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Syllabus: Florida Campus

<p>Course Name-<i>Elementary School Mathematics III</i> (3 credit hours) Course Number-MTA 262</p>

<p>Instructor of this Course-Towanna Roller Office Hours: Contact Information: Office 310A, Science Building, Asbury College, Wilmore KY; Email: Towanna.Roller@Asbury.Edu</p>

Course Pre-requisite: MTA 261

<p>Text and Required Materials: <i>Mathematical Reasoning for Elementary teachers</i> (5th ed.), 2009, by Calvin Long, Duane W. DeTemple, and Richard Millman, Published by Pearson. Also you will need a calculator which is not part of a cell phone (make sure it has exponents) and an Asbury computer account and access to the Discovery web site (See Information Services with any access problems).</p>
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Links to...	Course Description
<p>Department Mission, Theme, and Conceptual Framework</p>	<p>This course includes an emphasis on the skills and concepts of arithmetic, algebra, statistics and probability. Problem solving, guided discovery, manipulatives, communication (written and verbal), applications (connections), and technology will be incorporated. Academic excellence is part of the mission statement of the department, and this course seeks to prepare candidates with a deep understanding of mathematics and an awareness of the structure of mathematical conceptual development. This understanding and awareness is necessary if the candidate is to become a servant leader and a facilitator of student success as required by the department mission and theme. This course is the third in a sequence of three courses that together seek to prepare</p>

	<p>candidates in the mathematical content knowledge needed to design, implement, and assess mathematical instruction for all students at the elementary school level. The focus of the course at every point is mathematics, but candidates will learn mathematics in a more effective manner if it is in context as much as possible. Truly deep, connected mathematical understanding appropriate for an elementary school teacher is foundational to the candidate's becoming a facilitator of student success. Since the math sequence is relatively early in the course plan for candidates and since the course is a content course declarative and procedural knowledge is emphasized with only occasional attention to conditional knowledge.</p>
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Summary Standards Addressed in Course:

Florida Educator Accomplished Practice: 4, 5, 7, 8
 Florida Elementary Competencies: 60.7, 8, 9, 10, 11
 National Council of Teachers of Mathematics Standards: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Algebraic Thinking, Number and Operations, Data Analysis and Probability, Geometry, Measurement.
 National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3 and review of focal points from MTA 261.

Attention to...	Description
Culturally Responsive Instruction	<p>The question, "What is mathematics?" is itself a cultural issue. Mathematics was created in cultural context and mathematics historians are very aware of the very different forms and content of mathematics from one culture to another. Cultural values, resources and needs shaped the development of both numerical and geometric thought. Mathematics has been studied for its beauty, used as recreation, developed for keeping track of money, invented to create an accurate calendar, discovered as part of religious experience and abused as a way for one group of people to control another. Though this is not a math history and culture course we will explore the cultural side of mathematics when we discuss numeration and algorithm development. Algorithms from a variety of cultures will be used. Other cultural issues in the notation and language of mathematics will be discussed. We must be prepared when faced with punctuation of numbers, algorithms, and other mathematics that is not part of our own cultural heritage but which may be in the cultural heritage of our students.</p> <p>Each new mathematics topic will be accompanied by activities that stress learning methods other than rote memorization. Rote memorization is not effective for the process standards, not effective for mathematical concepts, not very easy for some students, and always culturally biased. (Memorization does have its place though I prefer "connected</p>

	<p>memorization.”). Heavy emphasis will be placed on the use of manipulatives, including pattern blocks, base ten blocks, fraction circles and squares, fraction tiles and towers, Cuisenaire rods, two-color counters, dice of many shapes, color tiles, connecting people, and snap cubes. This emphasis is due to the theory that many students who are not currently successful in mathematics classrooms need instruction that is more student-centered, concept-oriented, kinesthetic, tactile and visual. These students are not benefiting significantly from instruction that consists mainly of traditional lecture, memorized algorithm, and pencil and paper drill techniques. Though moving toward kinesthetic, tactile, visual and concept-oriented learning as the classroom model certainly does not solve all the problems, it reduces the need for individual adaptations as more students are better served by “regular class instruction.” Research indicates that some underserved learner groups are more supported by development of skills in a meaningful context; careful attention to prior learning experiences when developing new concepts; use of a balance of auditory, visual, tactile, and kinesthetic mathematical experiences; respect for multiple types of learning; balance between individualized and cooperative activities; balance between inductive, deductive and intuitive mathematical reasoning; integration of technology; mathematics in real life context; immediate application of mathematics for the good of the student’s cultural group; integration of social issues into the mathematics curriculum; and emphasis on the social construction of knowledge.</p> <p>As stated in the 1989 Curriculum and Evaluation Standards for School Mathematics, “Mathematics has become a critical filter for employment and full participation in our society.” Equity in mathematics education should be a nonnegotiable. The Principles and Standards for School Mathematics, 2000, states, “Equity does not mean that every student should receive identical instruction: instead, it demands that reasonable and appropriate accommodations be made as needed to promote access and attainment for all students.”</p>
Technology Integration:	
Professor’s Use	Advanced Word Processing, Internet, Calculators, Spreadsheets
Candidate’s Use	Advanced Word Processing, Internet, Calculators, Spreadsheets
Dispositional Development	It is the strong desire of the department that all faculty model the dispositions, that each cohort of candidates develops a community that encourages these dispositions, and that the short devotional time in each class period also foster the dispositions. Additionally, the understanding of math as

	constructed knowledge opens a new way of viewing students. Their cultures, previous knowledge, learning profiles, areas of giftedness, areas of challenge, likes and dislikes, activity levels, and communication styles all influence the ways in which they learn mathematics. Knowing math deeply means that teachers can see and celebrate conceptual developments and insights that otherwise might go unnoticed or worse yet labeled as “unacceptable” by teachers who mistake rote memory for understanding.
Impact on Learning	
Impact on Candidate Learning	The main purpose of the course is to provide all candidates with the mathematical content they need to be effective facilitators of student learning. Thus, impact on candidate learning is the main goal of the course.
Candidate’s Impact On K-6 Student Learning	Candidates are not required to work directly with P-5 students during this course. However, we will be examining children’s work and analyzing it for mathematical understandings and misunderstandings. Also, for some assignments, candidates may elect to do projects with children.

Course Objectives and Standards Addressed

1. Know the mathematical content of elementary school mathematics in the areas of arithmetic and algebraic thinking. This includes a profound understanding of the meaning of various representations of numbers, of operations, and of mathematical procedures, as well as patterns; Functions, tables, graphs, equations, and algebraic expressions. FEAP 8; FEC 7, 8, 9, 10, 11; NCTM Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Algebraic Thinking, Number and Operations, Geometry, Measurement, Data Analysis and Probability; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3.
2. Have extensive connections between various mathematical concepts at the same conceptual level and extensive understanding about how concepts are tied to previous knowledge and to future knowledge. FEAP 7, 8; FEC 7,10, 11; NCTM Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Algebraic Thinking, Number and Operations, Geometry, Measurement, Data Analysis and Probability; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3.
3. Be confident and effective at mathematical problem solving. FEAP 4, 8; FEC 7, 10,11; NCTM Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Algebraic Thinking, Number and Operations, Measurement, Data Analysis and Probability; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3.

4. Be able to use manipulatives effectively in explaining mathematical concepts and in problem solving. FEAP 4, 5, 7, 8; FEC 7,11; NCTM Problem Solving, Communication, Connections, and Representation, Number and Operations Geometry, Measurement; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1, G7,3.
5. Be better able to communicate mathematics both in writing and orally. FEAP 4, 5, 8; FEC 7, 10, 11; NCTM Communication, and Representation, Algebraic Thinking, Number and Operations, Measurement, Data Analysis and Probability; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3.
6. Have begun to investigate the power and limitations of technology in the teaching of mathematics. FEAP 5, 8; FEC 7, 10, 11; NCTM Number and Operations, Data Analysis and Probability.
7. Be aware of the prominent position of mathematics in the development of human cultures and the current relationship between mathematics and culture. FEAP 5, 8; FEC 7,11; NCTM Connections, and Representation, Number and Operations, Data Analysis and Probability.
8. Be more adaptable mathematically so that he/she can teach from a variety of mathematical perspectives, use multiple algorithms and solution paths, adjust to different curriculums, and accommodate diverse learners. FEAP 4, 5, 7, 8; FEC 7, 10,11; NCTM Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Number and Operations, Geometry, Measurement, Data Analysis and Probability; National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3.

Instructional Strategies Used in this Course

Cooperative Learning

Direct Instruction

Large and Small Group Discussion

Instructor Modeling

Lecture

Independent Student Activities

Math Homework

Short on-line videos for frequently asked math questions

Manipulative workshops

Course Topics: This course is very closely tied with our text so these are the section titles from the part of the text we will cover in this course.

6. Fractions and Rational Numbers

- 6.1 The Basic Concepts of Fractions and Rational Numbers.
- 6.2 Addition and Subtraction of Fractions
- 6.3 Multiplication and Division of Fractions
- 6.4 Properties and Applications of Rational Numbers

7. Decimals, Real Numbers, and Proportional Reasoning

- 7.1 Decimals and Real Numbers
- 7.2 Computations with Decimals.
- 7.3 Proportional Reasoning
- 7.4 Percent.

8. Algebraic Reasoning and Representation

- 8.1 Expressions, Functions, and Equations
- 8.2 Graphing Functions in the Cartesian Plane

9. Statistics: The Interpretation of Data

- 9.1 Graphical Representation of Data.
- 9.2 Measures of Central Tendency and Variability.
- 9.3 Statistical Inference and Sampling

10. Probability

- 10.1 Empirical Probability.
- 10.2 Principles of Counting.
- 10.3 Permutations and Combinations
- 10.4 Theoretical Probability

Attendance Statement-This course requires in-class and out-of-class time to complete the assignments. Attendance is very important. Candidates are expected to attend all classes. In the event of an emergency the candidate should contact the professor prior to the beginning of class.

Academic Integrity Statement-Cheating (dishonestly taking the knowledge of another person whether on a test or an assignment and presenting it as your work) and plagiarism (to take and pass off as one's own the ideas or

writing of another) are a serious issue. While it is legitimate to talk to others about your assignments and incorporate suggestions, do not let others “write” your assignments in the name of peer review or “borrow” sections or whole assignments written by others. We do get ideas from life experiences and what we read, but be careful that you interpret these ideas and make them your own. I am aware that many types of assignments are available on the internet and will check these sources when there is legitimate suspicion. Penalty is a zero on the assignment. In cases where there is a major or continuous breach or trust, further discipline, such as an “F” in the course, may be necessary. The major consequence of any form of cheating is damage to your character and the lack of trust and respect that result. Remember, in the teacher education program and on job recommendations we are asked to rate your character and integrity. Once a paper, project, or assignment is used in a class that same paper, project, or assignment cannot be used again for another class in your teacher education program. A paper, project, or assignment can be used as an evidence in your portfolio to support a Florida Educator Accomplished Practice.

COURSE REQUIREMENTS, POINT VALUES, GRADING

Homework and Tests: (5 tests @ 100 points each.)

Florida Educator Accomplished Practice: 4, 5, 7, 8

Florida Elementary Competencies: 60.7, 8, 9, 10, 11

National Council of Teachers of Mathematics Standards: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Algebraic Thinking, Number and Operations, Data Analysis and Probability.

National Council of Teachers of Mathematics Focal Points: G3,2, G4,2, G5,2, G6,1,2,3, G7, 1,3, G8,1,3

The homework for the course is listed here. It will not be graded directly but each chapter test will be based on the homework for that chapter. Chapter tests will include questions about connections between concepts, questions about children’s conceptual development, questions about alternate methods of computation, essay questions, and the many other types of questions which appear in the homework.

Chapter 6: Read sections 6.1 through 6.4.

Section 6.1 p357 1-4, 6-26, 28-29, 36, 39-46

Section 6.2 p372 #1-16, 24-35

Section 6.3 p387 #1-18, 22, 26-40

Section 6.4 p399 #1-8, 11-14, 16-17, 19-25, 41-43

Chapter Review Exercises p408 #1-16

Chapter 7: Read sections 7.1 through 7.4.

Section 7.1 p431 1-8, 10, 17, 31-33, 37

Section 7.2 p441 #1-12, 24-28, 32-35
Section 7.3 p457 #1-10, 12, 24-28, 31-35, 37-45
Section 7.4 p470 #1-18, 25-31, 37-41

Chapter 8: Read sections 8.1 through 8.2.
Section 8.1 p496 1- 23, 42-45
Section 8.2 p523 #1-12, 39-41

Chapter 9: Read sections 9.1 through 9.3
Section 9.1 p548 1- 3, 8, 9, 16, 17, 22-26, 32-36
Section 9.2 p573 #1-6, 12, 17, 18, 30, 33-36
Section 9.3 p589 #1-7, 11-18, 20-23, 31

Chapter 10: Read sections 10.1 through 10.4.
Section 10.1 p614 1-15, 28, 32-37
Section 10.2 p626 #1-16,20-25, 36, 37
Section 10.3 p637 #1-8, 10, 30-33
Section 10.4 p657 #1-18, 38-41

Manipulative Demonstrations: (100 points.)

Florida Educator Accomplished Practice: 4, 5, 7, 8

Florida Elementary Competencies: 60.7

National Council of Teachers of Mathematics Standards: Problem Solving, Reasoning and Proof, Communication, Connections, and Representation, Number and Operations
National Council of Teachers of Mathematics Focal Points: K1; G1,1,2; G2,1,2; G3,1,2; G4,1,2; G5,1,2; G6,1; G7,3

After demonstrations in class, some explanations using manipulatives in the textbook, online videos for each of the manipulative areas, and several opportunities to attend optional outside-of-class sessions for extra practice, you will take the manipulative “test.” You will be given a list of arithmetic problems with the indicated manipulative to use designated by each problem. You will prepare a demonstration of the mathematical operation along with appropriate verbal explanation obtaining the correct answer. You may take your time in preparation and if you become confused during the demonstration you may go back into preparation time until you are ready to try again. The entire test may be repeated (with different problems) up to three times. You will be given a list in class of possible problem types to use in your preparation.

Proficiency Test: (100 points.)

Florida Educator Accomplished Practice: 8

Florida Elementary Competencies: 60.7, 8, 9, 10, 11

National Council of Teachers of Mathematics Standards: Algebraic Thinking, Number and Operations, Measurement, Geometry, and Data Analysis and Probability

A list of 50 problems along with their answers and videos demonstrating these problems are available on the course website. Each student will take a test of 20 questions selected from these 50 problem types. The first two problems missed will not count off any points but subsequent problems missed will count off 10 points each.

Grading:

There are 7 equally weighted grades:

Chapter 6 Test
Chapter 7 Test
Chapter 8 Test
Chapter 9 Test
Chapter 10 Test
Manipulative Test
Proficiency Test

Grading Scale:

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D	65-69
F	below 65

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