Course Overview

This course is designed to demonstrate the use of manipulative materials, including technology, in the teaching of elementary and intermediate algebraic concepts. Exploration of the various algebraic topics will be via hands-on activities that use graphing calculators and related equipment. This course has been specifically designed for graduate students who are, or will be, teaching mathematics at the middle school or high school level.

Calculator Usage: You must have a graphing calculator to use in nearly every class session. Instruction will be based on Texas Instruments graphing calculators, but if you presently are using another brand, and can adapt its usage to the class activities, you need not purchase a TI product. If you do plan to purchase a calculator, the TI-84 is recommended.

Class Schedule*

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Sept 10</td>
<td>Introduction</td>
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<tr>
<td></td>
<td>History of the development of algebra</td>
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<td></td>
<td>Introducing algebraic thinking to students</td>
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<td>Sept 17</td>
<td>Using algebra tiles to teach algebraic manipulation</td>
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<tr>
<td></td>
<td>Introduction to algebra tiles; adding and subtracting polynomials</td>
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<td></td>
<td>Using algebra tiles to solve equations</td>
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<td></td>
<td>*Multiplying Polynomials with Algebra Tiles</td>
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<td></td>
<td>*Factoring Trinomials with Algebra Tiles/Completing the Square</td>
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<td>Sept 24</td>
<td>Overview of functions of the graphing calculator</td>
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<td></td>
<td>*Box-and-Whisker Plots</td>
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<tr>
<td>Oct 1</td>
<td>*CBR</td>
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Linear Function Concepts

First article critique due

Oct 8  Slope Intercept Form of a Line
       Line of Best Fit

Oct 15 Systems of Linear Equations
       First activity and reflection due

Oct 22 Graphing Inequalities
       Linear Programming

Oct 18 Quadratic Functions

Oct 29 Trigonometric Functions
       Second article critique due

Nov 5 Trigonometric Functions

Nov 12 Inverse Functions

Nov 19 Exponential Functions
       Logarithmic Functions
       Second activity and reflection due

Nov 26 Other Functions (absolute value, step, etc.)
       Interpreting Graphs

Dec 3 Parametric Equations

Dec 10 Final Examination (5:30 – 7:30 pm)

*This class schedule is tentative, and subject to change.
The due dates for assignments and the final examination date will not change.

Course Assessment

1) Class attendance and participation 10%
There is no textbook for this course so all material will be given and analyzed during class. Therefore, class participation is an essential component of this course, and consistent attendance is essential.

2) Article Critiques
   20%
   You will be required to read, summarize, and critique two recent journal articles from a recent copy of *The Mathematics Teacher* or *Teaching Mathematics in Middle School*. One must be on the use of technology in the mathematics classroom. The other article must be related to the teaching of algebra and may or may not include technology. You may submit either article first. **Due: Oct 1, Oct 29.**

3) Hands-on Activities and Reflections
   20%
   You will be required to find two hands-on activities that are related to the teaching of algebraic concepts in middle or high school. These activities may be found in textbooks, lesson plan resource books, on the internet, and so on. Once you find an activity that you think you might be able to use in your own classroom, you are asked to write about what you like about the activity, what objectives the activity would help students obtain, and how you would implement this activity in your classroom. **Be specific** about any changes that you would make before using the activity, and explain your rationale for doing so. Please submit each activity in the form in which you found it along with your reflection. (You may NOT use one of these activities for the Activity Demonstration described in #4.) **Due: Oct 15, Nov 19.**

4) Activity Demonstration
   25%
   You will be required to present an activity that is related to the teaching of algebraic concepts in middle or high school. This activity is to focus on a specific algebraic concept that you would like to teach using any hands-on materials. The objective of the project is to have you plan and execute an activity that you will be able to use in your own mathematics classroom. These lessons will be incorporated into regular instruction as appropriate. Ideas for Activity Demonstrations are listed in *italics* on the syllabus, but you may suggest an idea that you have that is not listed, and if appropriate, present it as your Activity Demonstration. Some concepts listed may have two or more activities that focus on different concepts within that topic, so it is possible for there to be multiple presentations in Trigonometry, for example.

4) Final Examination
   25%
   Questions will cover all issues presented in this course, including those that may arise during student lesson presentations.