MATH G104: MATHEMATICS FOR ELEMENTARY TEACHERS

Item	Value
Curriculum Committee Approval Date	02/18/2020
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)	• GWC Mathematic Competency (GB2)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

Formerly: Mathematics for Elementary Teachers 1. This course is designed for the prospective elementary school teacher. Topics include problem-solving, structure and arithmetic of the real numbers and other numerical systems, set theory, and manipulatives. This course is designed to develop and reinforce conceptual understanding of the national and state curriculum standards for elementary school mathematics, including the common core. PREREQUISITE: Course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Draw a model using base ten blocks to illustrate the use of classroom manipulatives to preform arithmetic operations on whole numbers.
3. Apply elementary number theory to find prime numbers, factorization, divisors, and multiples.
4. Perform calculations with the base ten place value systems.

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
• 8. Develop activities and use of manipulative in implementing curriculum standards

Lecture Content

1.An Introduction to problem solving   A. Explorations with patterns   B. Mathematics and problem solving   C. Algebraic thinking   D. Logic: An Introduction. Develop and reinforce conceptual understanding of mathematical topics through the use of communication, connections, modeling, and representation (optional) 2. Sets, whole numbers, and functions   A. Describing sets   B. Other set operations and their properties   C. Addition and subtraction of whole numbers   D. Multiplication and division of whole numbers   E. Relations and Functions 3. Numeration systems and whole-number computation   A. Numeration systems: History, Hindu-Arabic numeration system, and place value systems;   B. Algorithms for whole-number addition and subtraction   C. Algorithms for whole-number multiplication and division   D. Mental mathematics and estimation for whole-number operations 4. Integers and operations of addition and subtraction   A. Integers and the operations of addition and subtraction structure and basic properties; prime factorization, fundamental theorem of arithmetic   B. Multiplication and division of integers   C. Divisibility tests   D. Prime and composite numbers   E. Greatest common divisor and least common multiple   F. Clock and modular arithmetic 5. Rational num bers and fractions   A. The set of rational numbers structure and properties; number line representation of real numbers   B. Addition and subtraction of rational numbers   C. Multiplication and division of rational numbers   D. Proportional reasoning 6. Decimals, percents, and real numbers   A. Introduction to decimals   B. Operations on decimals   C. Nonterminating decimals   D. Percents   E. Computing interest(optional)   F. Real numbers 7. Patterns, problem solving, communication, connections, modeling, reasoning, and representation   A. Solving linear equations   B. Solving inequalities   C. Use of manipulatives   D. Verbalize conclusions arising from the recognition and exploration of mathematical patterns. 8. National and state curriculum standards for elementary school math including Common Core State Standards.

Lab Content

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Method(s) of Instruction

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

Reading Assignments

Read each section in the text before and/or after the lectures on that section.

Writing Assignments

Students will demonstrate problem solving skills when they write their own solutions to regular homework problems, quiz problems, and exam problems.

Out-of-class Assignments

1. Optional professional journal reading assignments.2. Optional individual/group projects.

Demonstration of Critical Thinking

Students will demonstrate critical thinking and problem solving skills by using logic, in conjunction with past mathematical solving techniques, to solve and interpret a variatey of applications not previously seen. Demonstrations will be shown by completing assignments, participating in discussions, and completing required exams and quizzes

Required Writing, Problem Solving, Skills Demonstration

Written homework assigned for each problem set corresponding to the lecture.

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 Rick Billstein, Shlomo Libeskind, Johnny W. Lott. A Problem Solving Approach to Mathematics for Elementary School Teachers, 13th ed. Pearson, 2020 2. Required Dan Dolan, Him Williamson, Mati Muri. Mathematical Activities for Elementary School Teachers, 11th ed. Pearson, 2017