I. INTRODUCTION

A. MATH 1350, Fundamentals of Mathematics I (Mathematics for Middle Grade Teacher Certification), is a three-semester-hour course. The course is designed to meet the educational needs of prospective elementary and middle school teachers, with an emphasis on problem solving and critical thinking. Topics covered in this course include sets, functions, numerations systems, number theory, and properties of the various number systems with an emphasis on problem solving and critical thinking.

B. Math 1350 is the first semester of a two-semester sequence (1350/1351) designed for prospective elementary and middle school teachers. This course extends the foundational ideas of mathematics so that prospective elementary/middle school teachers have an explicit understanding of elementary analysis.

C. Prerequisite: A grade of C or better in MATH 1314, College Algebra.

II. OVERALL OR GENERAL OBJECTIVES OF THE COURSE

Upon successful completion of this course, Mathematics for Middle Grade Teacher Certification, the student will

A. Explain and model the arithmetic operations for whole numbers and integers.
B. Explain and model computations with fractions, decimals, ratios, and percentages.
C. Describe and demonstrate how factors, multiples, and prime numbers are used to solve problems.
D. Apply problem-solving skills to numerical applications.
E. Represent and describe relationships among sets using the appropriate mathematical terminology and notation.
F. Compare and contrast structures of numeration systems.
G. Devise effective communication skills that will be useful to the student when they begin teaching.
III. INSTRUCTIONAL MATERIALS
   
   A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

   B. Other Materials: A TI-83, TI-83+, TI-84 or TI-84+ Graphing Calculator is required; however, if the student plans on continuing onto Calculus, he or she should purchase the TI-89 or TI-89 Titanium.

IV. COURSE REQUIREMENTS
   
   A. Assignments will be made daily. All assignments are to be completed by the following class meeting. Assignments may be collected and scored at any time.

   B. Students are expected to attend every class and to arrive at each class on time and remain in class for the entire period.

   C. The instructor will post office hours during which he/she will be available if you need additional help with your studies.

V. EXAMINATIONS
   
   A. Examinations will be given at the end of each lesson. If a lesson is short and simple, it might be included with another short and simple lesson for one exam. A final exam will be given and students must take the final exam in order to pass the course. The final exam date will be announced in advance.

   B. Students who miss an exam should discuss with the instructor the circumstances surrounding the absence. The instructor will determine whether a make-up exam is to be given. Make-up exams are given by appointment only.

VI. SEMESTER GRADE COMPUTATION
   
   A. Your point total is determined by adding the points earned on each lesson examination. Your letter grade for the course is then determined by the following formula:

   \[
   \frac{\text{Your point total}}{\text{Total points possible}} \times 100
   \]
B. Final grades will follow the grade designation below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Class Average</th>
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</thead>
<tbody>
<tr>
<td>“A”</td>
<td>90 to 100</td>
</tr>
<tr>
<td>“B”</td>
<td>80 to 89</td>
</tr>
<tr>
<td>“C”</td>
<td>70 to 79</td>
</tr>
<tr>
<td>“D”</td>
<td>60 to 69</td>
</tr>
<tr>
<td>“F”</td>
<td>0 to 59</td>
</tr>
</tbody>
</table>

VII. ADDITIONAL NOTES FROM COURSE INSTRUCTOR

A. Withdrawal from Course: It is the student's responsibility to officially drop a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file an Application for Withdrawal or an Application for Refund. The withdrawal form must be signed by the student.

Application for Withdrawal will be accepted at any time prior to Friday of the 12th week of classes during the 16 week fall and spring semesters. The deadline for sessions of other lengths is as follows.

- Friday of 3rd week for 5-week courses
- Friday of 4th week for 6-week courses
- Friday of 6th week for 8-week courses
- Friday of 7th week for 10-week courses
- Friday of 9th week for 12-week courses
- Friday of 12th week for 16-week courses

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

Students who officially withdraw will be awarded the grade of "W," provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of "F".

B. An Incomplete Grade: The College catalog states, "An incomplete grade may be given in those cases where the student has completed the
majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course..." Prior approval from the instructor is required before the grade of "I" is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an "F" for the course.

C. **Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

D. **Americans With Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

E. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

F. **Advanced Math Lab:** The Math Department operates an Advanced Mathematics Lab in Building 152, Room 145. All courses offered by the Math Department are supported in the lab with appropriate tutorial software. Calculators are available for student use in the lab. Students are encouraged to take advantage of these opportunities. See posted hours for the Advanced Math Lab.

G. **Office Hours:** Full-time instructors post office hours outside the door of the Mathematics Department (Building 152, Room 223). Part-time instructors may be available by appointment. If you have difficulty with the course work, please consult your instructor.

**VIII COURSE OUTLINE**

A. **Lesson One:** Introduction to Logic and Sets

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:

   a. Describe a set using various notations.
   b. Know set operations and their properties.
   c. Explain operations with whole numbers using models and
manipulatives.

d. Understand the importance of functions as the center of mathematics, in particular algebra.

2. Learning Activities:
a. Read pages of assigned chapter.
b. Listen to classroom lecture and discuss exercises
c. Work section, chapter, and computer problems assigned by instructor.

3. **Lesson Outline:**
   a. Section 2.1 (Reasoning to Logic: An Introduction)
   b. Section 2.2 (Describing Sets)
   c. Section 2.3 (Other Set Operations and Their Properties)

B. **Lesson Two:** Numeration Systems and Whole Number Operations

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:
   a. Understand numbers, ways of representing numbers, relationships among numbers in different number systems.
   b. Understand meanings of operations and how they relate to one another.
   c. Demonstrate the use of algorithms for whole number operations.
   d. Compute fluently and make reasonable estimates with whole numbers.

2. **Learning Activities:**
   a. Read pages of assigned chapter.
   b. Listen to classroom lecture and discuss exercises
   c. Work section, chapter, and computer problems assigned by instructor.

3. **Lesson Outline:**
   a. Section 3.1 (Numeration Systems)
   b. Section 3.2 (Addition and Subtraction of Whole Numbers)
   c. Section 3.3 (Multiplication and Division of Whole Numbers)
   d. Section 3.4 (Addition and Subtraction Algorithms, Mental Computation, and Estimation)

C. **Lesson Three:** Integers and Number Theory

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:
a. Explain and demonstrate how to use factors, multiples, prime factorization and relatively prime numbers to solve problems.
b. Develop meaning for integers, and represent and compare quantities with them.
c. Explain the properties of, and use operations on the set of integers.
d. Understand modular arithmetic.

2. **Learning Activities:**
   
a. Read pages of assigned chapter.
b. Listen to classroom lecture and discuss exercises
c. Work section, chapter, and computer problems assigned by instructor.

3. **Lesson Outline:**
   
a. Section 4.1 (Divisibility)
b. Section 4.2 (Prime and Composite Numbers)
c. Section 4.3 (Greatest Common Divisor and Least Common Multiple)
d. Section 5.1 (Addition & Subtraction of Integers)
e. Section 5.2 (Multiplication & Division of Integers)

D. **Lesson Four:** Rational Numbers & Proportional Reasoning

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will be able to:
   
a. Relay an understanding of fractions to include them as parts of lesson wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.
b. Understand and use ratios and proportions to represent quantitative relationships.
c. Understand, explain and demonstrate operations with fractions.

2. **Learning Activities:**
   
a. Read pages of assigned chapter.
b. Listen to classroom lecture and discuss exercises
c. Work section, chapter, and computer problems assigned by instructor.

3. **Lesson Outline:**
a. Section 6.1 (The Set of Rational Numbers)
b. Section 6.2 (Addition, Subtraction and Estimation with Rational Numbers)
c. Section 6.3 (Multiplication, Division and Estimation with Rational Numbers)
d. Section 6.4 (Proportional Reasoning)

E. Lesson Five: Rational Numbers as Decimals and Percent

1. Learning Outcomes: Upon successful completion of this lesson, the student will be able to:
   a. Work flexibly with fractions, decimals and percents to solve problems.
   b. Compare and order fractions, decimals and percents efficiently.
   c. Understand the real number system; including the subsets and properties of the real number system.
   d. Develop an understanding of large numbers and recognize and appropriately use exponential and scientific notation.
   d. Understand and explain the meaning and effects of arithmetic operations with fractions, decimals and percents.

2. Learning Activities:
   a. Read pages of assigned chapter.
   b. Listen to classroom lecture and discuss exercises
   c. Work section, chapter, and computer problems assigned by instructor.

3. Lesson Outline:
   a. Section 7.1 (Introduction to Finite Decimals)
   b. Section 7.2 (Operations on Decimals)
   c. Section 7.3 (Repeating Decimals)
   d. Section 7.4 (Percents & Interest)

F. Lesson Six: Real Numbers and Algebraic Thinking

1. Learning Outcomes: Upon successful completion of this Lesson, the student will be able to:
   a. Understand and explain real numbers.
   b. Perform operations on real numbers.
   c. Compute nth roots and in particular square root.
   d. How \( a^{1/n} \) and \( a^{n/m} \) are defined and why they are defined in this way.
e. Expressions involving radicals and radical exponents.
f. Variables to translate word phrases into algebraic expressions.
g. Find solutions of equations using properties of equations.
h. Graph and explain equations in reference to the coordinate plane.

2. Learning Activities:
   a. Read pages of assigned chapter.
   b. Listen to classroom lecture and discuss exercises
   c. Work section, chapter, and computer problems assigned by instructor.

3. Lesson Outline:
   a. Section 8.1 (Real Numbers)
   b. Section 8.2 (Variables)
   c. Section 8.3 (Equations)
   d. Section 8.4 (Functions)
   e. Section 8.5 (Equations in a Cartesian Coordinate System)