

University of Arkansas – Fort Smith
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General Syllabus

MATH 1343 Number Sense II

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisite: MATH 13373 Number Sense I

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

Study of connections among elementary numerical ideas and the instantiation of pedagogical methods used by current practitioners. The mathematical content domains involve common core standards concepts associated with problem solving, functions, and computation involving integers, fractions, decimals, and percents. Students will study the foundations of algebraic reasoning.

B. Additional Description - None

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Draw significant connections between knowledge of numerical mathematical domains and age appropriate pedagogical methodologies that lead to significant K-6 student knowledge.
2. Understand four basic operations (e.g., addition, subtraction, multiplication, division) with rational numbers, fractions, and decimals and their properties (e.g., commutative, associative, distributive, order of operations) including solving problems using multiple strategies.
3. Understand basic number systems (e.g., rational numbers, fractions, decimals) and understand age appropriate methods for engaging students in learning about fractions and decimals.
4. Understand ratio concepts and use ratio reasoning to solve problems using multiple strategies and understand age appropriate methods for engaging students in learning about ratios and proportions.

5. Understand basic number systems (e.g., rational numbers, irrational numbers, real numbers) and basic concepts of number theory (e.g., factors, multiples, place value, prime/composite).
6. Understand basic algebraic methods and representations (e.g., variables, expressions, ordered pairs, tables, graphs).
7. Solve real-life and mathematical problems using numerical and algebraic expressions and equations and understand age appropriate methods for engaging students in learning to solve equations and inequalities.
8. Use different representations of functions to solve problems using algebraic reasoning and understand age appropriate methods for engaging students in learning different representations of functions to solve problems using algebraic reasoning.
9. Use problem-solving techniques with these topic areas and develop mathematical classroom ecologies that lead to development of K-6 student problem solving ability.

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will analyze strategies used to compute with integers, fractions, decimals, and percents. Students will compare and contrast representations and strategies used to see a coherent consistency in the language of mathematics used by elementary teachers and students.

Quantitative Reasoning: Students will assign and use numbers, read and analyze data, create models, draw inferences, and support conclusions based on sound mathematical reasoning. Students will solve problems with rational numbers in various representations.

Communication Skills (written and oral)

Students will communicate proficiently. Students will have small group discussions and individual presentations of problem-solving strategies as well as written reflections of various techniques for calculations with rational numbers.

Ethical Decision Making

Students will model ethical decision-making processes while working in groups and during assessments. Students will practice the expectations concerning plagiarism by completing their own work.

III. Major Course Topics

- A. K-6 Mathematics Pedagogy
 1. Use of manipulatives for fractions, decimals, percents
 2. Standards of Mathematical Practice
- B. Computations on Rational Numbers, including fractions, decimals, and percents
 1. Use of manipulatives to represent quantities and drawing pictures to represent

- operations.
- 2. Multiple strategies for computation such as expanded form, repeated subtraction for division
- 3. Solving application problems such as discounts, compound interest, sales tax
- 4. Establishing the standard algorithm for operations
- 5. Converting fractions, decimals, and percents, including repeating decimals
- C. Ratios and Proportions
 - 1. Establish proportions as linear functions with a y-intercept of zero and a constant y:x ratio equal to the unit rate or slope
 - 2. Solve application problems such as unit rates and scale drawings
- D. Functions
 - 1. Definition of a function
 - 2. Determine values of functions using $f(x)$ notation
 - 3. Use of variables
 - 4. Linear functions
 - a. Constant rates of change
 - b. Writing equations of lines when given points or slopes
- E. Solving Equations
 - 1. Using models such as Hands-On-Equations or other manipulatives
 - 2. Solving application problems using equations
 - 3. Solving systems of equations
- F. Properties of the Real Number System
 - 1. Closure, associative, commutative, distributive, density, identity, inverse
- G. Statistics
 - 1. Measures of center: mean, median, mode
 - a. Meanings of each and when to use each
 - b. Calculating mean, median, and mode
 - 2. Measures of spread: range, interquartile range, mean absolute deviation, standard deviation
 - a. Meanings of each and when to use each
 - b. Calculating measures of spread
 - 3. Uses of each measurement in displaying data (median and interquartile range for box plots, mean and standard deviation for bell curves)
 - 4. Displays of numerical data
 - a. Box plots, line plots, histograms, stem-and-leaf plots
 - b. Normal curve
 - c. Line graphs and scatterplots
- H. Probability
 - 1. Theoretical vs. Experimental probabilities
 - 2. Simulations with and without technology
 - 3. Simple and compound probabilities
 - 4. Solving application problems using tools such as tree diagrams
 - 5. Combinations and permutations