All transfer credits must carry a letter grade of "B" or higher from official transcript.
13. \_\_\_\_\_ No Pass/Fail or Credit courses accepted.
14. \_\_\_\_\_ All transfer credit must be relevant to proposed program and completed within last 7 years.
15. \_\_\_\_\_ Once admitted, prior permission from Dean and Registrar must be obtained to apply credit from other college or university towards degree.
16. \_\_\_\_\_ Up to 6 credit hours may be accepted from approved workshops. If from other institution, would be counted towards approved transfer credit limit of 9 hours..

Core Courses Required for Degree	Hours	Semester Completed	Transferred	Grade	Notes
EDU 50500 Analysis of Teaching & Learning	3				
EDU 51000 Conceptualization of Education	3				
EDU 57000 Educational Research	3				
EDU 52000 Curriculum Analysis and Design or EDU 60000 Master of Arts Project	3				
Administration Courses	Hours	Semester Completed	Transferred	Grade	Notes
EDM 53000 Numbers and Operations	3				Take Seminar with Internship I concurrently.
EDM 53500 Seminar w Internship I Numbers and Operations	1				Take Numbers and Operations concurrently.
EDM 54000 Geometry and Measurement	3				Take Seminar with Internship II concurrently.





EDM 54500 Seminar w Internship II Geometry and Measurement	1				Take Geometry and Measurement concurrently.
EDM 55000 Algebraic Reasoning	3				Take Seminar with Internship III concurrently.
EDM 55500 Seminar w Internship III Algebraic Reasoning	1				Take Algebraic Reasoning concurrently.
EDM 56000 Data Analysis, Statistics, and Probability	3				Take Seminar with Internship IV concurrently.
EDM 56500 Seminar w Internship IV Data Analysis, Statistics, and Probability	1				Take Data Analysis, Statistics, and Probability concurrently.
EDM 58000 Foundations of Mathematics Education Leadership	3				
EDM 58090 Mathematics Leadership: Influencing and Facilitating Improvement	3				
EDM 58095 Elementary Mathematics Specialists: Influencing and Facilitating Improvement	3				
<b>Total Program Hours</b>	<b>37</b>				

Revised 1/2011, 3/2013

## Course Descriptions and Offerings

<i>Core Curriculum</i>		
EDU 50500	Analysis of Teaching and Learning Behavior	3
EDU 51000	Conceptualization of Education	3
EDU 57000	Educational Research	3
EDU 52000	Curriculum Design <b>or</b>	3
EDU 60000	Master's Project	3
<i>Mathematics-Specialist Curriculum</i>		
EDM 53800	Numbers and Operations	3
EDM 53900	Seminar with Internship I-Numbers and Operations	1
EDM 54000	Geometry and Measurement	3
EDM 54500	Seminar with Internship II-Geometry and Measurement	1
EDM 55000	Algebraic Reasoning	3
EDM 55500	Seminar with Internship III-Algebraic Reasoning	1
EDM 56000	Data Analysis, Statistics, and Probability	3
EDM 56500	Seminar with Internship IV-Data Analysis, Statistics, and Probability	1
EDM 58000	Foundations of Mathematics Educational Leadership	3
EDM 58090	Mathematics Leadership: Influencing and Facilitating Improvement	3
EDM 58095	Elementary Mathematics Specialists: Influencing and Facilitating Improvement	3

### **EDM 53800 Numbers and Operations (3)**

This course will focus on the content and complexities of teaching and assessing number and operations in an elementary classroom setting. Candidates will develop an expertise related to number and operations that will support teachers and enhance student learning. Candidates will also examine the learning trajectories as children develop number concepts and skills. Course content will include multiple representations, computational strategies, relationships, and meanings related to number and operations. To be taken concurrently with EDM 53900 Seminar with Internship I – Numbers and Operations (1).

### **EDM 53900 Seminar with Internship I – Numbers and Operations (1)**

To develop depth of understanding, candidates will analyze teaching and learning of number and operations across the 1 - 6 grade levels through a variety of clinical experience [e.g. examine

curriculum implementation, diagnose students, synthesize assessments, determine interventions, and develop instructional plans]. Other course activities will include seminar discussions, reflective papers, and field journals. To be taken concurrently with EDM 53800 Numbers and Operations (3).

**EDM 54000 Geometry and Measurement (3)**

This course will focus on the content and complexities of teaching and assessing geometry and measurement in an elementary classroom setting. Candidates will develop an expertise related to geometry and measurement that will support teachers and enhance student learning. Candidates will also examine the learning trajectories as children develop geometry and measurement concepts and skills. Course content will include geometric properties and relationships, visualization and spatial reasoning, adaptive reasoning, and measurement in multiple dimensions. To be taken concurrently with EDM 54500 Seminar with Internship II – Geometry and Measurement (1).

**EDM 54500 Seminar with Internship II – Geometry and Measurement (1)**

To develop depth of understanding, candidates will analyze teaching and learning of geometry and measurement across the 1 - 6 grade levels through a variety of clinical experience [e.g. examine curriculum implementation, diagnose students, synthesize assessments, determine interventions, develop instructional plans]. Other course activities will include seminar discussions, reflective papers, and field journals. To be taken concurrently with EDM 54000 Geometry and Measurement (3).

**EDM 55000 Algebraic Reasoning (3)**

This course will focus on the content and complexities of teaching and assessing algebraic reasoning in an elementary classroom setting. Candidates will develop an expertise related to algebraic reasoning that will support teachers and enhance learning. Candidates will also examine the learning trajectories as children develop algebraic reasoning concepts and skills. Course content will include examination of representation and analysis of mathematic situations and structures. Attention will be given to patterns, functions, and the transition from arithmetic to algebra. To be taken concurrently with EDM 55500 Seminar with Internship III – Algebraic Reasoning (1).

**EDM 55500 Seminar with Internship III – Algebraic Reasoning (1)**

To develop depth of understanding, candidates will analyze teaching and learning of algebraic reasoning across the 1 - 6 grade levels through a variety of clinical experience [e.g. examine curriculum implementation, diagnose students, synthesize assessments, determine interventions, develop instructional plans]. Other course activities will include seminar discussions, reflective papers, and field journals. To be taken concurrently with EDM 55000 Algebraic Reasoning (3).

**EDM 56000 Data Analysis, Statistics, and Probability (3)**

This course will focus on the content and complexities of teaching and assessing data analysis, statistics, and probability in an elementary classroom setting. Candidates will develop an expertise related to data analysis, statistics and probability that will support teachers and enhance student learning. Candidates will also examine the learning trajectories as children develop data analysis, statistics, and probability concepts and skills. Course content will include the essentials

of probability and statistics including designing data investigations, describing data, drawing conclusions and making inferences. To be taken concurrently with EDM 56500 Seminar with Internship IV – Data Analysis, Statistics, and Probability (1).

### **EDM 56500 Seminar with Internship IV – Data Analysis, Statistics, and Probability (1)**

To develop depth of understanding, candidates will analyze teaching and learning of data analysis, statistics, and probability across the 1 - 6 grade levels through a variety of clinical experience [e.g. examine curriculum implementation, diagnose students, synthesize assessments, determine interventions, and develop instructional plans]. Other course activities will include seminar discussions, reflective papers, and field journals. To be taken concurrently with EDM 56000 Data Analysis, Statistics, and Probability (3).

### **EDM 58000 Foundations of Mathematics Education Leadership (3)**

In this introductory course, candidates will develop an understanding of the role of mathematics education leaders and the challenges leaders face including implementing national and state standards, increasing mathematics content knowledge of teachers, enhancing the pedagogical skills of teachers, and utilizing and interpreting assessments of student understanding. Course content focuses on students as mathematics learners, teachers as learners, and the design, teaching, and evaluation of inquiry-based lessons.

### **EDM 58090 Mathematics Leadership: Influencing and Facilitating Improvement (3)**

In this course, candidates will explore research and practice related to teamwork, interaction, communication, conflict resolutions, and leadership in k-12 schools. Candidates will also examine effective strategies for influencing and facilitating school / district improvement.

### **EDM 58095 Elementary Mathematics Specialists: Influencing and Facilitating Improvement (3)**

In this course, candidates will examine the complexities and challenges related to the roles of elementary mathematics specialists including mathematics coaching, mentoring novice teachers, and facilitating professional development. Candidates will explore effective models and strategies related to professional development and working with adult learners.

## Field Experience/Internship/Practicum

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Each of the four core mathematics courses required for the M.A.E. emphasis area of Mathematics Specialist, Grades 1 – 6, Numbers and Operations; Geometry and Measurement; Algebraic Reasoning; and Data, Statistics and Probability, require the student to enroll in a companion seminar and internship course. Completion of the core course earns three hours of credit, while the seminar and internship course is offered for one hour of course credit.

Participation in the core course allows the student explore the necessary mathematics concepts needed by the elementary classroom teacher to effectively share course content with elementary-aged students. Additionally, age-appropriate activities will be discussed and modeled in the course. The seminar and internship will promote opportunities for reading the latest mathematics research, discussion of data-driven decision-making with regard to the mathematics classroom, opportunity for observation of teachers of varied experience backgrounds in action, and further exploration of the leadership skills necessary to fulfill the role of Mathematics Education Specialist for Grades 1- 6.

The seminar and internship course activities are assigned, discussed, and led by the teacher of the companion core course. Discussion will be held in class; assignments and activities will be completed by the student outside of class.

Assessment for all activities is at the discretion of the individual course instructor and can include oral examination, written examination, project or research assignment, and presentation to the class.

## Frequently Asked Questions

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**1. Where do I find the application of admission to the master's degree program?**

<http://www.lindenwood.edu/admissions/graduate/index.html>

**2. How do I get an advisor?**

After you have completed the application process, please contact the education office at (636) 949-4844 or the Assistant Dean at (636) 949-4435 to be assigned to an advisor.

**3. Where will I park and do I need a parking sticker?**

There are several parking lots on campus along with on street parking. It is wise to get a parking sticker. The cost is minimal. See the web address below for more information.

<http://www.lindenwood.edu/current/graduate/idParking.html>

**4. How much will tuition cost?**

Current educators receive an educator grant deduction of \$60.00 per credit hour. Just make sure that the admissions advisor designates you as an educator. The cost of tuition varies by year so it is best to check with the business office or on the Lindenwood website for the latest tuition fees.

**5. Who will evaluate my transcript?**

DESE will evaluate your transcript and indicate which classes you will need to be certified. You will need to apply to add the certification by completing the DESE form located on the DESE website. Additionally you will need to request a transcript from Lindenwood University. You should furnish Academic Services with a copy of your form so that they can send it directly to DESE.

**6. How is the job market and do districts only hire from within?**

Districts look for the most qualified candidates to hire. No one can predict that there will always be job openings but you can rest assured that literacy will always be at the forefront of the educational system.

### 7. Can I get a provisional certificate?

DESE will indicate on your evaluation whether or not you are eligible for a provisional certificate.

### 8. How long will it take for me to complete the program?

A student can usually complete the degree program in two years. This will vary with the number of classes taken per semester. Those students seeking certification only will complete the certification classes much faster depending on how many classes they need according to the DESE evaluation.

### 9. What do I have access to as a student?

As a student at Lindenwood University you have access to many amenities such as a Fitness center, Butler Library with printing capabilities, computer labs on Lindenwood University's campus and at extension centers, a writing center, online tutoring services that are available 24 hours a day, a Lionmail email account, career development, the Student Counseling and Resource Center, and more. Students who are campus residents have access to the Student Health Center in the Spellmann Center.

**Fitness Center** is open to students only. You must present your I.D. upon arrival. The hours of operation are: Monday – Friday 6 a.m. – 1 a.m. and Saturday and Sunday 10 a.m. – 1 a.m.

**Writing Center** is located in the lower level of the library. You can receive help with the writing process of your research assignments. For more information: (636) 949-4870.

**Butler Library** allows you to have access to Mobius, Worldcat, E books, audiobooks, writing center, wireless services, and laptops.

For library hours, staff, reference services, and other information, go to <http://library.lindenwood.edu/>.

**Career Development** assists undergraduates and graduate students with searching and applying for jobs and interviewing. The career center has plenty of written handouts that will assist students with preparation for an interview and career searches. For more information, please contact Dana Wehrli, Director of Career Development, at (636) 949-4806 or Brandi Goforth, Assistant Director of Career Development, at (636) 949-4307.

**10. What kind of housing is available to undergrad and grad students?**

There are graduate housing opportunities located minutes from the campus. Lindenwood University owns an apartment community and several homes in a nearby neighborhood. For further inquiries please call: Michelle Giessman at (636) 949-4848, located on the third floor of Spellmann Center.

**11. What are the main buildings on campus, where are they, and what schools are housed or what subjects do they house, typically.**

On the Heritage campus:

**Roemer - located inside Roemer are the following offices:**

- accounting
- Business Office
- student refunds
- payroll/human resources
- accounts payable
- LCIE/GRAD business offices
- the executive offices
- In the lower level of Roemer are Financial Aid and Academic Services

**Academic Services has the following services:**

- Academic Appeal Letter Requirements
- AP Exam Credits - LU Transfer Equivalencies
- Application for Degree



- Degree Verification

National Student Clearinghouse  
13454 Sunrise Valley Drive, Suite 300  
Herndon, VA 20171  
degreeverify@studentclearinghouse.org  
Phone: (703) 742-4200  
Fax: (703) 742-4239

- Diploma Reprint Request

- Enrollment Verifications and Loan Deferments

- Petition for Policy Exemption

- Request for VA Certification

- Transcript Requests

- Transfer student evaluations

Academic Services can be reached at: (636) 949-4954

## **12. How do students apply to be a graduate assistant?**

Any student interested in becoming a graduate assistant should contact Samantha Shadrach (636) 627-2562.

Appendix

**Table 1a. Math Specialist, K-5, Certification Matrix for Core Content**

<b>Educational Specialist With an emphasis in K - 5 Mathematics Education Specialist</b>	<b>Number and Operations</b>	<b>Algebraic Reasoning</b>	<b>Geometry and Measurement</b>	<b>Data Analysis, Statistics, and Probability</b>	<b>Seminar with Internship I – Number and Operations</b>	<b>Seminar with Internship II – Geometry and Measurement – 1 hour</b>	<b>Seminar with Internship III – Algebraic Reasoning</b>	<b>Seminar with Internship IV – Data Analysis, Statistics, and Probability</b>
<b>National Council of Teachers of Mathematics</b>								
<b>Standards</b>								
<b>Number and Operations</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable all students to—</b>								
Understand numbers, ways of representing numbers, relationships among numbers, and number systems	X	X	X	X	X	X	X	X
Understand meanings of operations and how they relate to one another	X	X	X	X	X	X	X	X
Compute fluently and make reasonable estimates	X	X	X	X	X	X	X	X
<b>Understand numbers, ways of representing numbers, relationships among numbers, and number systems</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								
· count with understanding and recognize "how many" in sets of objects;	X							
· use multiple models to develop initial understandings of place value and the base-ten number system;	X							



· develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections;	X								
· develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing, and decomposing numbers;	X								
· connect number words and numerals to the quantities they represent, using various physical models and representations;	X								
· understand and represent commonly used fractions, such as $\frac{1}{4}$ , $\frac{1}{3}$ , and $\frac{1}{2}$ .	X								
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should–									
· understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals;	X								
· recognize equivalent representations for the same number and generate them by decomposing and composing numbers;	X								
· develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers;	X								
· use models, benchmarks, and equivalent forms to judge the size of fractions;	X								
· recognize and generate equivalent forms of commonly used fractions, decimals, and percents;	X								
· explore numbers less than 0 by extending the number line and through familiar applications;	X								
· describe classes of numbers according to characteristics such as the nature of their factors.	X								
<b>Understand meanings of operations and how they relate to one another</b>									
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should–									
· understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations;	X								
· understand the effects of adding and subtracting whole numbers;	X								
· understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally.	X								
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should–									
· understand various meanings of multiplication and division;	X								
· understand the effects of multiplying and dividing whole numbers;	X								
· identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;	X								
· understand and use properties of operations, such as the distributivity of multiplication over addition.	X								
<b>Compute fluently and make reasonable estimates</b>									
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should–									

· develop and use strategies for whole-number computations, with a focus on addition and subtraction;	X							
· develop fluency with basic number combinations for addition and subtraction;	X							
· use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.	X							
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as $30 \times 50$ ;	X							
· develop fluency in adding, subtracting, multiplying, and dividing whole numbers;	X							
· develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results;	X							
· develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience;	X							
· use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals;	X							
· select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools.	X							
<b>Algebra</b>								
<b>Instructional programs from prekindergarten through grade 12</b>								
<b>should enable all students to—</b>								
Understand patterns, relations, and functions	X	X	X	X	X	X	X	X
Represent and analyze mathematical situations and structures using algebraic symbols	X	X	X	X	X	X	X	X
Use mathematical models to represent and understand quantitative relationships	X	X	X	X	X	X	X	X
Analyze change in various contexts	X	X	X	X	X	X	X	X
<b>Understand patterns, relations, and functions</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								
· sort, classify, and order objects by size, number, and other properties;		X						
· recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another;		X						
· analyze how both repeating and growing patterns are generated.		X						
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· describe, extend, and make generalizations about geometric and numeric patterns;		X						
· represent and analyze patterns and functions, using words, tables, and graphs.		X						



<b>Represent and analyze mathematical situations and structures using algebraic symbols</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								
· illustrate general principles and properties of operations, such as commutativity, using specific numbers;		X						
· use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations.		X						
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers;		X						
· represent the idea of a variable as an unknown quantity using a letter or a symbol;		X						
· express mathematical relationships using equations.		X						
<b>Use mathematical models to represent and understand quantitative relationships</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								
· model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols.		X						
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.		X						
<b>Analyze change in various contexts</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								
· describe qualitative change, such as a student's growing taller;		X						
· describe quantitative change, such as a student's growing two inches in one year.		X						
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—		X						
· investigate how a change in one variable relates to a change in a second variable;		X						
· identify and describe situations with constant or varying rates of change and compare them.		X						
<b>Measurement Standard</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable all students to—</b>								
Understand measurable attributes of objects and the units, systems, and processes of measurement	X	X	X	X	X	X	X	X
Apply appropriate techniques, tools, and formulas to determine measurements.	X	X	X	X	X	X	X	X
<b>Understand measurable attributes of objects and the units, systems, and processes of measurement</b>								
<b>Pre-K–2 Expectations:</b> In pre-K through grade 2 all students should—								

· recognize the attributes of length, volume, weight, area, and time;			X					
· compare and order objects according to these attributes;			X					
· understand how to measure using nonstandard and standard units;			X					
· select an appropriate unit and tool for the attribute being measured.			X					
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;			X					
· understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems;			X					
· carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;			X					
· understand that measurements are approximations and how differences in units affect precision;			X					
· explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way.			X					
<b>Apply appropriate techniques, tools, and formulas to determine measurements.</b>								
<b>Pre-K–2 Expectations:</b> In prekindergarten through grade 2 all students should—								
· measure with multiple copies of units of the same size, such as paper clips laid end to end;			X					
· use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick;			X					
· use tools to measure;			X					
· develop common referents for measures to make comparisons and estimates.			X					
<b>Grades 3–5 Expectations:</b> In grades 3–5 all students should—								
· develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;			X					
· select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles;			X					
· select and use benchmarks to estimate measurements;			X					
· develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms;			X					
· develop strategies to determine the surface areas and volumes of rectangular solids.			X					
<b>Data Analysis and Probability</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable all students to—</b>								
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	X	X	X	X	X	X	X	X
Select and use appropriate statistical methods to analyze data	X	X	X	X	X	X	X	X



Develop and evaluate inferences and predictions that are based on data	X	X	X	X	X	X	X	X
Understand and apply basic concepts of probability	X	X	X	X	X	X	X	X
<b>Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them</b>								
<b>Pre-K–2 Expectations: In pre-K through grade 2 all students should–</b>								
· pose questions and gather data about themselves and their surroundings;				X				
· sort and classify objects according to their attributes and organize data about the objects;				X				
· represent data using concrete objects, pictures, and graphs.				X				
<b>Grades 3–5 Expectations: In grades 3–5 all students should–</b>								
· design investigations to address a question and consider how data-collection methods affect the nature of the data set;				X				
· collect data using observations, surveys, and experiments;				X				
· represent data using tables and graphs such as line plots, bar graphs, and line graphs;				X				
· recognize the differences in representing categorical and numerical data.				X				
				X				
<b>Select and use appropriate statistical methods to analyze data</b>								
<b>Pre-K–2 Expectations: In pre-K through grade 2 all students should–</b>								
· describe parts of the data and the set of data as a whole to determine what the data show.				X				
<b>Grades 3–5 Expectations: In grades 3–5 all students should–</b>								
· describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed;				X				
· use measures of center, focusing on the median, and understand what each does and does not indicate about the data set;				X				
· compare different representations of the same data and evaluate how well each representation shows important aspects of the data.				X				
<b>Develop and evaluate inferences and predictions that are based on data</b>								
<b>Pre-K–2 Expectations: In pre-K through grade 2 all students should–</b>								
· discuss events related to students' experiences as likely or unlikely.				X				
<b>Grades 3–5 Expectations: In grades 3–5 all students should–</b>								
· propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions.				X				

<b>Understand and apply basic concepts of probability</b>								
<b>Pre-K–2 Expectations: In pre-K through grade 2 all students should—</b>								
<b>Grades 3–5 Expectations: In grades 3–5 all students should—</b>								
· describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible;				X				
· predict the probability of outcomes of simple experiments and test the predictions;				X				
· understand that the measure of the likelihood of an event can be represented by a number from 0 to 1.				X				
<b>Process Standards</b>								
<b>Problem Solving</b>								
<b>Instructional programs from prekindergarten through grade 12</b>								
<b>should enable all students to—</b>								
· Build new mathematical knowledge through problem solving	X	X	X	X	X	X	X	X
· Solve problems that arise in mathematics and in other contexts	X	X	X	X	X	X	X	X
· Apply and adapt a variety of appropriate strategies to solve problems	X	X	X	X	X	X	X	X
· Monitor and reflect on the process of mathematical problem solving	X	X	X	X	X	X	X	X
<b>Reasoning and Proof</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable</b>								
<b>all students to—</b>								
· Recognize reasoning and proof as fundamental aspects of mathematics	X	X	X	X	X	X	X	X
· Make and investigate mathematical conjectures	X	X	X	X	X	X	X	X
· Develop and evaluate mathematical arguments and proofs	X	X	X	X	X	X	X	X
· Select and use various types of reasoning and methods of proof	X	X	X	X	X	X	X	X
<b>Communication</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable</b>								
<b>all students to—</b>								
· Organize and consolidate their mathematical thinking through communication	X	X	X	X	X	X	X	X
· Communicate their mathematical thinking coherently and clearly to peers, teachers, and others	X	X	X	X	X	X	X	X
· Analyze and evaluate the mathematical thinking and strategies of others;	X	X	X	X	X	X	X	X
· Use the language of mathematics to express mathematical ideas precisely.	X	X	X	X	X	X	X	X
<b>Connections</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable</b>								





<b>all students to—</b>								
· Recognize and use connections among mathematical ideas	X	X	X	X	X	X	X	X
· Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	X	X	X	X	X	X	X	X
· Recognize and apply mathematics in contexts outside of mathematics	X	X	X	X	X	X	X	X
<b>Representation</b>								
<b>Instructional programs from prekindergarten through grade 12 should enable</b>								
<b>all students to—</b>								
· Create and use representations to organize, record, and communicate mathematical ideas	X	X	X	X	X	X	X	X
· Select, apply, and translate among mathematical representations to solve problems	X	X	X	X	X	X	X	X
· Use representations to model and interpret physical, social, and mathematical phenomena	X	X	X	X	X	X	X	X

**Table 1b. Math Specialist, K-5, Certification Matrix for Leadership Standards**

<b>Educational Specialist With an emphasis in K - 5 Mathematics Education Specialist</b>	<b>Foundations of Mathematics Education Leadership</b>	<b>Mathematics Leadership: Influencing and Facilitating Improvement</b>	<b>Elementary Mathematics Specialists: Influencing and Facilitating Improvement</b>
<b>National Council of Teachers of Mathematics</b>			
<b>Standards</b>			
<b>Number and Operations</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable all students to promote in their peers an ability to —</b>			

Understand numbers, ways of representing numbers, relationships among numbers, and number systems	X	X	X
Understand meanings of operations and how they relate to one another	X	X	X
Compute fluently and make reasonable estimates	X	X	X
<b>Algebra</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable all students to promote in their peers an ability to —</b>			
Understand patterns, relations, and functions	X	X	X
Represent and analyze mathematical situations and structures using algebraic symbols	X	X	X
Use mathematical models to represent and understand quantitative relationships	X	X	X
Analyze change in various contexts	X	X	X
<b>Measurement Standard</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable all students to promote in their peers an ability to —</b>			
Understand measurable attributes of objects and the units, systems, and processes of measurement	X	X	X
Apply appropriate techniques, tools, and formulas to determine measurements.	X	X	X
<b>Data Analysis and Probability</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable all students to promote in their peers an ability to —</b>			
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	X	X	X
Select and use appropriate statistical methods to analyze data	X	X	X
Develop and evaluate inferences and predictions that are based on data	X	X	X
Understand and apply basic concepts of probability	X	X	X
<b>Process Standards</b>			
<b>Problem Solving</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable all students to promote in their peers an ability to —</b>			
· Build new mathematical knowledge through problem solving	X	X	X
· Solve problems that arise in mathematics and in other contexts	X	X	X
· Apply and adapt a variety of appropriate strategies to solve problems	X	X	X
· Monitor and reflect on the process of mathematical problem solving	X	X	X
<b>Reasoning and Proof</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable</b>			
<b>all students to promote in their peers an ability to —</b>			

· Recognize reasoning and proof as fundamental aspects of mathematics	X	X	X
· Make and investigate mathematical conjectures	X	X	X
· Develop and evaluate mathematical arguments and proofs	X	X	X
· Select and use various types of reasoning and methods of proof	X	X	X
<b>Communication</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable</b>			
<b>all students to promote in their peers an ability to —</b>			
· Organize and consolidate their mathematical thinking through communication	X	X	X
· Communicate their mathematical thinking coherently and clearly to peers, teachers, and others	X	X	X
· Analyze and evaluate the mathematical thinking and strategies of others;	X	X	X
· Use the language of mathematics to express mathematical ideas precisely.	X	X	X
<b>Connections</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable</b>			
<b>all students to promote in their peers an ability to —</b>			
· Recognize and use connections among mathematical ideas	X	X	X
· Understand how mathematical ideas interconnect and build on one another to produce a coherent whole	X	X	X
· Recognize and apply mathematics in contexts outside of mathematics	X	X	X
<b>Representation</b>			
<b>Instructional programs from prekindergarten through grade 12 should enable</b>			
<b>all students to promote in their peers an ability to —</b>			
· Create and use representations to organize, record, and communicate mathematical ideas	X	X	X
· Select, apply, and translate among mathematical representations to solve problems	X	X	X
· Use representations to model and interpret physical, social, and mathematical phenomena	X	X	X

**Table 2. Semesters Courses are Offered**

Math	Fall 2014	Spring 2015	Summer 2015	Fall 2015	Spring 2016	Summer 2016
EDM 53800	X					
EDM 53900	X					
EDM 54000				X		
EDM 54500				X		
EDM 55000					X	
EDM 55500					X	
EDM 56000		X				
EDM 56500		X				
EDM 58000	X				X	
EDM 58090		X				
EDM 58095				X		