Mathematics For Elementary Education
Math 46
Syllabus

De Anza College

Spring 2025

Instructor
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Hello everyone, and welcome to Mathematics for Elementary Education! I am very excited to get to know everyone and help everyone have an amazing, informative experience as we go through the year. This course is designed for prospective elementary and middle school teachers. It gives an introduction to the discipline of mathematics as the use of logical, quantitative, and spatial reasoning in the abstraction, modeling, and problem solving of real-world situations. The main topics in the course include the origins of mathematics, mathematical reasoning and problem solving strategies, theory of sets, integers and integral number theory, rational numbers and proportion, real numbers and decimal notation, and measurement. Throughout the course students will experience the learning of mathematics in a way that models how they can create an active learning environment for their future students.

Textbook
Mathematical Reasoning for Elementary Teachers Calvin T. Long, Duane W. DeTemple, and Richard S. Millman. (7^{th} Edition)

Assessment and Grading

Your grade will be determined by the following assessments:

Discussion Posts (10 total)

There will be 10 discussion posts throughout the course. Each post is worth **10 points**.

- To receive full points for a discussion post, you must:
  - Respond to the prompt.
  - Reply to at least two of your classmates' posts.

Total points for discussion posts: 100 points (10 posts x 10 points each).

Essays (2 total)

There will be two essays, each worth **20 points**.

- A prompt/rubric will be provided for each essay when it is assigned.

Total points for essays: 40 points (2 essays x 20 points each).

Projects (3 total)

There will be three projects, each worth **20 points**.

- A prompt/rubric will be provided for each project when it is assigned.

Total points for projects: 60 points (3 projects x 20 points each).

Quizzes (15 total)

There will be 15 quizzes throughout the course. Each quiz is worth **10 points**.

- Quizzes will be assigned every **Tuesday and Thursday**, with each quiz due exactly **one week from when it is assigned**.

Total points for quizzes: 150 points (15 quizzes x 10 points each).

Exams (2 total)

- **Midterm Exam:**
  - Date: **May 15th**
  - Points: **50 points**
  - You will be given a few hours to complete the midterm.
- **Final Exam:**
  - Date: **May 26th**
  - Points: **100 points**
  - You will be given a few hours to complete the final.

Grading Breakdown

Assessment	**Points**
Discussion Posts (10 posts)	100
Essays (2 essays)	40
Projects (3 projects)	60
Quizzes (15 quizzes)	150
Midterm Exam	50
Final Exam	100
Total	**500**

Grading Scale

Grade	**Percentage**	**Points**
A	90-100%	450-500
B	80-89%	400-449
C	70-79%	350-399
D	60-69%	300-349
F	Below 60%	Below 300

Office Hours

Tuesday: 5:00pm-6:30pm (Online on Zoom)
Thursday: 5:00pm-6:30pm (Online on Zoom)

Academic Honesty

For quizzes and exams, a specific amount of time will be given to the students to view the assignment, write their answers on their own paper, take photos of their solutions on their phones, upload the photos to canvas, and submit the assignment. I *will not* require you to be on zoom during the allotted quiz/exam hours.

I am fully aware of how easy it is to cheat in an online class. Using *chatgpt*, *photomath*, *wolframalpha*, *symbolab*, or any online calculator to do any of your work on quizzes or exams is strictly prohibited. Further, using forums such as *mathstackexchange* or homework help websites like *quizlet* or *chegg* are also strictly prohibited. If you are caught cheating, the dean will be notified and you will receive an F on that particular assignment.

During each time period for quizzes and exams, I will be monitoring the forums for posts that resemble the questions I give. Further, I will look into any two or more students whose solutions look identical. If it is concluded that cheating was involved, *all* students involved will receive zero points for the assignment. In other words, do not *copy* solutions and do not *share* solutions.

Tips for Success

Success in this class is reliant on your willingness to learn. I will not force anyone to get a good grade in this class. If you do not want to succeed in this class, that is your choice. That being said, if you *do* want to get a good grade in this class, I will do everything in my power to help you get it. The following are some things that the successful students in this class do :

- Take Notes
- Ask Questions
- *Do* the Homework
- Communicate

As always, please email me with any further questions. I am looking forward to the quarter!

TENTATIVE SCHEDULE

The following is a *rough* weekly schedule of content for the quarter as well as where to study in the book. It is subject to change as the year progresses. The dates listed are the first days of the given week.

W1: (4-8-2025) *Introduction to Problem Solving & Critical Thinking*
Topics: Problem solving strategies (Guess and Check, Make a Table, Look for a Pattern, Draw a Picture) and Polya's Problem-Solving Principles.
Quiz 1: Problem Solving Strategies
Quiz 2: Polya's Principles
Discussion: How would you introduce problem-solving strategies to elementary students? What activities would you use to engage them in applying these strategies?

W2: (4-15-2025) *More Problem-Solving Strategies & Algebra Basics*
Topics: Additional problem-solving strategies (Make an Orderly List, Draw a Diagram, Guess My Rule) and Algebra as a Problem-Solving Strategy.
Quiz 3: More Problem-Solving Strategies
Quiz 4: Algebra for Problem Solving
Discussion: How can you explain the concept of algebra to young learners? What challenges might they face, and how can you address them in your teaching?

W3: (4-22-2025) *Additional Problem Solving & Reasoning Mathematically*
Topics: Work Backward, Elimination, and Reasoning Mathematically (Inductive and Deductive Reasoning).
Discussion: How can you incorporate inductive and deductive reasoning in your elementary classroom? What activities or games might be useful for teaching these concepts?

W4: (4-29-2025) *Introduction to Sets & Whole Numbers*
Topics: Set operations (Union, Intersection, Subsets) and Whole Number Concepts (One-to-One Correspondence, Finite vs. Infinite Sets).
Quiz 5: Sets & Operations
Quiz 6: Whole Numbers
Discussion: How would you make the concept of sets and set operations accessible to elementary students? What real-life examples could you use to illustrate these ideas?

W5: (5-6-2025) *Addition and Subtraction of Whole Numbers*
Topics: Properties of Addition (Commutative, Associative, Identity) and Representations of Addition/Subtraction.
Quiz 7: Addition & Subtraction Properties
Quiz 8: Representations of Addition/Subtraction
Discussion: What types of manipulatives or visual aids can you use to help young learners understand the properties of addition and subtraction? How can you make the properties engaging for them?

W6: (5-13-2025) *Multiplication and Division of Whole Numbers*
Topics: Models for Multiplication (Array, Area, Tree Models) and Division (Partition, Missing-Factor Models).
Midterm

W7: (5-20-2025) *Numeration Systems & Algorithms for Operations*
Topics: Base-Ten Numeration Systems, Writing Numbers in Expanded Form, Algorithms for Adding/Subtracting Whole Numbers.
Quiz 9: Numeration Systems
Quiz 10: Algorithms for Addition/Subtraction
Discussion: How do you explain the concept of expanded form to young learners? What strategies would you use to introduce different algorithms for addition and subtraction?

W8: (5-29-2025) *Algorithms for Multiplication and Division of Whole Numbers*
Topics: Multiplication Algorithms (Partial Products, Expanded Notation) and Division Algorithms (Short Division, Long Division).
Quiz 11: Multiplication Algorithms
Quiz 12: Division Algorithms

Discussion: How would you teach long division to young learners? What approaches would you take to ensure that students understand the division process?

W9: (6-3-2025) *Number Theory: Divisibility, Prime Numbers & Factors*
Topics: Divisibility Rules, Prime vs. Composite Numbers, Greatest Common Divisors (GCD) and Least Common Multiples (LCM).
Discussion: What strategies can you use to help young students understand prime numbers and divisibility? How would you teach the concept of factors and multiples using hands-on activities?

W10: (6-10-2025) *Representation and Operations with Integers*
Topics: Representing Integers (Number Line, Counters), Addition/Subtraction of Integers, Integer Rules.
Quiz 13: Integers
Quiz 14: Operations with Integers
Discussion: How would you introduce the concept of integers to elementary students? What types of activities or games would you use to teach integer operations?

W11: (6-17-2025) *Fractions and Rational Numbers*
Topics: Introduction to Fractions (Area Model, Set Model), Addition/Subtraction of Fractions, Cross Products for Ordering.
Quiz 15: Fractions & Rational Numbers
Quiz 16: Fraction Operations
Discussion: What visual models (e.g., fraction bars, number lines) would you use to teach fractions? How can you help students develop a deep understanding of adding and subtracting fractions?

W12: (6-24-2025) *Decimals, Proportions & Percent*
Topics: Ordering Decimals, Decimal Operations, Proportional Reasoning (Ratios, Unit Rates), Basic Percent Problems (Percent of Increase/Decrease).
Final Exam

Course Objectives

⋆ Use a variety of problem-solving strategies and their applications to the world. Model and solve mathematical problems using concrete, pictorial, graphical, numerical, algebraic, and technological methods and representation, and learn how to communicate about them orally and in writing.
⋆ Use inductive and deductive reasoning to discover and analyze patterns.
⋆ Use set theory to represent and solve problems.
⋆ Analyze the structure and properties of whole numbers, integers, rational numbers, and real numbers, use a variety of algorithms to do computations with numbers, and identify common errors in computation.
⋆ Examine patterns and modular arithmetic: use the properties of numbers to explain numerical and visual patterns.
⋆ Measure and compute the lengths, areas, and volumes of mathematical shapes as well as real objects.
⋆ Use algebraic thinking and modeling to represent and solve problems.
⋆ Utilize a variety of mathematical resources including reference books, histories, essays, the internet, news articles, and interviews to analyze contemporary trends in mathematics and math education; relate and apply the Common Core Mathematics Standards and other frameworks and standards to the teaching of elementary mathematics.

Student Learning Outcomes

⋆ Analyze mathematical problems from elementary mathematics, apply problem solving techniques using a variety of methods, solve these problems individually and in groups, and communicate results mathematically through a variety of forms.
⋆ Utilize ideas from number theory, distinguish types and properties of numbers, and employ mathematical rules for operating on rational and irrational numbers using verbal, symbolic, geometric, and numerical methods.
⋆ Examine and evaluate myths and realities about the contemporary discipline of mathematics and its practitioners.
⋆ Identify and discuss developments in the history of elementary mathematics from a variety of cultures.

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Zoom T,TH 5:00 PM - 6:30 PM