

SYLLABUS

COURSE # AND TITLE: Math 121, Mathematics for the Elementary Teacher I **# OF CREDITS:** 3

CATALOG DESCRIPTION:

A development of the properties, concepts, and logical reasoning of the arithmetic of whole numbers. Topics include problem solving techniques, set theory, numeration systems, algorithms of arithmetic in base ten and other bases, estimation and mental computation techniques, and number theory.

Semester Offered: Fall, Spring

Prerequisites: Grade of "C" or better in Math 115 or ACCUPLACER score of 104 – 120 (algebra)

Common Student Learning Outcomes

Upon successful completion of San Juan College programs and degrees, the student will...

<i>Learn</i>	<i>Students will actively and independently acquire, apply and adapt skills and knowledge to develop expertise and a broader understanding of the world as lifelong learners.</i>
<i>Think</i>	<i>Students will think analytically and creatively to explore ideas, make connections, draw conclusions, and solve problems.</i>
<i>Communicate</i>	<i>Students will exchange ideas and information with clarity and originality in multiple contexts.</i>
<i>Integrate</i>	<i>Students will demonstrate proficiency in the use of technologies in the broadest sense related to their field of study.</i>
<i>Act</i>	<i>Students will act purposefully, reflectively, and respectfully in diverse and complex environments.</i>

GENERAL LEARNING OBJECTIVES

Upon completion of this course, the student should have a working knowledge of the following content areas:

- 1.) Problem Solving Techniques
- 2.) Set Theory and Numeration Systems
- 3.) Whole Numbers: Operations and Properties
- 4.) Whole Number Computation – Mental, Electronic, and Written
- 5.) Number Theory

SPECIFIC LEARNING OUTCOMES

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

- 1.1) Solve problems using Polya's 4-step process
- 1.2) Solve problems using a wide variety of other problem solving strategies

- 2.1) Use set notation to define and describe finite and infinite sets
- 2.2) Determine one-to one correspondence between sets, subsets, and disjoint sets through various techniques including Venn diagrams
- 2.3) Perform operations on sets including union, intersection, complement, set difference, and Cartesian product
- 2.4) Perform conversions between the Hindu-Arabic numeration system and the following numeration systems: Tally, Egyptian, Roman, Babylonian, and Mayan
- 2.5) Perform conversions between the base-10 system and other bases

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- 2.6) Represent relations in the following formats: set of ordered pairs, arrow diagram, table of values, set builder notation, Cartesian graphs
- 2.7) Determine if a relation possesses the following properties: reflexive, symmetric, and transitive
- 2.8) Determine when a relation is a function and the functions domain, co-domain, and range
- 2.9) Determine formulas for arithmetic and geometric sequences, and apply them to solve problems

- 3.1) Define and use the properties of whole number addition, multiplication, and division
- 3.2) Use the set and measurement models to illustrate the concepts of addition and subtraction using multiple approaches
- 3.3) Use the repeated addition, rectangular array, Cartesian Product, and tree diagram approaches to illustrate the concepts of multiplication
- 3.4) Use the partitive and measurement conceptual models as well as the missing factor and repeated subtraction approaches to illustrate the concepts of division
- 3.5) Create addition and multiplication tables in other bases and use fact families to perform addition, subtraction, multiplication and division in those bases
- 3.6) Define and use the definitions for ordering whole numbers
- 3.7) Define and use the properties of “less than” for whole numbers
- 3.8) Define and use the properties of whole number exponents

- 4.1) Use mental math techniques to acquire accurate answers to arithmetical expressions
- 4.2) Use mental math techniques for estimating answers to arithmetical expressions
- 4.3) Use various written algorithms to perform arithmetic in base 10 and other bases including the tally and base ten block systems, abacus, place-value methods, scaffold method, and the lattice method

- 5.1) Determine if a number is prime or composite using various techniques including the Sieve of Eratosthenes and the Prime Factor Test
- 5.2) Define the Fundamental Theorem of Arithmetic
- 5.3) Find the prime factorization of a number using various techniques including factor trees
- 5.4) Understand and use the tests for divisibility
- 5.5) Find the number of factors of a composite number
- 5.6) Find the Greatest Common Factor and Least Common Multiple of a set of numbers using the Set Intersection and Prime Factorization Methods as well as the Euclidean Algorithm and associated theorems

At the discretion of the instructor, other objectives may be added.

Additional requirements of the course: Graphing Calculator, TI-83, TI-83 Plus, or TI-84 Plus is required.

DIVISION DEAN: Frank Williams

DATE: 8/15/05

A current syllabus must be on file in the dean’s office for every course being taught during a given semester.