# MATH A104: MATHEMATICS FOR ELEMENTARY TEACHERS

| Item | Value |
| --- | --- |
| Curriculum Committee Approval Date | 03/20/2024 |
| Top Code | 170100 - Mathematics, General |
| Units | 3 Total Units |
| Hours | 54 Total Hours (Lecture Hours 54) |
| Total Outside of Class Hours | 0 |
| Course Credit Status | Credit: Degree Applicable (D) |
| Material Fee | No |
| Basic Skills | Not Basic Skills (N) |
| Repeatable | No |
| Grading Policy | Standard Letter (S), <br>• Pass/No Pass (B) |
| Associate Arts Local General Education (GE) | • OC Comm/Analytical Thinking - AA (OA2) |
| Associate Science Local General Education (GE) | • OCC Comm/AnalyticalThinking-AS (OAS2) <br> • OCC Mathematics (OMTH) |
| California State University General Education Breadth (CSU GE-Breadth) | • CSU B4 Math/Quant.Reasoning (B4) |

## Course Description

Designed for prospective elementary school teachers, the course emphasizes mathematical structure and problem solving techniques associated with the real number system, elementary number theory, ratio and proportion, set theory, elementary logic, and percent. Instructional delivery design techniques and technological applications will be explored. PREREQUISITE: MATH A030 or higher or appropriate placement. Transfer Credit: CSU; UC.

## Course Level Student Learning Outcome(s)

1. Illustrate mathematical ideas through use of manipulatives, models, verbal explanation and writtenrepresentation.
2. Apply mathematical thinking and modeling to solve problems.
3. Work cooperatively, explore, discover, make conjectures and formulate conclusions based upon mathematical concepts.

## Course Objectives

• 1. Formulate and solve applied problems using whole numbers, integers, fractions, decimals, percents and real numbers by applying a recognized problem-solving process.
• 2. Solve simple linear equations and inequalities.
• 3. Demonstrate and explain computational algorithms and problem solving techniques to elementary school students.
• 4. Evaluate and utilize manipulatives which emphasize mathematical concepts and common core curriculum standards.
• 5. Apply elementary set theory to categorization problems.
• 6. Verbalize conclusions arising from the recognition and exploration of mathematical patterns.
• 7. Develop properties and computational algorithms for numeration systems with nonstandard bases.
• 8. Apply elementary number theory to find prime numbers, factorizations, divisors and multiples.
• 9. Explain the concept of rational numbers using decimal representations.
• 10. Analyze the structure and properties of whole, rational, and real numbers.
• 11. Analyze the arithmetic algorithms for representing rational numbers using ratio and decimal representations and justify their equivalence.
• 12. Define the concept of rational and irrational numbers including their decimal representation and illustrate the use of the number line representation.
• 13. Develop and reinforce conceptual understanding of mathematical topics through the use of problem solving, communication, connections, modeling, reason, and representation.
• 14. Develop activities implementing curriculum standards.

## Lecture Content

Each of these topics is presented in terms of how and why to explain concepts to elementary school students. While the emphasis is on content, there will also be demonstrations of ways to present topics referencing national and state curriculum standArds for elementary school math. Students may be required to observe an elementary school math class, interview an elementary school teacher, read and summarize articles in mathematics teaching journals, design mathematics manipulative, and/or prepare and present a classroom lesson designed for elementary students. Introduction to Problem Solving Polyas four-step problem-solving process pattern exploration the calculator as a problem-solving tool Sets, Functions, Logic set operations Venn diagrams relations and functions truth tables conditional statements Numeration System and Whole Numbers whole number operations algorithms estimation techniques place value and number bases numberation systems including Hindu-Arabic, Roman, and Mayan or Bqabylonian Fundamental Theorem of Arithmetic Integers structures, operations, and algorithms with integers solving equations solving inequalities Number theory divisibility tests prime and composite numbers greatest common divisor least common multiple Real Numbers structure, properties, and operations with rational number  ratio and proportion structure, properties, and operations with irrational numbers number line Decimals decimal operations           percents d ecimal representation of rational numbers

## Lab Content

See Course Content

## Method(s) of Instruction

• Lecture (02)
• DE Live Online Lecture (02S)

## Instructional Techniques

Although the primary instructional mode is the lecture/demonstration method emphasizing approaches to problem solving and the attendant classroom presentation strategies for elementary school students, significant class time is reserved for student discussion and group

exercises.  When student oral presentation is appropriate, both instructor and peer feedback are elicited.

## Reading Assignments

Assigned from textbook 1 hour

## Writing Assignments

Writing is required on essay test questions, journal article summaries, and interview/observation reports. 1 hour

## Out-of-class Assignments

Optional lesson plans, peer feedback, game/manipulative design, and planned presentations all require written justification and rationale. 4 hour

## Demonstration of Critical Thinking

Grades are determined by student performance on unit tests which evaluate problem-solving techniques as well as written responses to essay questions; a comprehensive final exam whose structure is similar to that of the unit test; written reports which may include journal article summaries, interviews and/or classroom observations.  In addition, evaluations may include classroom presentation performance as well as peer evaluation.

## Required Writing, Problem Solving, Skills Demonstration

Writing is required on essay test questions, journal article summaries, and interview/observation reports.

## Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

## Textbooks Resources

1. Required Musser G., Person B., Burger W.. Mathematics for Elementary Teachers, 10th ed. Wiley, 2014 Rationale: Please note there has not been a new edition made of the textbook yet. We are making these updates for C-ID compliance, but will look for an alternative textbook that has a more recent release date.

## Other Resources

1. Other appropriate textbook as chosen by faculty.