# EDUC 4301.001
# Mathematics Problem Solving
# Summer I 2022

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**Course Catalog Description:**
Study topics in mathematical content for the intermediate grades through problem solving techniques like problem- and project-based instruction. Prerequisites: MATH 1350

**Student Learning Outcomes:**
The students will:

- Demonstrate an understanding of mathematical content from the elementary and middle school grade levels. (3.A)
    - Number concepts and operation
    - Algebraic thinking
    - Geometry
    - Measurement
    - Probability and statistics
- Demonstrate an understanding of mathematical processes and reason mathematically. (3.A, 3.C)
- Solve mathematical problems and make connections within and outside of mathematics. (3.A, 3.C)

| Learning Outcome | Activities | Assessment | Standards |
|---|---|---|---|
| Demonstrate an understanding of mathematical content | Class problem solving activities | Algebraic thinking problems<br>Class problem solving tasks<br>Video problems | TEKS: Math K-6<br>INTASC: 4<br>Texas Educator Standards: 3A<br>CCRS: Math I-VII |
| Demonstrate an understanding of mathematical processes and reasoning | Class problem solving activities | Algebraic thinking problems<br>Class problem solving tasks<br>Math project | TEKS: Math process standards K-6<br>INTASC: 4, 5<br>Texas Educator Standards: 3A, 3C<br>CCRS: Math VII, IX |
| Solve mathematical problems and make connections within and outside of mathematics | Class problem solving activities | Algebraic thinking problems<br>Class problem solving tasks<br>Great Mathematician project | TEKS: Math K-6<br>INTASC: 4, 5<br>Texas Educator Standards: 3A, 3C<br>CCRS: Mathematics X |

**Teaching Models and Strategies:**
The following instructional models will be utilized in class:

- inquiry
- teacher-directed
- cooperative learning

The following constructivist teaching strategies will be incorporated in class:

- reflective thinking
- technology integration
- critical thinking
- problem solving
- communication
- manipulative-based
- algebraic thinking
- patterns and relationships

Strategies will be presented that address the academic and linguistic needs of children.

## Required Text and Materials:

Lenchner, G. (2005). *Creative problem solving in school mathematics* (2nd Ed.). Bellmore, New York: Mathematical Olympiads for Elementary and Middle Schools, Inc.

A student of this institution is not required under law to purchase a textbook from a university-affiliated bookstore The same textbook may also be available from an independent retailer, including an online retailer.

## Course Requirements/Policies:

**Attendance, Participation, and Professionalism are prerequisites for success as a classroom teacher and crucial to being successful in this class.**

1. Attendance: Attendance at all classes is an expectation of the course and a future professional skill. Each class represents an opportunity to learn. Weekly class discussions and activities cannot be made up if class is missed.
2. Class Participation: The student will be required to read text chapters as assigned, participate in discussions, and work collaboratively and cooperatively with classmates. Class participation is essential.
3. Video Algorithm Assignment: Each student is required to explain two different problems. These problems will be videotaped and a self-reflection and script of explanation will be written. Problems will be shared and details will be given in a separate handout. This assignment will be repeated twice.
5. Math Project: Details will be shared with students in class.
6. Exams: There will be one exam. All exams must be taken on the assigned date unless arrangements are made **prior** to the exam. If there is a documented emergency, contact the instructor within 24 hours of the exam.

*All assignments are due on or before the dates provided in the **Course Outline**. Each assignment must be **word-processed**. **No email attachments will be accepted**. A penalty will be assessed for late work. Assignment dates may be moved to later (but not earlier) than the scheduled dates during the course of the semester. Any changes will be discussed with students in class.

We have 5 weeks of class and each week you will be given a Math Menu that will identify math problems and activities for you to complete. You will bring all of the assigned work to our weekly meeting. The points below are an estimate the values may change but it will be done with a discussion during class.

## Evaluation:

| | |
|---|---|
| Weekly Problems and Reflections | 50 points |
| Math projects | 20 points |
| Video Algorithm Assignments | 20 points |
| Exam | 50 points |
| TOTAL | 140 points |

A 90-100% B 80-89% C 70-79% D 60-69% F 59% and below

**Last Day to Withdraw is June 21st.**

**Bibliography**

Donovan, M. S., & Bransford, J. D. (Eds) (2005). *How students learn: History, mathematics, and science in the classroom*. Washington, D.C.: The National Academies Press.

National Council of Teachers of Mathematics (2000). *Principles and Standards for School Mathematics*. Reston, VA.: Author.

Burns, M. (2015). *About teaching mathematics: A K-8 resource*. Sausalito, CA: Math Solutions Publications.

Reys, R.E., Lindquist, M. M., Lambdin, D. V., & Smith, N. L. (2015). *Helping children learn mathematics* (11th Ed.). New York: John Wiley & Sons Inc.

Van de Walle, J., Karp, K., & Bay-Williams, J. (2016). *Elementary and Middle School Mathematics*. Boston: Pearson Education, Inc.

NCTM website – www.nctm.org

| Class | Topic(s) | |
|---|---|---|
| **May 31** | **Introduction** | |
| **June 6** | **Algebraic thinking**<br>**Number and operations** | |
| **June 13** | **Algebraic thinking**<br>**Fractions and decimals** | |
| **June 20** | **Algebraic thinking**<br>**Measurement** | |
| **June 27** | **Algebraic thinking**<br>**Geometry** | |
| **July 1** | **Exam** | |

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**Vision:** The College of Education and Psychology is nationally recognized and respected for its academic programs and opportunities. It is a center of academic excellence, scholarly inquiry, and public service. The College prepares leaders to meet the critical challenges of the 21st Century through productive contributions to local and global communities and toward individual and cultural equity.

**Mission:** The mission of the College of Education and Psychology is to provide a positive

environment that fosters the acquisition of knowledge and skills. The mission is individually and collectively realized through a community of scholars that contributes to knowledge through scholarly inquiry; organizes knowledge for application, understanding and communication; and provides leadership and service. We affirm and promote global perspectives that value individual and cultural diversity to enhance learning, service, and scholarship.

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**Texas Education Standards**: The School of Education are committed to teaching and implementing the Texas Educator Standards at the highest level. The School of Education faculty use the Texas Education Standards, along with the Interstate New Teacher Assessment and Support Consortium (InTASC) standards used by educator preparation programs throughout the United States. The list of Texas Education Standards can be accessed online.

*Access the Code of Ethics and Standard Practices for Texas Educators online.*