

# EDUC541 16

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## Course Summary

**Course :** EDUC541 **Title :** Elementary School Mathematics

**Length of Course :** 16

**Prerequisites :** N/A **Credit Hours :** 3

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## Description

**Course Description:** This course explores mathematics in the elementary school setting. The class is approached through the following four sections: 1) preparing students to study higher level mathematical content; 2) math content and pedagogy; 3) connection between elementary math and higher level math content; and 4) best practices for teaching mathematics at the elementary level. Throughout the course, candidates will be asked to make connections between higher level mathematics and how that relates to the depth and complexity of the content. Candidates will then explore those connections through creating practical methods to be used in a class setting. The use of instructional technology and resources as enhancements to understanding and the teaching of math will also be explored.

### Course Scope:

In this course candidates acquire the knowledge, skills, and abilities necessary to make broad connections related to k-12 math curriculum and then narrow the information to particular age groups.

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## Objectives

After successfully completing this course, candidates will be able to:

1. Explore the following content in relation to pedagogy: Number and Operations, Algebra, Geometry, Measurement and Data Analysis
2. Examine mathematics activities appropriate for the k-12 math school classroom.
3. Design mathematics lessons that use manipulative materials and utilize the arts to help children develop in one of the explored content areas.
4. Create mathematics lessons, student interviews, and units that utilize the mathematical processes of problem solving, communication, reasoning and proof, representations, and connections.
6. Explore alternative methods for assessing mathematical understanding.
7. Explore methods that use assessment as a guide for planning future instruction.
8. Create technological resources appropriate for mathematics in the elementary and middle school setting.

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# Outline

## Week 1: Learning and Teaching Mathematics

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### Learning Outcomes

Explore different modes of representation in the discipline of mathematics.

Apply different modes of representation to a mathematical concept.

Reflect on the teaching of mathematics.

Contextualize broad ideas about elementary math curriculum.

### Required Readings

Cathcart et al. - Chapter 1 and 2

Review NCTM Math Standards

### Deliverables

Forum 1: Introductions

Forum 2: Gretchen

Mathematical Content Practice

## Week 2: Learning and Teaching Mathematics

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### Learning Outcomes

Explore different modes of representation in the discipline of mathematics.

Apply different modes of representation to a mathematical concept.

Reflect on the teaching of mathematics.

Contextualize broad ideas about elementary math curriculum.

### Required Readings

Cathcart et al. - Chapter 1 and 2

Review NCTM Math Standards

### Deliverables

Forum 1: Introductions

Forum 2: Gretchen

Mathematical Content Practice

## Week 3: Developing Mathematical Thinking and Problem Solving Ability

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## Learning Outcomes

Assess ways students think about mathematics.

Explain mathematical problem solving strategies.

## Required Readings

Cathcart et al. - Chapter 3

## Deliverables

Forum 3: NCTM Standards

Forum 4: Problem Solving

Mathematical Content Practice

Assignment: Mathematics Observation

## **Week 4: Developing Mathematical Thinking and Problem Solving Ability**

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## Learning Outcomes

Assess ways students think about mathematics.

Explain mathematical problem solving strategies.

## Required Readings

Cathcart et al. - Chapter 3

## Deliverables

Forum 3: NCTM Standards

Forum 4: Problem Solving

Mathematical Content Practice

Assignment: Mathematics Observation

## **Week 5: Developing Number Concepts**

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## Learning Outcomes

Assess personal understanding of number concepts.

Explain number concepts for elementary students.

Distinguish between the preservice teachers' number concepts and how that relates to assessing elementary students mathematical thinking.

## Required Readings

Cathcart et al. - Chapter 5

## Deliverables

Forum 5: Number Sense

Mathematical Content Practice

Assignment: Student Interview 1

Recommended Optional Reading

Recommended Media

## **Week 6: Developing Number Concepts**

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Learning Outcomes

Assess personal understanding of number concepts.

Explain number concepts for elementary students.

Distinguish between the preservice teachers' number concepts and how that relates to assessing elementary students mathematical thinking.

Required Readings

Cathcart et al. - Chapter 5

Deliverables

Forum 5: Number Sense

Mathematical Content Practice

Assignment: Student Interview 1

## **Week 7: Developing Understanding of Numeration**

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Learning Outcomes

Assess personal understanding of number theory.

Explain number theory concepts for elementary students.

Distinguish between the preservice teachers understanding of numeration and how that relates to teaching elementary students.

Required Readings

Cathcart et al. - Chapter 6

Deliverables

Forum 6: Numeration in Relation to Elementary Mathematics

Mathematical Content Practice

Assignment: Student Interview 2

## **Week 8: Developing Understanding of Numeration**

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Learning Outcomes

Assess personal understanding of number theory.

Explain number theory concepts for elementary students.

Distinguish between the preservice teachers understanding of numeration and how that relates to teaching elementary students.

Required Readings

Cathcart et al. - Chapter 6

Deliverables

Forum 6: Numeration in Relation to Elementary Mathematics

Mathematical Content Practice

Assignment: Student Interview 2

## **Week 9: Developing Whole-Number Operations: Addition, Subtraction, Multiplication, and Division**

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Learning Outcomes

Demonstrate modeling word problems for addition and subtraction.

Assess instructional technology within the classroom.

Demonstrate modeling word problems for Multiplication and Division.

Required Readings

Cathcart et al. - Chapter 7

Deliverables

Forum 7: What is the Connection

Forum 8: Math and Art Resource Search

Mathematical Content Practice

Assignment: Lesson Plan

## **Week 10: Developing Whole-Number Operations: Addition, Subtraction, Multiplication, and Division**

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Learning Outcomes

Demonstrate modeling word problems for addition and subtraction.

Assess instructional technology within the classroom.

Demonstrate modeling word problems for Multiplication and Division.

Required Readings

Cathcart et al. - Chapter 7

Deliverables

Forum 7: What is the Connection

Forum 8: Math and Art Resource Search

Mathematical Content Practice

Assignment: Lesson Plan

### **Week 11: WebQuests**

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Learning Outcomes

Evaluate a WebQuest for mathematical integrity and technology effectiveness.

Apply high-level mathematical thinking utilizing instructional technology.

Assess higher level mathematical thinking.

Required Readings

There are no reading assignments this week.

Deliverables

Forum 6: WebQuest Draft

Mathematical Content Practice

### **Week 12: WebQuests**

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Learning Outcomes

Evaluate a WebQuest for mathematical integrity and technology effectiveness.

Apply high-level mathematical thinking utilizing instructional technology.

Assess higher level mathematical thinking.

Required Readings

There are no reading assignments this week.

Deliverables

Forum 6: WebQuest Draft

Mathematical Content Practice

### **Week 13: Estimating and Measurement**

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Learning Outcomes

Examine estimation strategies.

Connect number operation and theory with estimation strategies for the preservice teacher.

Distinguish connections between the broad concepts of elementary math.

Develop teaching strategies related to measurement and estimation.

Required Readings

Cathcart et al. - Chapter 9

Deliverables

Forum 10: Estimating and Measurement

Forum 11: Linear Regression

Mathematical Content Practice

Assignment: Student Interview 3

## **Week 14: Estimating and Measurement**

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Learning Outcomes

Examine estimation strategies.

Connect number operation and theory with estimation strategies for the preservice teacher.

Distinguish connections between the broad concepts of elementary math.

Develop teaching strategies related to measurement and estimation.

Required Readings

Cathcart et al. - Chapter 9

Deliverables

Forum 10: Estimating and Measurement

Forum 11: Linear Regression

Mathematical Content Practice

Assignment: Student Interview 3

Estimating and Measurement

## **Week 15: Algebra**

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Learning Outcomes

Explore different algebraic representations.

Develop connections between elementary mathematics as a foundation for algebraic concepts.

Evaluate other PBL examples for mathematical integrity.

Apply higher level mathematical thinking utilizing integrated, problem based approaches to learning.

Required Readings

Cathcart et al. - Chapter 17

Deliverables

Forum 12: Determining Functions Using Regression

Mathematical Content Practice

Assignment: Problem Based Learning Unit (PBL)

## **Week 16: Algebra**

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Learning Outcomes

Explore different algebraic representations.

Develop connections between elementary mathematics as a foundation for algebraic concepts.

Evaluate other PBL examples for mathematical integrity.

Apply higher level mathematical thinking utilizing integrated, problem based approaches to learning.

Required Readings

Cathcart et al. - Chapter 17

Deliverables

Forum 12: Determining Functions Using Regression

Mathematical Content Practice

Assignment: Problem Based Learning Unit (PBL)

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## **Evaluation**

**Grading:**

Name	Grade %
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## **Materials**

**Book Title:** If you prefer the electronic format, your required book(s) may be available for purchase from the APUS Bookstore in a VitalSource e-book format

**Author:**

**Publication Info:**

**ISBN:** GRAD NOTE

**Book Title:** Learning Mathematics in Elementary and Middle School: A Learner-Centered Approach, Enhanced Pearson eText with Loose-Leaf Version --Access Card Package. 6th ed. (custom)- (Non-custom ISBN is:9780133783780, please use this when purchasing elsewhere)

**Author:** Cathcart, Pothier, Vance and Bezuk

**Publication Info:** Pearson

**ISBN:** 9781323249420

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Cathcart, G., Pothier, Y., Vance, J., & Bezuk, N. (2001). *Learning mathematics in elementary and middle schools* (4th ed.). Merrill, Prentice Hall.

In addition to the required course texts the following public domain Websites are useful. Please abide by the university's academic honesty policy when using Internet sources as well. Note Web site addresses are subject to change.

APA Format

<http://www.apa.org>

NCTM Principles and Standards for School Mathematics

<http://www.nctm.org>

Technology Foundation Standards for All Students

<http://www.iste.org/inhouse/nets/cnets/students/index.html>

Technology Foundation Standards for All Teachers

<http://www.iste.org/inhouse/nets/cnets/teachers/index.html>

US Dept of Education – No Child Left Behind

<http://www.ed.gov>

National Library of Virtual Manipulatives

<http://nlvm.usu.edu/>

Edutopia: The George Lucas Educational Foundation

<http://www.edutopia.org/>

Webquests

<http://webquest.org/index.php>

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## Course Guidelines

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## University Policies

### [Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

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