

Course Syllabus

 Edit



MATH 164 | Foundations of Arithmetic

General Information

Class Time: M - F, 12pm -- 12⁵⁰pm

Location: Samuelson 115

Instructor: Dr. Emilie Hancock (Please refer to me as Emilie or Dr. Hancock)

Office: Samuelson 218C | **Email:** emilie.hancock@cwu.edu | **Phone:** 509.963.2402

Office Hours: Tu 10am - 12pm, W 9am - 11am (no appointment necessary)

Contact me to schedule an in-person or virtual appointment at an alternate time.

Refer to the [course calendar](#) for any planned changes to office hours

Required Materials

- **Textbook:** Mathematics for Elementary Teachers with Activities (5th edition, Looseleaf) by Sybilla Beckmann, ISBN-13: 9780134423319
 - We will be completing the activities in class. Make sure your book says "with activities" and you will want loose-leaf, 3-hole-punched pages.
 - You do not need MyLab Math access.
 - Do not rent this text. You need it for subsequent math courses, you will write on the activities pages in class, and many teachers reference this text throughout their career.
- **Three-ring binder:** You need a binder large enough to hold the textbook activities and in-class handouts.
- **Canvas Access:** I will update the course site on Canvas with announcements, assignments, handouts, and due dates. Check Canvas often.

Disability Support Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. [Disability Services](#) (<https://www.cwu.edu/disability-services/>) serves students with permanent and temporary disabilities attending Central on the Ellensburg campus, online or at any of our eight University Centers. Their mission is to make university life accessible to students with disabilities. They work individually with students identifying barriers, and providing accommodations to ensure equal access. 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. (<mailto:DS@cwu.edu>)

Course Overview and Outcomes

Reflecting Washington State [mathematics K-12 learning standards](http://www.k12.wa.us/Mathematics/Standards.aspx) (<http://www.k12.wa.us/Mathematics/Standards.aspx>), the National Council of Teachers of Mathematics ([NCTM](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/)) [principles and standards](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/) (<https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/>), and the State of Washington Professional Educator Standards Board ([PESB](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/)) [endorsement standards](https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/) (<https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/>) for Number and Operations, this course emphasizes the development of the real number system in conjunction with the four arithmetic operations (+, -, ×, ÷). Elementary mathematics content is rediscovered through problem solving^{1,2} in an inquiry-based learning³ context to support the development of mathematical processes and practices.

Major content topics of the course include number sets and their properties; investigation of place value in different bases; meaning and interpretations of four arithmetic operations; standard and alternative algorithms of operations; and investigation of operations on various subsets of real numbers using concrete and abstract models. Exploration of these topics will follow the outline:

Unit 1: Number Representations (Chapters 1 and 2)

Unit 2: Meaning and Interpretation of Addition and Subtraction (Chapter 3)

Unit 3: Meaning and Interpretation of Multiplication (Chapters 4 and 5)

Unit 4: Meaning and Interpretation of Division (Chapter 6)

Mathematical problem solving permeates this course. We will focus more explicitly on mathematical problem-solving strategies through weekly 'Portfolio Problem' sessions.

Upon successful completion of this course, you will be able to:

1. Understand and explain the connections and distinctions among whole numbers, integers, rational numbers, and real numbers.
2. Understand and explain the key mathematical structures and ideas underlying procedures used for operating on various subsets of real numbers.
3. Persevere in solving mathematical problems involving number and operations using a variety of strategies, and reflect on this process.
4. Provide alternative mathematical solutions, evaluate the reasonableness of these solutions, and identify connections among solutions to problems in the area of number and operations.
5. Make mathematical conjectures and investigate the reasonableness of these conjectures.
6. Develop and evaluate mathematical arguments related to number and operations.
7. Select appropriate tools for computation, whether mental computation, estimation, paper and pencil techniques, or technology based approaches.
8. Clearly and precisely communicate mathematical ideas about numbers and operations using appropriate mathematical language.
9. Make connections between mathematical ideas to build mathematical knowledge and solve problems regarding numbers and operations.
10. Represent operations on various subsets of real numbers using a variety of concrete and abstract models.
11. Utilize representations as tools to mediate mathematical thinking and problem solving in a dual process of decontextualizing and contextualizing problem situations, such as organizing and communicating mathematical ideas, or modeling and interpreting mathematical phenomena.

This course directly addresses the State of Washington Professional Educator Standards Board ([PESB](https://www.pesb.wa.gov/preparation-programs/endorsement-competencies/)) [Endorsement Standards](https://www.pesb.wa.gov/preparation-programs/endorsement-competencies/) (9.D.1, 9.D.2, 9.D.4A (Early Childhood Education), 1.D.1, 1.D.2, 1.D.4A, 1.D.5, 1.D.6A (Elementary Education), 2.0 (Middle Level Mathematics), 2A, 2B (Mathematics)).

Grading Scale and Method of Evaluation

Final letter grades will be determined based on your weighted percent grade, rounded to the nearest whole percent.

Letter Grade	F	D	D+	C-	C	C+	B-	B	B+	A-	A
Percent	0-59	60-66	67-69	70-72	73-76	77-79	80-82	83-86	87-89	90-92	93-100

Overall grades will be determined as a weighted average:

- 10% Attendance and Professional Participation
- 30% Skills Mastery Quizzes
- 40% Mathematical Reasoning Portfolio
- 20% Problem-Solving Journal

These evaluation categories are intended to cover the spectrum of lower- and higher-levels of [cognitive demand for mathematical tasks](#)⁴.

Skills Mastery Quizzes

Skills Mastery Quizzes are focused on the lower-level demands of *memorization* and *procedures without connections*. By the end of this course, you should be proficient working with definitions of numbers and operations, constructing a variety of visual representations of numbers and operations, and performing common calculation methods with numbers and operations.

Mathematical Reasoning Portfolio

The Mathematical Reasoning Portfolio targets the higher-level cognitive demand of *procedures with connections*. You will critique mathematical reasoning to investigate common errors and misconceptions in order to deepen your understanding of key concepts and principles. At the end of this course, you should be able to explain *why* an erroneous method is incorrect, instead of just saying "you can't do it that way."

You will also examine calculation methods that are nonstandard but nevertheless correct. When explaining why nonstandard methods are correct, you have further opportunities to draw on key concepts and principles and to see how these concepts and principles underlie calculation methods. By examining nonstandard methods, you also learn there can be more than one correct way to solve a problem. At the end of this course, you should understand that valid reasoning, not convention or authority, determines whether a method is correct. Moreover, you will be better prepared to value your students' creative mathematical activity.

Problem-Solving Journal

The Problem-Solving Journal is designed to provide you opportunities to engage with higher-level, cognitively demanding *doing mathematics* tasks, where the key mathematical ideas of the problem are directly related to course content. These problems will help you (1) deepen your mathematical content knowledge of the current unit, (2) develop your problem-solving skills, and (3) increase your awareness of your problem-solving process.

Assignment deadlines available in Canvas.

Course Expectations

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 culture for all in its classrooms, work environments, and at campus events.

Attendance Policy

Attendance is required for all class meetings and is included as part of your course grade.

University Policy CWUP 5-90-040(38) provides for reasonable accommodation of student absences for religious holidays in accordance with RCW 28B.137.010. Students seeking reasonable accommodations under this policy must provide written notice to their instructors within the first two weeks of class specifying the dates for which religious accommodations are requested. Contact the Dean of Student Success at (509) 963-1515 for further information.

Professional Participation

Think critically. People that analyze, infer, evaluate, and make reasoned judgments perform better, make better daily decisions, and have greater professional success. Ask questions to support your critical thinking process

Apply yourself. Success in this course will require considerable time and energy. If you have high learning expectations, that is what you will achieve. Expect to invest significant effort. Budget the time and energy needed to accommodate the workload.

Be present. Focus on learning by being an active participant. Show enthusiasm and bring a positive, energetic attitude.

Act professionally. Arrive to class on time and stay for the entire class. Respect everyone, treat each other with dignity, and encourage all to participate.

Communicate clearly. Effective written and oral communication is an important component of teaching. Clarity, proper format, spelling, and grammar are expected of every student.

Use common sense. Don't cheat on assignments, and don't plagiarize others' work – either will result in a zero and the possibility of disciplinary action by the university. If you have a problem that prohibits you from turning something in on time, let me know ahead of time. In all instances, good communication with me will prevent the vast majority of problems.

Assignment Deadline Extensions

You may submit a **deadline extension request** if you must submit an assignment past the deadline. Requests should (a) be submitted via email and (b) include a brief explanation as to why the assignment was unable to be completed on time. Assignments submitted late but with an approved extension will not receive any grading penalties.

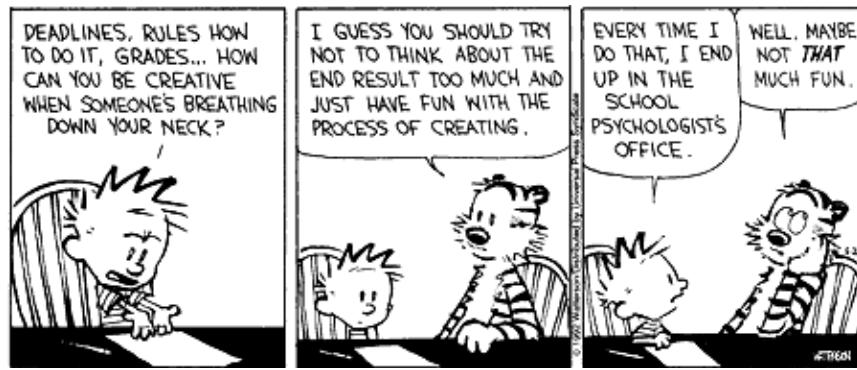
Academic Honesty and Student Conduct

Consult university policies [CWUP 5-90-040\(25\)](http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation) (<http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations#Class%20Attendance%20and%20Participation>), [CWUR 2-90-040\(24\)](http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty) (<http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations#Academic%20Dishonesty>), and [WAC 106-125-020](https://apps.leg.wa.gov/WAC/default.aspx?cite=106-125-020) (<https://apps.leg.wa.gov/WAC/default.aspx?cite=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.

Central Washington University is committed to providing all community members with a learning and work environment that is free from sexual harassment and assault. Students have options for getting help if they have experienced sexual assault, relationship violence, and sexual harassment, or stalking. Information can be found at <http://www.cwu.edu/wecare> (<http://www.cwu.edu/wecare>) and in [CWUP 2-35-050](http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment) (<http://www.cwu.edu/resources-reports/cwup-2-35-equal-opportunity-policies-and-programs#Harassment>): Sexual Harassment. Faculty are required to report information regarding sexual misconduct or related crimes. Students may speak to someone confidentially by contacting the CWU Wellness Center, 509-963-3213, or the CWU Student Counseling Clinic, 509-963-1391.

Changes

I reserve the right to amend, adjust, or otherwise modify the syllabus at any time during the course.



Footnotes

1. Stein, M. K., Boaler, J. & Silver, E. A. (2003). Teaching mathematics through problem solving: Research perspectives. In H. L. Schoen & R. I. Charles (Eds.), Teaching mathematics through problem solving: Grades 6-12 (pp. 245–256). Reston, VA: National Council of Teachers of Mathematics.
2. Cai, J., & Lester, F. (2010). Why is teaching with problem solving important to student learning. National council of teachers of mathematics, 13(12), 1-6.
3. Ernst, D. C., Hodge, A., & Yoshinobu, S. 2017. Inquiry-based learning. Notices of the AMS, 64(6), p. 570-574.
4. Smith, M. S., and M. K. Stein. Selecting and Creating Mathematical Tasks: From Research to Practice. Mathematics Teaching in the Middle School, 3(February 1998): 344–50.