MATH C104: MATHEMATICS FOR ELEMENTARY TEACHERS

Item	Value
Curriculum Committee Approval Date	03/06/2020
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)
Local General Education (GE)	• CL Option 1 Math Competency (CA3)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

This course will develop and reinforce conceptual understanding of mathematical topics through the use of connections, modeling, and representation and national and state curriculum standards for elementary school math, including Common Core State Standards. Instructional delivery design techniques and technological applications will be explored. The course involves using technology, participating in group work and projects, and observing and/or teaching in local elementary schools. Topics covered include whole numbers, integers, rational numbers, real numbers, number theory, ratio, proportion, percent, set theory, and elementary logic. PREREQUISITE: A course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitation: MATH C104 and MATH C106 combined: maximum credit, 1 course. C-ID: MATH 120.**C-ID:** MATH 120.

Course Level Student Learning Outcome(s)

1. Demonstrate conceptual understanding of mathematical topics through the use of connections, modeling, and representations in verbal and written explanation.
2. Apply mathematical thinking and modeling to solve application problems.
3. Use technology appropriately to enhance mathematical thinking to solve mathematical problems and to judge the reasonableness of the results.
4. Apply national and state curriculum standards for elementary school math, including Common Core State Standards.

Course Objectives

- 1. Perform calculations with place value systems;
- 2. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances;
- 3. Apply algorithms from number theory to determine divisibility in a variety of settings;
- 4. Analyze least common multiples and greatest common divisors and their role in standard algorithms;
- 5. Explain the concept of rational numbers, using both ratio and decimal representations; analyze the arithmetic algorithms for these two representations; and justify their equivalence;
- 6. Analyze the structure and properties of whole, rational, and real number systems; define the concept of rational and irrational numbers, including their decimal representation; and illustrate the use of a number line representation;
- 7. Develop and reinforce conceptual understanding of mathematical topics through the use of patterns, problem solving, communication, connections, modeling, reasoning, and representation; and
- 8. Develop activities implementing curriculum standards.

Lecture Content

THINKING CRITICALLY Introduction to Problem Solving Pólyas Problem-Solving Principles and the Standards for Mathematical Practice of the Common Core State Standards for Mathematics Pattern Exploration Problem-Solving Strategies Reasoning Mathematically SETS AND WHOLE NUMBERS Set Operations, Venn Diagrams, DeMorgans Laws, True Tables, Equivalent Statements, Deductive Reasoning, Contradictions, Conditional Statements Sets, Counting, Relations and Functions, and the Whole Numbers Addition and Subtraction of Whole Numbers Multiplication and Division of Whole Numbers Structure and Properties of Whole Number System NUMERATION AND COMPUTATION Numeration Systems Past and Present Nondecimal Positional Systems Algorithms for Adding and Subtracting Whole Numbers Algorithms for Multiplication and Division of Whole Numbers Mental Arithmetic and Estimation Analyze least common multiples and greatest common divisors role in standard algorithms NUMBER THEORY Divisibility of Natural Numbers Tests for Divisibility Prime and Composite Numbers, Prime Factorization, and Fundamental Theorem of Arithmetic Greatest Common Divisors and Least Common Multiples Connections to Number Theory Define the concept of irrational numbers, including their decimal representation Illustrate the use of a number line representation INTEGERS Representation of Integers. Addition and Subtraction of Integers Multiplication and Division of Integers Basic Properties and Computational Algorithms FRACTIONS, RATIONAL NUM BERS and PROPORTIONAL REASONING The Basic Concepts of Fractions and Rational Numbers The Arithmetic of Rational Numbers. The Rational Number System: Structures and Properties Proportional Reasoning, Ratio and Proportion DECIMALS AND REAL NUMBERS Introduction to Rational and Decimal Representation Computations with Decimals Structure and Properties of Real Number System Decimal and Ratio Presentations, Algorithms, and Equivalence Percent ACTIVITIES IMPLEMENTED WITH CURRICULUM STANDARDS Observation of Elementary School Classroom Prepare and Deliver an Instructional lesson to Elementary School Students Class Project and Presentation

Method(s) of Instruction

- Lecture (02)
- DE Online Lecture (02X)

Instructional Techniques

- Deliver lectures of course content. - Assign homework and quizzes. - Deal with math anxiety by establishing a friendly, student-centered learning environment. - Relate material in the course to real life and the outside world. - Require participation including student-to-student and student-to-instructor interaction through the use of small-group activities

and whole-class discussion. - Apply technologies to increase learner motivation such as Scientific and/or Graphing Calculator and computer software such as Wolfram

Reading Assignments

Alpha. - Give objective examinations - Give midterm examination - Give final examination (comprehensive)

Writing Assignments

- Homework - Written Assignments - Projects

Out-of-class Assignments

- Problem Solving Exercises - Skills Demonstration - Quizzes

Demonstration of Critical Thinking

Essay Examinations Final Exam Midterm Exam Objective Examinations Oral Presentations Problem Solving Exercises Projects (ind/group) Report Short Quizzes Skills Demonstration Written Assignments

Required Writing, Problem Solving, Skills Demonstration

Written Assignments include a variety of problems to reinforce the understanding and achievement of all SLOs.

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.

Manuals Resources

1. Required Long, Calvin T.; DeTemple, Duane W.; Millman, Richard S. Mathematical Reasoning for Elementary School Teachers, 7th ed. Pearson, 2019 Rationale: -