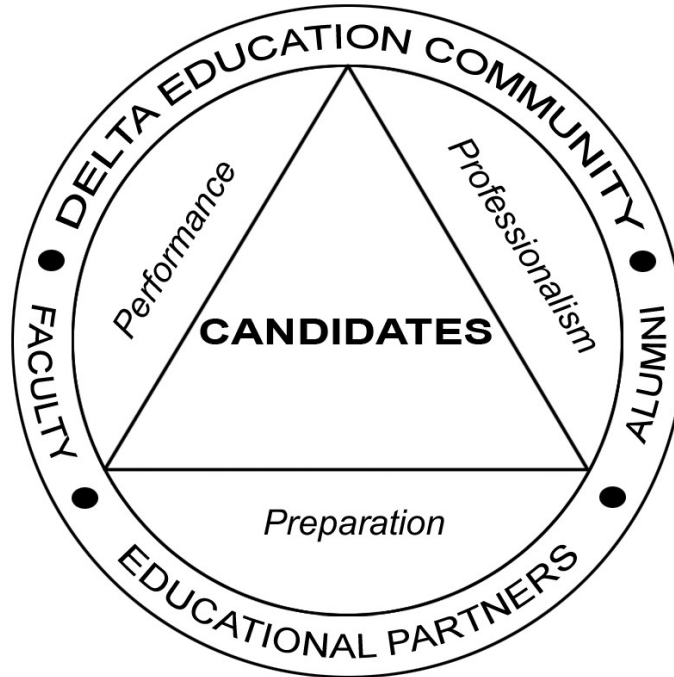**Delta State University**
Division of Teacher Education
Course Syllabus
MAT 331

I.   **Course Designation: MAT 331**
      Course Title: MATHEMATICS THROUGH PROBLEM SOLVING
      Course Description: Professionalized subject matter of elementary school mathematics. Prerequisites: MAT 131 with a C or better. 3

The course is designed as the extension of the whole number system to rational numbers and their decimal representations, both terminating and non-terminating included, and integers. Special attention will be given to ratios as a means to solving problems using proportional reasoning. The material is presented in a problem solving fashion using hands-on materials and manipulatives for personal explorations.

II. Conceptual Framework

DELTA P^3 MODEL

Vision: The Delta State University College of Education promotes a vibrant educational community committed to preparing capable and confident candidates who can positively affect learning outcomes of candidates in the P-12 school setting. Appropriately illustrated by the Delta triangle, the model reflects candidate development through the triad of preparation, performance and professionalism, supported by the greater Delta educational community (faculty, educational partners, and alumni).

Guiding Principles:

1. **Education is a lifelong endeavor,** requiring an ever-expanding content knowledge base, a repertoire of skills, and a broad experience base. (GP1)
2. **Education is interactive and reflective,** a process that is accomplished through assessment and reflection of a collaborative nature. (GP2)
3. **Education is culturally contextualized**, requiring both an understanding and appreciation of the diversity of all individuals within the learning community. (GP3)
4. **Education is dynamic,** with change being driven by assessment data and the needs of all segments of the educational community. (GP4)
5. **Education is enhanced by technology,** infused throughout programs and services. (GP5)

III.   General Course Goals/Objectives

This course is more than a mathematics content course; content-specific methods will be considered. The course is designed to provide the prospective teacher, who has knowledge of the content of elementary school mathematics, with strategies for teaching mathematics. The National Council of Teachers of Mathematics document, Curriculum and Evaluation Standards for School Mathematics, lists five general goals for all candidates. All candidates will (1) learn to value mathematics, (2) become confident in their ability to do mathematics, (3) become mathematical problem solvers, (4) learn to communicate mathematically, and (5) learn to reason mathematically. The NCTM document, Principles and Standards for School Mathematics that was released in April, 2000, addresses six principles for school mathematics: equity, curriculum, teaching, learning, assessment, and technology. These are also goals and principles for the candidates in this class. Additionally, goals of this course include the following: candidates will develop proficiency in modeling mathematical concepts using a variety of concrete materials, apply critical judgment to resources for the purpose of investigating materials and strategies, compare traditional approaches to teaching and learning mathematics to current research on how children learn, use technology appropriately in teaching and learning mathematics for elementary school.

Subject Matter/Content

A. Primary Texts and Resources

Text: Musser, Burger and Peterson: Mathematics for Elementary Teachers Tenth Edition, Wiley, 2014. (Students may use the 8th, 9th or 10th editions)

Common Core State Standards: These may be found on line at http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf This document will be a guide to all that is covered in this class.

B. Content Topics

This course will cover the following topics: number theory, fraction numbers and operations with fraction numbers, decimal numbers and operations on decimal numbers, ratios, integers, and operations with integers.

C. Technology Statement

Candidates will use a variety of technology resources in this course. These include, but are not limited to, the Internet, calculators, and various programs found on the internet.

D. Diversity

Diversity Proficiencies Expected of all Candidates

Candidates will:

1. Develop the capacity to teach in diverse settings with candidates and colleagues of varying backgrounds, ethnicities, capabilities, and beliefs (CF 1, 3; DRS 3)

2. Identify contextual factors that may influence candidate learning and act upon those factors in planning curriculum and instruction. (CF 2, 3, 4; DRS 2)

3. Establish classroom and school climate that reflects the belief that all candidates have the ability to learn. (CF 2, 3, 4; DRS 1, 2, 4)

4. Differentiate instruction and experiences based on contextual factors and the diverse needs of learners. (CF 2, 3, 4, 5; DRS 1, 2, 4)

5. Use appropriate assessment strategies to serve the diverse needs of learners. (CF 3, 4; DRS 1,2)

*CF = Delta P^3 Model; DRS = Dispositions Rating Scale

IV Specific Course Objectives
Chapter 5 page numbers for the Tenth Edition
Section 1

 The candidate should know and understand what are prime and composite numbers.
 The candidate should know and be able to use the Sieve of Eratosthenes.
 The candidate should be able to use the Fundamental Theorem of Arithmetic.
 The candidate should be able to state and use the definition of Divides.
 The candidate should be able to use the words Factors, Multiples and Divides correctly.
 The candidate should be able to use the test for divisibility for 2,3,4,5,6,8,9 and 10.
 The candidate should be able to use the Prime Factor Test.
 The candidate should be able to use the properties of divides:

   If $a|m$ and $a|n$ then $a|(m+n)$
   If $a|m$ and $a|n$ then $a|(m-n)$ where $m>n$
   If $a|m$ then $a|km$

 Page 185 #'s 1-9, 11-18, 31, 32, 37, 38

Section 2

 The candidate will be able to determine all of the divisors of the given number.
 The candidate will be able to determine all of the multiples of a give number.
 The candidate will be able to determine the greatest common factor for a group of whole numbers.
 The candidate will be able to determine the least common multiple for a group of whole numbers.

 Page 198 #'s 1-4, 6-8, 9-10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 26, 27

Chapter 6
Section 1

 The candidate will be able to explain the concept of a fraction.
 The candidate will be able to explain the concept of Equivalent Fractions.
 The candidate will be able to draw and use Fraction Strips.
 The candidate will be able to determine if two fractions are equal.
 The candidate will be able to express fractions in simplest forms.
 The candidate shall **not** use the expressions lowest terms.
 The candidate will know how to write improper fractions as mixed numbers and vice versa.
 Page 219   #'s   1-6, 8-13, 15-29

Section 2

      The candidate will be able to add fractions with Common Denominators.
      The candidate will be able to add fractions with unlike Denominators.
      The candidate will be able to explain the reason for finding common denominators.
      The candidate will be able to use the Commutative Property of Fraction Addition.
      The candidate will be able to use the Associative Property of Fraction Addition.
      The candidate will be able to subtract fractions with like Denominators.
      The candidate will be able to subtract fractions with unlike Denominators.
      Page 230   #'s   1, 2, 4-8, 10-14, 17-30

Section 3

      The candidate will be able to explain how to multiply fractions.
      The candidate will be able to draw and explain illustrations for multiplication. (Fig. 6.19 and 6.20)
      The candidate will be able to use, explain, and illustrate the following:
            Closure Property for Fraction Multiplication
            Commutative Property for Fraction Multiplication
            Associative Property for Fraction Multiplication
            Multiplicative Identity Property for Fraction Multiplication.
            Multiplicative Inverse Property for Fraction Multiplication.
      The candidate will be able to use, draw, and explain the Distributive Property of Multiplication over Addition for Fractions.
      The candidate will be able to divide fractions with like and unlike denominators.
      The candidate will be able to draw and explain illustrations for the division of fractions.
      Page 242   #'s   1-24, 26-40

Chapter 7

Section 1

      The candidate will be able to write decimal numbers in expanded form.
      The candidate will be able to use a hundred squares to represent a decimal number.
      The candidate will be able to multiply or divide a decimal number by a power of ten mentally.
      The candidate will be able to know which fractions terminate.
      Page 259   #'s   1-20

Section 2

The candidate will be able to add and subtract decimal numbers.
The candidate will be able to multiply decimals using the standard algorithm.
The candidate will be able to multiply decimals using the lattice algorithm.
The candidate will be able to divide decimal numbers.
The candidate will be able to adjust by powers of ten the factors in a multiplication problem so that the product remains the same.
The candidate will be able to adjust by powers of ten the dividends and divisor in a division problem such that the quotient remains the same.
The candidate will be able to convert fraction numbers to decimal numbers.
The candidate will be able to convert decimal numbers to fraction numbers.
The candidate will be able to use scientific notation.
Page 270   #'s   1-34

Section 3

The candidate will be able to write ratios using the colon notion, and fraction notation.
The candidate will be able to determine if two ratios are equal.
The candidate will be able to define part-to-part, part-to-whole, and whole-to-part ratios.
The candidate will be able to define the extremes and means of two ratios.
The candidate will be able to define a proportion.
The candidate will be able to use the ideas of scaling up and scaling down.
Page 279   #'s   1-33

Section 4

The candidate will be able to define percent.
The candidate will be able to draw and use the grid approach to solving percent problems.
The candidate will be able to use the proportion approach to solving percent problems.
The candidate will be able to use the equation approach to solving percent problems.
Page 292   #'s   1-8, 10-13, 16-44

Chapter 8

Section 1

The candidate will be able to define the set of Integers.

The candidate will be able to define a zero pair.

The candidate will be able to use two color chips to represent any integer amount.

The candidate will be able to apply, explain and use the following properties for Integer Addition:

> Closure
> Commutative Property
> Associative Property
> Identity
> Additive Inverse

The candidate will be able to state the definition of addition for Integers.

The candidate will be able to state the definition of subtraction for Integers.

The candidate will be able to use all of the approaches for subtraction of integers:

> Take – Away
> Adding-the-opposite
> Missing addend

Page 314   #'s   1-12, 14- 26

Section 2

The candidate will be able to multiply and divide integers.

The candidate will be able to apply, explain and use the following properties for Integer Multiplication: Closure, Commutative, Associative, Identity, and the Distributive Property of Multiplication over Addition for Integers.

The candidate will be able to apply and explain the multiplicative 'cancellation' Property.

The candidate will be able to apply and explain Zero Division Property.

The candidate will be able to state the definition of Division of Integers.

The candidate will be able to apply and explain the Properties of Ordering Integers.

Page 329   #'s   1-19, 24-34

VI. Major Course Activities:

Week 1: Chapter 5, Section 1
Week 2: Chapter 5, Section 1
Week 3: Chapter 5, Section 2
Week 4: Chapter 6, Section 1 and Chapter 6, Section 2

Test 1

Week 5: Chapter 6, Section 2
Week 6: Chapter 6, Section 2
Week 7: Chapter 6, Section 3
Week 8: Chapter 6, Section 3
Week 9: Chapter 6, Section 3

Test 2

Week 10: Chapter 7, Section 1
Week 11: Chapter 7, Section 2
Week 12: Chapter 7, Section 3
Week 13: Chapter 7, Section 4
Week 14: Chapter 8, Section 1
Week 15: Chapter 8, Section 2

Final Exam

VII. Methods of Instruction:
Lectures, small group work, and discussions are used to convey the information in this class.

VIII. Evaluation Methods:

There are three categories of scores for this class: tests, homework/quizzes, and final examination. Each category will account for a various amount of your final average according to the following weights: tests - 60%, final examination - 25% and homework/quizzes - 15%.

Within each category the average will be computed on a part out of total procedure. For example, suppose that you receive the following scores of three tests: 51 out of 57, 78 out of 123, and 44 out of 45. The test average will be computed as follows:

$$\frac{51+78+44}{57+123+45} = \frac{173}{225} = 76.89\%$$

To compute your final grade use the above method for each category, and then use the results for the final calculation. Suppose that our student has a 76% test grades, 53% on homework and quizzes and 68% on the final. To calculate the final average perform the following calculations:

$$\frac{(76)(60)}{100} + \frac{(53)(15)}{100} + \frac{(68)(25)}{100} = 45.60 + 7.95 + 17.0 = 70.55$$

This student would have earned a 70.55 percent in the class and thus a D grade.

No late assignments will be accepted, but one of every five homework/quizzes will be dropped.

Cheating and plagiarism are not tolerated. If it is established that a violation has occurred the score on the assignment will be a zero, and in addition the instructor will report the offense as outlined by university policy.

Grading Scale:

       Grades will be assigned according to the following scale:
            A 100%-94%
            B 93%-84%
            C 83%-74%
            D 73%-65%
            F Below 65%

Requirement

Passing a rational numbers examination. Every student must take and pass a rational numbers test with no less than an 80% by the end of March or October which ever falls within the current semester. Each student may take the examination at most three times during the semester. If a student does not pass the examination on the third attempt or by the drop date the student will receive an "F" in the course. Your first examination will be in class; whereas, the second two examinations, if needed, will be taken out of class at a time agreed upon by both the student and instructor.

Mathematics Department
Caylor White Walters 209A, Phone 662-846-4508
Dr. David Jay Hebert
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Office Hours are posted on my office door. Additional times may be arranged by appointment.
09.00-10.00 Monday, Wednesday, and Friday
09.00-10.30; 13.30-15.30 Tuesday and Thursday
Other times by appointment.

Class Attendance
1. The maximum number of absences allowable is the equivalent to two weeks of classes. This means for a Monday-Wednesday-Friday class is six or four for a Tuesday-Thursday class. If you exceed the allowable number of absences, a grade of "F" will be assigned as the final grade in the course. The only absences that do not count in this list is official university business such as but not limited to sporting activities for candidate athletes, or conflicts caused by other university activities.
2. When a candidate is tardy for class, it is the candidate's responsibility to request that the faculty member change the recorded absence to a tardy. This must be done on the day the tardy occurred. A maximum of 3 tardies will be allowed. Any additional tardies will be recorded as unexcused absences.

Classroom Policies and Make-Up Tests:
Candidates are expected to conduct themselves in a professional academic fashion at all times. **Cell phones are to be kept on the table top at all times.**

Examinations. Candidates are expected to take examinations at the scheduled times. Should an authorized absence occur on a test date, then prior to the next scheduled class meeting, the candidate is to contact the instructor and make arrangements for the make-up examination. If a candidate fails to contact the instructor within one week (7 calendar days), concerning the absence and a desire to makeup the exam, a grade of zero will be recorded by the instructor

[*Cheating and Plagiarism*](#). Cheating and plagiarism will not be tolerated. University policy will be followed, according to current catalog issues, and procedures specific to the Division will be enforced consistently across programs. These procedures will be disseminated and explained at the beginning of the semester.

Accountability for Individual Work. Unless otherwise directed, all papers and assignments are to represent the individual candidate's efforts. Candidates submitting a personal assignment that represents the collaborative works of others or the work of another individual will not be given credit for the assignment. If the offense constitutes cheating or plagiarism, university policy will be followed.

Pay for Print. The University campus provides Pay-for-Print copying services at key locations campus-wide. Candidates are responsible for the costs of printing a copy of papers and other assignments.

Bibliography:

Principles and Standards for School Mathematics (2000) published by the National Council of Teachers of Mathematics. ISBN: 978-87353-480-2

The Common Core Standards for Mathematics may be found at the following website for free.

http://www.corestandards.org/the-standards/mathematics

The National Library of Virtual Manipulatives will be used to aid the candidates in understanding some of the topics being covered. This library may be found at the URL:

National Library of Virtual Manipulatives

X. Disabilities Statement and Policy:

It is the responsibility of candidates who have professionally diagnosed disabilities to notify the instructor so that necessary and/or appropriate modifications can be made to meet any special learning needs. Candidates are also directed to contact the Disability Director for the University who will coordinate the accommodations process.

Important Dates:

Test and Finals Policy

Final Examination Schedule