Faculty is required to have the outline submitted to the Academic Affairs Office. The course outline is the form used for approval of new courses by the Academic Affairs and Standards Council.

DEPT. Math  COURSE NUMBER: 1109

NUMBER OF CREDITS: 3

COURSE TITLE: Math Skills for Elementary Education

CATALOG DESCRIPTION:
Develops mathematical skills required for Elementary Education majors by pairing various skills with a beginning discussion of pedagogy and best-practices in Elementary Math Education. In addition, this course also fulfills some of the Minnesota Board of Teaching Competencies required for Teachers of Elementary students.

AUDIENCE:
This course if for students who are interested in becoming Elementary Education teachers who desire to complete some of the Math Competencies required for Elementary Education certification.

FULFILLS MN TRANSFER CURRICULUM AREA(S) (Leave blank if not applicable)
Area: by meeting the following competencies:
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PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE:
Two years of high school Algebra, Math 0092, or placement by exam.

LENGTH OF COURSE:
1 semester

THIS COURSE IS USUALLY OFFERED:
Every other year fall spring summer undetermined

Four goals are emphasized in course at Minnesota West Community & Technical College:

1) ACADEMIC CONTENT: The academic objectives of this course are:
   a. To solve problems using basic concepts of Algebra and Geometry.
   b. To use Mathematics to describe real-world situations.
   c. To develop a basic level of skill at using mathematical methods.
   d. To develop a basic level of mathematical thinking.
   e. To develop an appreciation of the scope and utility of Mathematics.
2) THINKING SKILLS: This course will help students improve the effectiveness of their thinking skills through:
   a. Developing the use of mathematical expressions to analyze and solve real-world problems.
   b. Developing the use of mathematical models to represent patterns.
   c. Developing the use of problem solving strategies.
   d. Focusing on improving critical thinking skills (logical, observational, insightful, and evaluative).

3) COMMUNICATIONS SKILLS: This course will help students improve their oral and written communication skills through:
   a. Writing concise solutions to mathematical problems, ideas and definitions.
   c. Solving problems in cooperative groups.
   d. Organizing ideas and data using graphing techniques.
   e. Relating mathematical concepts to real-world applications.

4) HUMAN DIVERSITY: This course will help students recognize, understand, and appreciate human diversity through:
   a. Working in cooperative groups to experience different ways people develop strategies, solve, and interpret mathematical problems.
   b. Changing groups to enrich each person’s point of view.

TOPICS TO BE COVERED:

1) Number properties and operations.
2) Measurement principles and Geometry concepts.
3) Discrete and Finite concepts like recursion, combinatorics and graph theory.
4) Mathematical models, working with data and analyzing problems.
5) Multiple representations of Math including: verbal, algebraic, pictorial (geometric), graphical, and numerical.
6) Best teaching practices.

LIST OF EXPECTED COURSE OUTCOMES: This course:
1) Develops understanding of number properties and number operations.
2) Develops understanding of measurement principles and geometry concepts.
3) Develops use of discrete and finite math concepts like recursion, combinatorics and graph theory.
4) Develops mathematical models to organize data and analyze problems.
5) Develops use of multiple representations including verbal, algebraic, geometric (pictorial), graphical, and numerical methods where possible.

LEARNING/TEACHING TECHNIQUES used in the course are:
- Collaborative Learning
- Problem Solving
- Student Presentations
- Interactive Lectures
- Creative Projects
- Individual Coaching
- Lecture
- Demonstrations
- Films/Videos/Slides
- Other (describe below)
ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

- Reading
- Tests
- Individual Projects
- Oral Presentations
- Worksheets
- Collaborative Projects
- Textbook Problems
- Papers
- Portfolio
- Group Problems
- Term Paper
- Other (describe below)

EXPECTED STUDENT LEARNING OUTCOMES:

1) The student will apply and explain the use of number properties and number operations.
   A) Compute proficiently with integers and rational numbers (including decimals, fractions and percents)
   B) Discuss and apply properties appropriately including: closure, associative, commutative, identity, inverse, and distributive properties.
   C) Extend these properties to real numbers
   D) Compute proficiently using order of operations.

2) The student will apply and explain measurement principles and geometry concepts.
   A) Measure objects with both standard and metric systems.
   B) Convert measurements within and between systems.
   C) Describe how accuracy and precision are related.
   D) Name, draw and describe properties of common geometric figures including polygons.
   E) Compare and contrast properties in Euclidean geometry (measurements: degrees, length, perimeter, area, volume) with those in graph theory (measurements: adjacency, connectedness, paths, circuits)

3) The student will apply and explain measurement principles and geometry concepts.
   A) Use and explain recursion and iteration in mathematical patterns
   B) Apply counting techniques to count finite sets
   C) Use iterative algorithms to perform a given calculation or solve a given problem like in the linear and exponential models and math of finance and logistic populations (Now and Next patterns)
   D) Apply basic graph theory to find paths in a network or optimize a process

4) The student will develop mathematical models to organize data and analyze problems.
   A) Identify which type(s) of models can best be used to describe a pattern (for example: iteration, recursion, linear, exponential)
   B) Use technology to demonstrate an iterated or recursive pattern

5) The student will solve problems by multiple representations including verbal, algebraic, geometric (pictorial), graphical, and numerical methods where possible.
A) Use multiple representations to describe authentic situations, data, and patterns.
B) Graph and draw patterns which and use them to describe situations
C) Solve problems using multiple representations and estimate solutions and evaluate reasonableness for solutions.

6) Complete Competencies 3 - 13 for Teachers of Elem. Ed.  (8710.3200, Subp. 3, Standard H1a - H4b) As follows: H1a) identify and justify observed patterns, H1b) generate patterns to demonstrate a variety of relationships, H1c) relate patterns in one strand of mathematics to patterns across the discipline, H2a) help students investigate situations that involve counting finite sets, calculating probabilities, tracing paths in network graphs, and analyzing iterative procedures, H2b) apply these ideas and methods in settings in mathematics of finance, population dynamics, and optimization planning, H3a) possess number sense and be able to use numbers to quantify concepts in authentic problems H3b) understand a variety of computational procedures and how to use them in examining the reasonableness of answers, H3c) understand the concepts of number theory including divisibility, factors, multiples, prime numbers, and a basis for exploring number relationships, H3d) understand the relationships of integers and their properties that can be explored and generalized to other mathematical domains, H4a) understand the properties of geometric figures, H4b) understand geometry and measurement from both abstract and concrete perspectives and identify real world applications.

Veteran Services: Minnesota West is dedicated to assisting veterans and eligible family members in achieving their educational goals efficiently. Active duty and reserve/guard military members should advise their instructor of all regularly scheduled military appointments and duties that conflict with scheduled course requirements. Instructors will make every effort to work with the student to identify adjusted timelines. If you are a veteran, please contact the Minnesota West Veterans Service Office.

The information in this course outline is subject to revision

To receive reasonable accommodations for a documented disability, please contact the campus Student Services Advisor or campus Disability Coordinator as arrangements must be made in advance. In addition, students are encouraged to notify their instructor.

This document is available in alternative formats to individuals with disabilities by contacting the Student Services Advisor or by calling 800-658-2330 or via your preferred Telecommunications Relay Service.

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