

Foundations of Arithmetic

Math 164, Winter 2016, 5 credits

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Meeting Time: 3:00 PM, M – F
Meeting Place: Hertz, Room 120
Office Hours: 1:00 to 2:00 (often earlier on Mon
and Wed) or by appointment

Text: *Explorations in Elementary Mathematical Concepts Through Activities*, Willard & Shiver. You will need to bring your book to class every day.

Supplies: Plenty of lined paper and sharp pencils, calculator (need not be graphing), 3-ring binder with 6 dividers

Course Description: Structure of the real number system: properties of and operations on integers, rationals, decimal representation, percentages, proportion, graphing and elementary problem solving. Recommended for the prospective elementary school teacher.

Course Rationale: To meet the expectations for mathematics education of elementary teachers, a shift in content, instructional methods, and assessment practices is crucial. The *Principles and Standards for School Mathematics* (NCTM, 2000) outlined the specific changes needed in pre-service mathematics education. This document calls for prospective teachers to be taught using the methods they should model in their own classrooms. It also calls for teachers to have an understanding of the historical development and current applications of mathematics and the use of technology to promote mathematical understanding and to communicate meaning. This course is designed to address these changes in mathematics education and to prepare pre-service elementary teachers to teach important mathematical content to elementary students. This course will use the following reform ideas.

Content: *Toward:* A variety of mathematical topics and problem situations
 Away from: Only arithmetic topics

Learning: *Toward:* Investigating problems and exploring concepts
 Away from: Memorization and rote learning (although, in certain cases these are necessary)

Teaching: *Toward:* Questioning and listening
 Away from: Teaching by telling

Evaluation: *Toward:* A variety of sources evaluated by the instructor
 Away from: Evaluation by tests only

Expectations: *Toward:* Using understanding of concepts and procedures to solve problems
 Away from: Only the mastery of isolated concepts and procedures

Mathematical Practices and Content Areas for Math 164*:

Mathematical Practices: These Common Core State Standards are based upon the NCTM’s five process standards of problem solving, mathematical reasoning, communicating mathematically, making connections, and representation.

Standards for Mathematical Practices	
CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.	CCSS.Math.Practice.MP5 Use appropriate tools strategically.
CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.	CCSS.Math.Practice.MP6 Attend to precision.
CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others.	CCSS.Math.Practice.MP7 Look for and make use of structure.
CCSS.Math.Practice.MP4 Model with mathematics.	CCSS.Math.Practice.MP8 Look for and express regularity in repeated reasoning.

Content: The content areas are *Number and Operation* and *Algebra and Algebraic Thinking*. These topics will be studied while employing various manipulatives and hands-on experiences. The mathematical practice standards will be integrated into the content areas.

Content Topics
<p>1. Number and Operations</p> <ul style="list-style-type: none"> • counting and cardinality; • the base 10 numeration system and the significance of place value; • fractions as numbers and the four operations using this subset of the real numbers; • properties of the rational numbers, including the fact that properties are specific to a particular subset of the rational numbers; • performing addition, subtraction, multiplication, and division of rational numbers using a variety of strategies; • recognizing relationships between the four arithmetic operations; • real-world and nonstandard problems involving the four operations on rational numbers.
<p>2. Algebra and Algebraic Thinking</p> <ul style="list-style-type: none"> • identifying and explaining patterns of arithmetic; • generating and analyzing patterns and relationships; • generalizing patterns using symbols, such as algebraic expressions and equations; • extending patterns while solving relevant problems.

*Outcomes are adapted from the *Principles and Standards for School Mathematics* (NCTM, 2000) and Common Core State Standards Initiative.

Work and Assessment: Please remember that organization, neatness, and legibility count! A variety of assessment methods will be used to determine your level of accomplishment in this course.

- Math Autobiography & Course Reflection (8%)
- Homework (9%) Expect to read the textbook and do homework daily.
- Activities (9%) We will be doing a number of activities/worksheets in class. If you do not complete them in class, you will be responsible for finishing them outside of class.
- Notebook – (4%): I suggest a 3-ring binder with 6 sections labeled as shown on the Notebook Checklist. This notebook should be an excellent resource when you enter the elementary classroom.
- Quizzes/Daily Grades/Presentations (20%): Make-up grades are not possible (includes absences and quizzes that are papers).
- Tests (50%): There are tests covering chapters (20%) and a comprehensive final (30%).

Grades: 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% A, 90% A-, 87% B+, 83% B, 80% B-, 77% C+, 73% C, 70% C-, 67% D+, 63% D, 60% D-

Additional Topics

Attendance and Professionalism: If you are to fully benefit from this class, you must attend class. As you prepare to become a teacher, you need to become accustomed to setting a good example for students. Attendance demonstrates professionalism and dedication. High quality work and organization demonstrate professionalism, as well. Today, electronic devices, such as cell phones and personal tablets, are captivating and addictive but **do not** belong in a collaborative workplace.

Academic Honesty: There are times when it is proper to get help from others and times when it is not. Feel free to ask others for help on homework, take-home quizzes, and activities. You can only learn how to do something new by doing it correctly. During in-class quizzes and tests, you must do your own work. Academic dishonesty will not be tolerated during testing situations.

Schedule: I will keep you informed of the schedule and assignments and you can record them on the calendar I will hand out. Keep the calendar in your notebook.

Success: To be successful, you must work hard and **be organized**. I encourage you to form study groups. You must also study regularly, take notes, do your homework, and read the textbook. You must seek help before you are in trouble and/or too far behind. Never hesitate to ask for help from me, your classmates, or anyone else who can help. I am here to serve you and help you be successful. If you need help, decide what you need help with and write it down. If you are working on a problem unsuccessfully, write down the approaches you have tried. Then seek help with your paper in hand. Write down the helpful hints you receive.

The Future: Finally, after you successfully complete your elementary education degree, do not let this be your last course in mathematics. After you join the ranks as a teacher take more courses, attend workshops, read professional journals, attend conferences, and network with other teachers. Successful teachers continually renew themselves. Teaching can and should be a fulfilling and rewarding career.

Additional Note

Students with disabilities who wish to set up academic adjustments in this class should give me a copy of their “Confirmation of Eligibility for Academic Adjustments” from the Disability Support Services Office as soon as possible so we can discuss how the approved adjustments will be implemented in this class. Students without this form should contact the Disability Support Services Office, Bouillon 205, or dssrecept@cwu.edu or 963–2171.