

**Mathematics Education Capstone Course
Math 4800/8806**

1.0 Course Description

- 1.1 Overview of Content and Purpose:** The course is intended to help secondary mathematics teachers make connections between undergraduate mathematics and the mathematics that they teach or eventually will teach. Concept analysis is one feature of the course. In this feature, typical topics and concepts from secondary mathematics will be revisited but from an advanced perspective. Part of this feature involves unpacking mathematical structures typically taught in undergraduate mathematics and applying these structures to secondary mathematical topics. This unpacking and application of mathematics is vital component of mathematical understanding teachers need. Another feature of the course could be problem analysis. In this feature, the course will study and extend typical secondary mathematics problems.
- 1.2 For Whom Intended:** Preservice secondary mathematics majors and MAT in mathematics majors
- 1.3 Prerequisites:** Math 4030: Applied Modern Algebra or concurrent registration
- 1.4 Unusual Circumstances:** N/A

2.0 Objectives

- 2.1 Performance Objectives for the Student:**
- 1) Analyze mathematical problems using a problem analysis approach
 - 2) Analyze mathematical concepts using a concept analysis approach
 - 3) Demonstrate an understanding of the mathematical content of the secondary mathematics curricula through solving typical problems associated with these curricula including solutions using technology such as graphing calculators, spreadsheets, dynamic mathematics software, and data analysis software.

3.0 Content and Organization

- 3.1 Topics :**
- 1) Introduction to Functions
 - 2) Properties of Real Functions
 - 3) Problems involving Real Functions
 - 4) Concepts of Equation
 - 5) Algebraic Structures/ Solving Equations
 - 6) Euclid and Congruence
 - 7) Congruence Transformations
 - 8) Symmetry, Angle Measure, and Trigonometric Ratios
 - 9) Trigonometric Functions and their Connections
 - 10) the Properties of the Sine and Cosine Function
 - 11) Area, Volume, and Dimension

3.0 Teaching Methodology

- 4.1 Methods to be used:** The course will be taught with a combination of class lecture, discussions, technology activities, and some group work.
- 4.2 Student Role:** Students are expected to learn the content of the course via solving problems, lecture, mathematical programs, concept analyses and problem analyses.
- 4.3 Contact Hours:** 150 minutes per week

4.0 Evaluation

- 5.1 Basis for Evaluating Student Performances:** There will be a final project, as described above, which will be a significant component of the final grade. For graduate level students, a concept analysis and a problem analysis must be completed. For undergraduate students, either a concept analysis or a problem analysis must be completed.

Minor projects will be assigned throughout the semester. These projects involve mathematical problems that often times require research and significant work. Graduate students will be assigned projects that are more in depth than undergraduate students.

5.2	Basis for Determining Final Grade:	The final grade will be determined from a combination of homework assignments (50%), tests and minor projects (25%) and the final project (25%).															
5.3	Grading Scale:	<table border="0" style="width: 100%;"> <tr> <td>97-100: A+</td> <td>93-96: A</td> <td>90-92: A-</td> </tr> <tr> <td>87-89: B+</td> <td>83-86: B</td> <td>80-82: B-</td> </tr> <tr> <td>77-79: C+</td> <td>73-76: C</td> <td>70-72: C-</td> </tr> <tr> <td>67-69: D+</td> <td>63-66: D</td> <td>60-62: D-</td> </tr> <tr> <td>0-59: F</td> <td></td> <td></td> </tr> </table>	97-100: A+	93-96: A	90-92: A-	87-89: B+	83-86: B	80-82: B-	77-79: C+	73-76: C	70-72: C-	67-69: D+	63-66: D	60-62: D-	0-59: F		
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5.0	Resource Material																
6.1	Textbook(s) or Other required Readings:	<i>Mathematics for High School Teachers: An Advanced Perspective</i> written by Usiskin, Peressini, Marchisotto, and Stanley, copyright 2003, ISBN 0-13-044941-5															
6.2	Other Suggested Readings:	<i>How to solve it: A New Aspect of Mathematical Method</i> , written by G. Polya, ISBN 069111966X															
6.3	Current Bibliography of Resources:	<p><i>The Mathematical Education of Teachers: Part 1</i>, written by Alan Tucker, James Fey, Deborah Schifter, and Judith Sowder, ISBN 0-88385-459-7</p> <p><i>Principles and Standards for School Mathematics</i>, written by the National Council of Teachers of Mathematics, ISBN 0-87353-480-0</p> <p><i>Teaching Mathematics through Problem Solving: Grades 6-12</i>, edited by H. Schoen, ISBN 0-87353-541-3</p> <p><i>Vita Mathematica: Historical Research and Integration with Teaching</i>, written by Ronald Calinger, ISBN 0-88385-097-4</p>															