

# Foundations of Arithmetic

## Math 164 Winter 2020

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<b>Office:</b> SAM 228K	<b>Final Exam:</b> Section 1: Wednesday, 3/18, 8am Section 2: Thursday, 3/19, noon
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**Text:** *Mathematics for Elementary Teachers, Beckmann, 5e* (looseleaf version). You will need to bring chapters 1-6 to class daily. Put the rest of the book in a binder for use in Math 226 (elementary) and Math 316 (middle level).

**Supplies:** plenty of lined paper and pencils, colored pens or pencils/highlighters will be useful, calculator (need not be graphing), 2 – 3 folders with pockets, binder (1½ - inch should be sufficient), 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. Designed 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.

<b>Content:</b>	<i>Toward:</i> A variety of mathematical topics and problem situations
	<i>Away from:</i> Only arithmetic topics
<b>Learning:</b>	<i>Toward:</i> Investigating problems and exploring concepts
	<i>Away from:</i> Memorization and rote learning (although, sometimes this is necessary)
<b>Teaching:</b>	<i>Toward:</i> Questioning and listening
	<i>Away from:</i> Teaching by telling
<b>Evaluation:</b>	<i>Toward:</i> A variety of sources evaluated by the instructor
	<i>Away from:</i> Evaluation by tests only
<b>Expectations:</b>	<i>Toward:</i> Using understanding of concepts and procedures to solve problems
	<i>Away from:</i> 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
<b>1. Problem Solving</b> <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>
<b>2. Reasoning and Proof</b> <ul style="list-style-type: none"><li>• make and investigate mathematical conjectures;</li><li>• develop mathematical arguments or proofs.</li></ul>
<b>3. Communication</b> <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>
<b>4. Connections</b> <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>
<b>5. Representation</b> <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
<b>1. Number and Operations</b> <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>
<b>2. Algebra and Algebraic Thinking</b> (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:** *You are now practicing to be a teacher; when you start teaching, you will be writing, showing, demonstrating, etc. for students and parents.* 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.

- All work will be put into one of two categories: **Minor and Major**
- Minor category work will be weighted at 40% and Major category work will be weighted at 60%.
- I will drop ONE item from the Minor category. Nothing in the Major category will be dropped.

- *Because I allow a drop from the Minor category, I don't accept late work. Please do not ask me to accept or give an extension for work that you are not prepared to turn in on time. If you are going to be absent for any reason, turn the work in early or find someone to turn in your work for you. Do not email it to me.*

### Minor Category (weighted 40%)

- Math Autobiography see information sheet for details
- Course Reflection see information sheet for details
- Take Home Quizzes
- In Class Quizzes (these are generally unannounced attendance quizzes)
- Group Presentations
- Homework
  - Assigned from the text or extra handouts from class.
  - Homework will be collected regularly and graded for completion AND accuracy.
  - Specific details will be given in class regarding expectations for HW turn in.
- Activities
  - These are completed in class. If you don't finish in class, or are absent, expect to finish at home. Get any handouts you missed from your table group or me.
  - Activities will be collected regularly and graded for completion and accuracy.
  - Specific details will be given in class regarding expectations for Activity turn in.

### Major Category (weighted 60%)

- Exams
  - You will have *at least* three exams and a comprehensive final (everyone takes the final)
  - No electronic devices are allowed on exams. Calculators OK (no phone calcs)
- Note about Make up Exams
  - Make up exams will be allowed only for extraordinary circumstances.
  - You may be given a different exam than what was given in class.
  - **Make ups only considered if arranged with me *in advance* of your absence!**

### Grading Scale

93-100%	90-92.9%	87-89.9%	83-86.9%	80-82.9%	77-79.9%	73-76.9%	70-72.9%	67-69.9%	63-66.9%	60-62.9%	<60%
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

### Other Important Information

#### **Attendance and Professionalism**

- As a member of a peer learning community, a high degree of professionalism is necessary. **CWU expects every member of the university community to contribute to an inclusive and respectful classroom culture.**
- 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.
  - Excused absences will not lower your overall grade in this class and are determined on a case-by-case basis. Excused absences are those that are both valid and verifiable, e.g. illness, bereavement, and school-related activities. Documentation is required. Excused absences do not include travel for holiday breaks, work, or non-emergency travel delays.

- In compliance with RCW 28B.137.010, Central Washington University makes every effort to deal reasonably and fairly with students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Students must present written notice to their instructor within the first two weeks of class listing the specific dates on which accommodations are required. Contact the Dean of Student Success at (509) 963-1515 for further information or questions.
- **Please leave your phone in your bag during class time. Step out of the room if you have to use your phone during class. Remember no phone calculators.**
- High quality work and organization demonstrate professionalism. The work you do while you are learning to be a teacher should start to look like the work you will do as a teacher.

### **Academic Honesty**

Consult university policies (CWUP 5-90-040(22), CWUR 2-90-040(22), and WAC 106-125-020) for student conduct, cheating, plagiarism, and other academic expectations. CWU's policies and recommendations for academic misconduct will be followed, leading to disciplinary action up to and including failing the course.

### **Schedule**

I will keep you informed of the schedule and assignments and you can record them on the calendar I will hand out, or use your own method of scheduling. The calendar I hand out will be part of your graded 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 or middle level math 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**

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. Students with disabilities should contact Disability Services to discuss a range of options to removing barriers, including accommodations: Hogue Hall 126, (509)963-2214, DS@cwu.edu

***Good luck in this course! I hope you find it enjoyable and leave class with valuable resources, confidence and, most importantly, excitement to teach math concepts.***