

# Foundations of Arithmetic

## Math 164, 5 Credits, Fall 2014

Instructor: Molly Andaya Phone: 963-1826	Meeting Time: 164.001 9am M – F 164.003 11am M – F Meeting Place: Hertz 120
Office: Black 225-33	Final Exam: 164.001 Tues, 12/9, 8am 164.003 Wed, 12/10, 8am
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**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), 2 – 3 folders, 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 for elementary teachers, a shift in content, instructional methods, and assessment practices is crucial. The *Principles and Standards for School Mathematics* (NCTM, 2000) outlines 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

## Learner Outcomes for Process and Content Areas\*:

**PROCESS OUTCOMES:** The five process standards are problem solving, mathematical reasoning, communicating mathematically, making connections, and representation. After completing this course, you will be able to:

Performance Outcomes
1. Problem Solving <ul style="list-style-type: none"><li>• define a problem;</li><li>• use a variety of appropriate strategies to solve problems;</li><li>• monitor and reflect on the problem solution and the process of mathematical problem solving.</li></ul>
2. Reasoning and Proof <ul style="list-style-type: none"><li>• make and investigate mathematical conjectures;</li><li>• develop mathematical arguments or proofs.</li></ul>
3. Communication <ul style="list-style-type: none"><li>• organize and consolidate your mathematical thinking through communication;</li><li>• communicate your mathematical thinking coherently and clearly;</li><li>• use the language of mathematics to express mathematical ideas precisely.</li></ul>
4. Connections <ul style="list-style-type: none"><li>• recognize and use connections among mathematical ideas;</li><li>• recognize and apply mathematics in contexts outside of mathematics.</li></ul>
5. Representation <ul style="list-style-type: none"><li>• create and use representations to organize, record, and communicate mathematical ideas;</li><li>• select, apply, and translate among mathematical representations to solve problems.</li></ul>

**CONTENT OUTCOMES:** The three content areas in this course are *Number and Operation* (numeration, number systems, operations, estimation), *Algebra and Algebraic Thinking* (patterns, functions, symbolic representations), and *Data Analysis and Probability* (data displays, interpretation of data, basic probability). After completing this course, you will be able to

Performance Outcomes
1. Number and Operations <ul style="list-style-type: none"><li>• demonstrate understanding of numbers, ways of representing numbers, relationships among numbers, and number systems;</li><li>• demonstrate understanding of meanings of operations and how they relate to one another;</li><li>• compute fluently and make reasonable estimates.</li></ul>
2. Algebra and Algebraic Thinking (some of this may be optional) <ul style="list-style-type: none"><li>• demonstrate understanding of patterns, relations, and functions;</li><li>• represent and analyze mathematical situations and structures using algebraic symbols;</li><li>• use mathematical models to represent and understand quantitative relationships, for example, use graphs, tables, and equations;</li><li>• analyze change in various contexts.</li></ul>

\*Outcomes are adapted from the *Principles and Standards for School Mathematics* (NCTM, 2000).

**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 (20 pts each; 40 pts total) See description sheet and due date for this assignment.

Homework (120 pts): Expect to read the textbook and do homework daily. Homework will be collected for each unit on the day of the test for that unit (test dates for Tests 1 – 3, but not the final). Please place the homework, well-labeled by section, in a folder. The criteria for homework points will be completeness and random answer checks. If you need help with homework, arrange for help from me, your classmates, or the math help center.

Activities (90 pts): 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. Activities will be collected for each unit on the day of the test for that unit (test dates for Tests 1 – 3, but not the final). Please place the activities, well-labeled, in a folder. The criteria for activity points will be completeness and random answer checks.

Notebook – (15 pts): I suggest a 3-ring binder with 6 sections labeled Introduction, Information, Activities, Homework, Quizzes/Tests, and Resources. This notebook should be an excellent resource when you enter the elementary classroom.

Quizzes/Daily Grades/Presentations (150 pts): Each item in this category will be worth 25 points. There will be at least 7 of these scores, which could include: quizzes (in-class or take-home) and special in-class activities or presentations in class (announced and unannounced). At least 1(one) of the scores in this category will be dropped for a total of 150 points. These quizzes will be placed in a portfolio when turned in. **Make-up grades are not possible (includes absences and quizzes that are papers).**

Tests (500 pts): There are 3 tests covering several chapters each and a comprehensive final. The first three tests are 100 points each. The final is worth 200 points. Dates will be announced well in advance. Make-up tests will be allowed only for extraordinary circumstances, and only if cleared with me *in advance!* You must do your own work on tests. Notes, cell phones, headphones, or similar items will not be allowed during testing situations. Calculators, not attached to cell phones, are allowed. **No TEST grades are dropped!**

**Grades: total points = 915 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.

**Points and Letter Grades**

93-	90-	87-	83-	80-	77-	73-	70-	67-	63-	60-	<60%
100%	92%	89%	86%	82%	79%	76%	72%	69%	66%	62%	
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

## 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.

### **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.

### **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 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 [dssreceipt@cwu.edu](mailto:dssreceipt@cwu.edu) or 963-2171.

**Good luck** in this course! I hope you find it enjoyable and never hesitate to talk to me if you have any problems.