MATHEMATICS, PROBLEM SOLVING, AND TEACHING

MATH 486| FALL 2013

INSTRUCTOR:

Dr. Janet Shiver
Bouillon 115
Office Phone (509) 963-2834
shiverj@cwu.edu

COURSE RATIONALE:

Hiebert and others describe one of the essential principles for mathematics instruction as building understanding in mathematics through problems. Instruction ought to allow students to wonder why things 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. Ideally students need to explore problems, make conjectures, and draw generalizations about mathematics 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 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. Problem-based instruction in its simplest is summarized by Gail Burrill as; Good teachers foster an environment in which the students do the work!

Posing mathematical tasks in a way that promotes inquiry creates new classroom roles for instructors. Traditional practices offer a sense of accomplishment for teachers. Teachers explain, demonstrate, and monitor student practices. Students listen, observe, and practice skills and procedures that can be applied to specific kind of problems. However, it is not just the amount of engagement with content that matters. The quality of the experience, the way in which students learn and think determines the usefulness of the educational experiences.

COURSE OUTCOMES:

1. Teacher candidates will show their mathematical knowledge mastery of all six mathematical content domains of the state endorsement standards for middle level mathematics.
2. Teachers candidates will be able to use and teach the mathematical practices of the state endorsement standards for middle level mathematics.
3. Teacher candidates will design relevant and interdisciplinary learning activities that engage students in meaningful mathematics.
4. Teacher candidates will design assessment activities that align with the CCSS-Math and clearly reveal students' understanding of math concepts.
5. Teacher candidates will be able to reflect on the philosophical and pedagogical practices of teaching mathematics in our present culture.

What do you need to do to show you have met the course outcomes?

Students will demonstrate their ability to meet the outcomes of this course through solving problems, reading, reflecting, and writing about problems posed. Writing in mathematics helps the writer consolidate their thinking because it requires the writer to reflect and clarify thoughts. Communication is part of NCTM's call for mathematical literacy, which asserts that communication plays an essential role in assessing and developing understanding. Students will continue construction of the mathematics education electronic portfolio to meet the program standards including NMSA, NCATE, NCTM, CTL's Conceptual Framework, and Washington State Standards for secondary mathematics teachers.

ASSESSMENT AND EVALUATION GUIDELINES:

The instructional and assessment strategies for this course are designed to inform the teacher candidate of their progress in achieving the performance outcomes. The instructor reserves the right to change any assessment to meet the learning goals of the courses. Also, all assignments must be completed to receive a grade for the course.

Assignment	Points
Written Exercises for Each of 6 Content Area (20 points each)	120
Problem Creation and Presentation (40 points each)	80
Written Assessements (15 points each)	90
Assessment Creation	40
Content Quizzes (20 points each)	120
Livetext Portfolio	100
Assessment of Math History Paper	25
Total Points	575

Assessment: You will show your ability to meet the performance outcomes by completing the following assessments. More detail on some of these will be provided at the appropriate time.

1. **Problem–Creation and Presentation Assignment:** You will collaborate with your peers to create two engaging problems aligned with specific content and process standards. You will present your problems to the class and serve as facilitators during the class period. This is a small–group grade. (40 points each – 80 points total)

2. **Written Assessments:** You will write six concise papers, each relating either an item in **1**, an item from another class you took, or the item created in **3** to appropriate content standards These papers will allow you to review the work of peers and reflect upon your own knowledge and ability to explain content standards aligned with NCTM mathematics standards. This is an individual grade. (15 points each – 90 points)

3. **Assessment Creation Assignment:** The details of this assignment will be given at the appropriate time. This may be either an individual or small-group grade, depending upon time constraints and content. Each group will develop a game that will assess the content knowledge of students in grades k-8. These games will be presented at the Cle Elum math night in early November. Details to come(40 points).

4. **Mathematics Content Exercise Sets:** Six sets of exercises covering the basic concepts and procedures from each of the six mathematical content areas (listed under learner outcomes) will be given. These are take-home assignments and must be completed by the due date. No late work will be accepted. See the assignment directions for more details. This is an individual grade. (20 points each – 120 points total)

5. **Mathematics Content Quizzes:** Six in–class quizzes, each covering the basic concepts and procedures from exercise sets in **3**, will be given. This is an individual grade. There are some sample quizzes on Blackboard to aid you in studying and the items in **4** are also invaluable. Make-up quizzes are given at the discretion of the instructor. (20 points each – 120 points total)

6. **Portfolio:** The final in this course is to complete the Content and Process Standard section of the Livetext portfolio and write the corresponding reflections. **Item 2** above will be 6 of these reflections, but you will have to provide a newly written reflection (addressing 5 process standards for 50 points total) as described in Step 3 of the Livetext portfolio directions as part of this 100 point score. The portfolio sections must be complete by November 30 at 5 pm. For each day late, 20 points will be deducted from the score. This is an individual grade. (100 points). Start by reading the first question and statements that are in its folder. After you think about the writing prompt, write a

response using the guidelines outlined. The Livetext portfolio must be completed to receive a grade for the course. Incomplete portfolios will receive a grade of F for the course.

7. **Assessment of math history paper:** Each of you will be given a math history paper written by a secondary mathematics preservice teacher. You will review and assess the content of the paper and provide written feedback to the student. You will be given a rubric to complete. Your grade will be based on the thoroughness of your comments and your review of the mathematical content.

Grading Scale

Grades: total points = 575 from above

In order to teach others, you must have a good command of the subject. If you do not understand the material well enough to teach it, both you and your students will suffer. Therefore, your work in this course must be assigned a grade.

93-100%	90-92%	87-89%	83-86%	80-82%	77-79%	73-76%	70-72%	67-69%	63-66%	60-62%	<60%
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
532-575 pts	515-531 pts	498-516 pts	475-497 pts	458-474 pts	440-457 pts	418-439 pts	400 – 417 pts	383-399 pts	360-382 pts	343–359 pts	<342 pts

Performance Expectations

Absence Policy

Regular attendance is essential for successful completion of this course. A student absent from a test or other graded assignment will be given a zero unless excused in advance by the instructor. Extenuating circumstances will be evaluated on a case- by- case basis. Please have supporting documentation (doctor's note, note from faculty about school sponsored activity, etc.) available for review upon returning to class. ***More than 3 absences from this class may result in a grade of F for the semester.***

Suggestions for Success

Being successful in a mathematics class generally requires good study habits, hard work/patience while attempting problem sets, and proper time management during testing situations. Each student is expected to attend every class meeting, to read the assigned sections of the text prior to class, to complete homework problems and other assignments in a timely manner, and to seek the assistance of the instructor or a tutor when difficulties are encountered. All homework and in class assignments should either be NEATLY written in pencil or typed and all supporting work must be shown.

COURSE RESOURCES:

Blackboard

Blackboard is a Learning Management System which we will use for our course. You can login to Blackboard at http://courses.cwu.edu Your username and your password are the same one you use for Novell/Safari. The "Blackboard Help and Support" section of the Online Learning web site at, http://www.cwu.edu/~avpugrad/OnlineLearning/support.html, is provided to give you and your students vital information on teaching and learning online with Blackboard. You are required to read the information provided in both the "Getting Started" page and the "Blackboard Support" page.

Software and Hardware

The "Technical Requirements" page provides information on the software and hardware you need for Blackboard. Please be sure to use the correct browser specified for your operating system and computer. Also run the browser

check to be sure that you have the necessary browser settings. A plug-in check is available to be sure you have multimedia support for audio and video in your web browser. Documents in this course will be presented in .pdf or .docx, formats where possible. You will need Adobe Reader or Word to view these files, which you can obtain for free at http://get.adobe.com/reader/ . Written assignments may be presented as a Microsoft Word document (.doc). If you do not have Microsoft Word installed on your computer, you can use Open Office Writer instead, which you can obtain for free at http://www.openoffice.org/.

Textbook and Course Material

- Blackboard account with enrollment in MATH 486.001_1139
- Handouts provided by the instructors
- Washington State Academic Learning Requirements for Math http://www.k12.wa.us/CurriculumInstruct/default.aspx
- Graphing Calculator (TI-83+ is best)
- Internet access
- Livetext account in order to add to the Teaching Middle School Mathematics Portfolio

Additional Readings and Videos

Readings will be taken from peer-reviewed journals and education magazines. Most readings will be available in Blackboard in .pdf format. Other readings will be available online, with a hyperlink provided in Blackboard. Online presentations will be posted on Blackboard. Most videos are in MPEG4 these can be played through itunes or most video players.

Academic Honesty: The integrity of students and their oral and written work is a critical component of the academic process. All written work submitted in this course will be individual work unless otherwise directed by the instructor. Students must properly document all outside sources used for outside of class assignments. The submission of another's work as one's own is plagiarism, and will be dealt with using the procedures outlined in the CWU Undergraduate Catalog.

ADA STATEMENT:

Students with special needs or disabilities who desire academic accommodation are encouraged to submit a copy of the 'Confirmation of Eligibility for Academic Adjustments' from the Disability Support Services office as soon as possible so a plan can be developed that best serves the learning needs of the student. Students without this form should contact the Disability Support Services office in Bouillon 205 at 963-2171 or dssrecept@cwu.edu as soon as possible.