

SYLLABUS

COURSE # AND TITLE: Math 122, Mathematics for the Elementary Teacher II # **OF CREDITS:** 3

CATALOG DESCRIPTION:

A development of the properties, concepts, and logical reasoning of (1) the arithmetic of real numbers, (2) statistics, and (3) probability. Topics include fractions, decimals, ratios, proportions, percent, integers, rational numbers, real numbers, algebra, statistics, and probability.

Semester Offered: Fall, Spring

Prerequisites: Grade of "C" or better in Math 121

Common Student Learning Outcomes

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

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| <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.) Fractions
- 2.) Decimals, Ratio, Proportion, and Percent
- 3.) Integers, Rational Numbers, and Real Numbers
- 4.) Introductory Algebra
- 5.) Statistics
- 6.) Probability

SPECIFIC LEARNING OUTCOMES

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

- 1.1) Define and utilize equivalent fractions, proper and improper fractions, and mixed numbers
- 1.2) Determine when a fraction is in simplest form and when two fractions are equivalent
- 1.3) Use the part-to-whole concept of fractions to illustrate fractions and their equivalents
- 1.4) Order fractions
- 1.5) Use the density property of fractions to find a fraction between two other fractions
- 1.6) Perform arithmetic operations on fractions and mixed numbers
- 1.7) Define and utilize the properties of fraction addition, multiplication, and division
- 1.8) Explain and use the models of fraction addition, subtraction, multiplication, and division

- 2.1) Understand the concept of decimal and how it is an extension of the base-10 system
 - 2.2) Write decimals in expanded form
 - 2.3) Convert fractions to decimals and know when a terminating or repeating decimal will be obtained
 - 2.4) Order decimals
 - 2.5) Perform arithmetical operations on decimals
 - 2.6) Represent repeating decimals properly
 - 2.7) Define and use ratios, rates, proportions and percents to solve problems
 - 2.8) Convert decimals to percents and vice versa
- 3.1) Define the set of integers and the concept of opposite
 - 3.2) Use the set and measurement models to illustrate the concepts of addition and subtraction of integers
 - 3.3) Illustrate integer subtraction using the adding the opposite and missing addend approaches
 - 3.4) Define and use the properties of integer addition, multiplication, and division
 - 3.5) Explain why a negative times a negative is a positive
 - 3.6) Define and use the properties of integer exponents
 - 3.7) Convert numbers between scientific and standard notation
 - 3.8) Order integers
 - 3.9) Define and utilize the properties of ordering integers
- 4.1) Define the sets of rational, irrational, and real numbers
 - 4.2) Determine when a rational number is in simplest form and when two rational numbers are equivalent
 - 4.3) Perform all arithmetic operations on rational numbers
 - 4.4) Order rational, irrational, and real numbers
 - 4.5) Define and utilize the properties of rational number addition, multiplication, and ordering
 - 4.6) Define and utilize the properties of real numbers and the properties of ordering real numbers
 - 4.7) Evaluate radical expressions with even and odd roots
 - 4.8) Convert a radical expression to an exponential expression with rational exponents and vice versa
 - 4.9) Understand and utilize the concepts and procedures of algebra to solve linear equations and inequalities
 - 4.10) Use the Cartesian coordinate plane to graph linear, quadratic, exponential, cubic, and step functions
 - 4.11) Use the vertical line test to determine if a graph of a relation also represents a function
- 5.1) Define statistics and state its major goals
 - 5.2) Explain the difference between the descriptive and inferential branches of statistics
 - 5.3) Explain the difference between a population and a sample
 - 5.4) Explain the difference between qualitative and quantitative data and know which type of graph is appropriate for each type of data
 - 5.5) Organize data into various graphs and charts including: frequency distribution, histograms, pie charts, dot plots, stem-and-leaf plots, bar graphs, line graphs, pictographs, scatter plots, and box-and-whisker plots
 - 5.6) Find the equation of the regression line and the correlation coefficient of paired data, and use the equation to make a prediction
 - 5.7) Calculate the mean, median, mode, range, standard deviation, and variance of a set of data
 - 5.8) Calculate the weighted mean of a data set
 - 5.9) Find the quartiles, five-number summary, and interquartile range of a data set
 - 5.10) Use the interquartile range to determine if an outlier exists in a data set
 - 5.11) Use the empirical rule and z-scores of the normal distribution to identify outliers in a data set
 - 5.12) Understand how statistical design can introduce bias into an experiment and which methods of data collection produce the least bias
 - 5.13) Recognize misleading graphs and statistics and be able to explain why they are misleading
- 6.1) Explain the difference between theoretical, experimental, and subjective probabilities

- 6.2) Explain the law of large numbers
- 6.3) Use the definition of the complement of an event and the associated properties of probability
- 6.4) Explain the difference between independent events and mutually exclusive events
- 6.5) Use tree diagrams, the fundamental counting principle, permutations, and combinations to find the number of possible outcomes in a probability experiment
- 6.6) Calculate theoretical and experimental probabilities using probability tree diagrams and the addition, multiplication, and conditional probability rules
- 6.7) Find the expected value or odds of an event

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 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.