BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

MATH 4 - Concepts in Mathematics for Teachers I **3 Unit(s)**

Prerequisite(s): MATH 124 or Math Level V
Recommended Prep: Reading Level IV

Transfer Status: CSU
51 hours Lecture

This course focuses on the development of quantitative reasoning skills through in-depth, integrated explorations of topics in mathematics, including real number systems and subsystems. Emphasis is on comprehension and analysis of mathematical concepts and applications of logical reasoning. (C-ID MATH 120).

II. **OBJECTIVES**

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

A. Demonstrate an understanding of different numerations systems and be able to illustrate numbers in the different systems; perform calculations with place value systems.
B. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances;
C. Apply algorithms from number theory to determine divisibility in a variety of settings;
D. Analyze least common multiples and greatest common divisors and their role in standard algorithms;
E. Explain the concept of rational numbers, using both ratio and decimal representations; analyze the arithmetic algorithms for these two representations; and justify their equivalence;
F. 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;
G. Develop and reinforce conceptual understanding of mathematical topics through the use of patterns, problem solving, communication, connections, modeling, reasoning, and representation; and
H. Develop activities implementing curriculum standards.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Numeration systems: history, Hindu-Arabic numeration system, and place value systems	8.00
2. Integers: structure and basic properties, computational algorithms	7.00
3. Basic number theory: divisibility, prime and composite numbers, prime factorization, fundamental theorem of arithmetic, least common multiple and greatest common divisor	8.00
4. Real numbers: structure and basic properties, arithmetic operations, rational and irrational numbers, decimal representation, number line representation	7.00
5. Rational numbers: structure and properties, ratio and proportion	7.00

6.	Patterns, problem solving, communication, connections, modeling, reasoning, and representation	7.00
7.	National and state curriculum standards for elementary school math including Common Core State Standards	7.00
	Total Hours	51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Collaborative Group Work
C. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
D. Discussion
E. Board Work

V. **METHODS OF EVALUATION**

A. Exams/Tests
B. Quizzes
C. Class Assignments and Class Response
D. Daily Homework Assignments, where the student will demonstrate problem-solving skills

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
   1. Read the section in the textbook on Introduction to Problem Solving and be able to list the famous four-step process for solving problems and at least ten different problem-solving strategies.
   2. Read the section in the textbook on the whole numbers and numeration systems and be able to show the differences in the Egyptian, Roman, Babylonian, Mayan, Ionian, Chinese, and Hindu-Arabic numeration systems.

B. Writing Assignments
   1. Describe in words at least two characteristics of a problem that would suggest using (a) the "Guess and Test" strategy, (b) the "Use a Variable" strategy, and (c) the "Solve a Simpler Problem" strategy.
   2. Describe in words and explain the difference between a positional numeration system and a place-value numeration system.

C. Out-of-Class Assignments
   1. Review the section on the Introduction of Problem Solving and solve the problems assigned by the instructor showing each step.
   2. Review the section on the Whole Numbers and Numeration Systems and solve the problems assigned by the instructor showing each step.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Musser, G.L. and Burger, W.F. Mathematics for Elementary Teachers. 9th Edition. Wiley, 2011.

Materials Other Than Textbooks:

A. Scientific calculator

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