
Instructor: Dr. Chris Black
Office: Snoqualmie Hall #302B
Office Hours: M 12:00 - 2:00, and by arrangement
Office Phone: x3871
Email : blackc@cwu.edu (*It is most reliable to reach me via email*)

Required Text: None

Required Materials: TI-83+ graphing calculator
Access to www.Livetext.com

COURSE RATIONALE:

One of the essential principles for building understanding in mathematics is to make the subject problematic. Instruction should allow students to wonder why things are the way they are, to inquire, to search for solutions and to resolve incongruities. In a problem-based approach, students are expected to solve problems or make sense of mathematical situations for which no well-defined routines or procedures exist. In introductory activities, as well as in application settings, students are expected to explore problems, make conjectures, and draw generalizations about mathematical concepts and processes. Students can also make connections between mathematical ideas that are familiar to them by solving new problems in a variety of different settings. Although no one claims the existence of the one correct way to teach, using good problems to plan instruction with the focus on student thinking and reasoning is one strategy that holds promise.

The educational outcomes of a problematic approach to mathematics education are to:

- Build new mathematical knowledge through solving problems.
 - Solve problems that arise in mathematics and in other contexts.
 - Apply and adapt a variety of appropriate strategies to solve problems.
 - Monitor and reflect on the process of mathematical problem solving.
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GOALS FOR THIS COURSE:

- To assess the student's knowledge in mathematical content areas.
- To give students experiences with solving problems using many different strategies.
- To create learning activities where problems are posed to engage students in meaningful mathematics.
- To create assessment methods that give clear insight into students' understanding of mathematical concepts.

OUTCOMES FOR THIS COURSE:

Math 499E students will be able to...

- ... solve problems in each of the content areas in the mathematics teaching program.
- ... solve problems that arise in mathematics and in other contexts.
- ... apply and adapt a variety of appropriate strategies to solve problems.
- ... monitor and reflect on the processes of mathematical problem solving, communication, reasoning, and making connections.
- ... create assessment methods that clearly reveal their students' understanding of lesson outcomes.
- ... reflect on the philosophical and pedagogical practices of teaching mathematics.

The goals and outcomes of this course align with both NCTM and CTL standards. Students will demonstrate their ability to meet the outcomes of this course through reading, reflecting, and writing about problems posed. Writing about mathematics helps the writer consolidate ideas because it requires the writer to reflect and clarify the thought process. Communication is part of NCTM's call for mathematical literacy, which asserts that communication plays an essential role in assessing and developing understanding. Communication can take the form of various oral and written endeavors, but the primary goal remains to enhance the writer's mathematical reasoning and ability to make connections between branches of mathematics and with other disciplines.

FIELD EXPERIENCE:

You will be placed in a partner school for your field experience. You are required to be present in your assigned classroom a minimum two hours per week. For each week of the quarter, submit a 1-2 page reflection on your experiences in the classroom. Your role in your field experience classroom is to be determined by your assigned teacher. Your field experience reflections are worth 20 points total.

You also need to write a 2-4 page paper describing your observation and participation in a grade 6-12 mathematics classroom. Describe your experiences including tutoring, observing, miniteaching, and planning mathematics activities and lessons for different mathematics topics. You may refer to prior classroom experiences as well, from PreAutumn or prior classroom exposure as an observer or volunteer (but not as a student). Finish by describing at least three practical things you learned and support them with examples from your field experience. This paper is worth 25 points.

MINI-LESSONS:

You will be assigned two topics from among geometry, algebra I, algebra II, linear algebra, discrete mathematics, probability, statistics, number sense, calculus I and calculus II. Within your assigned topic, you will design and deliver two 30-minute guided-discovery lessons to your peers, demonstrating your ability to create and teach mathematical activities centered around problems. Your lesson plans are each worth 25 points. Lesson plans must be typed and may become artifacts in your final portfolio.

ASSESSMENT EXERCISE:

You will write an exam or quiz problem that assesses student knowledge of the content of your mini-lesson. You need to create questions that address a specific learning target, provide a solution appropriate for distribution to students, provide a grading rubric to describe the grading criteria for your exam question, and explain how your question relates to the target. The solution may be handwritten, but the remaining parts of this assignment must be typed. The assessment exercise is worth 20 points, and may become an artifact in your final portfolio.

PORTFOLIO:

The final assessment for the course is a LiveText portfolio containing all assignments, worth 100 points. As the artifacts in the portfolio will have been separately assessed, the portfolio grade hinges on the choice of your artifacts and the depth of your reflection paragraphs. The portfolio is due on **Friday, December 13th at noon. Completion of the portfolio is mandatory for passing the course.** You have not completed the course until you receive an email from me that I have received your portfolio.

PROBLEM SOLVING PAPERS:

You will be presented with 11 problem solving assignments, in which we will focus on problem solving techniques while applying mathematical knowledge from previous courses. These problems will be done individually. Many of the problems will be representative questions from the targeted content area (listed below), however, part of the assignment is also to reflect on the main techniques of the content area and explain the methods of your solution. There may be times when you will need to find an external resource to review some mathematical content embedded in a problem.

Content areas for these assignments are:

- Number Sense
- Discrete Mathematics
- Calculus (2)
- Statistics & Probability (2)
- Measurement
- Geometric Modeling
- Algebra & Abstract Processes (3)

Problem sets are worth 20 points each. Solutions to problem sets must be typed, and may become artifacts in your final portfolio.

GRADING:

Assessment Exercise:	20 points
Lesson Plans:	50 points
Problem Solving Papers	220 points
Field experience Journals	20 points
Field Experience Paper	25 points
Attendance, Participation & Citizenship :	25 points
Portfolio:	100 points

ATTENDANCE/CITIZENSHIP:

Each student is expected to present solutions to exercises from the in-class exercises to the class, in the role of a classroom teacher. I will allow you to volunteer for this activity, but if you do not volunteer, I will call on you to do so. Discussion, interaction, and group problem solving will all be important aspects of this course, which necessitate your attendance. Citizenship addresses your behavior and comportsment with class members and the instructor. We each need to be respectful of other students, other cultures, and differing ideas within our learning community. Attendance, participation & citizenship are worth 25 points.

HONOR, RESPECT, AND ACADEMIC HONESTY:

Each of us should consider our placement at this institution to be a privilege. We need to have respect for one another, and for ourselves. In light of these facts, cheating in any form will not be tolerated. Some of these problems are really challenging! You are encouraged to work together on them, however anything you turn in with your name on it should have been written by you alone. The word “plagiarize” is defined by Merriam-Webster as “to steal and pass off (the ideas or words of another) as one’s own: use (another’s production) without crediting the source.” This is a very serious offense.

DISABILITY SERVICES:

Students with special needs or disabilities that may affect their ability to access information or material presented in this course are encouraged to contact contact Bree Callahan, the Westside Disability Support Services Coordinator at bcallaha@cwu.edu or (425) 640-1574 x3866.