Course Syllabus

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MATH 406 | Algebra for Teachers

Winter 2020

General Information

Class Time: T – F, 10:00am – 10:50am

Location: Samuelson 115

Instructor: Dr. Emilie Hancock

Office: Samuelson 218C

Phone: 509.963.2402

Office Hours: Tu, Th 12-2pm and by appointment (F2F or virtual)

Email: emilie.hancock@cwu.edu

Testing Hours: M, Tu, W*, Th, F 12-2pm (*W until 1:45)

Course Description and Learning Objectives

Reflecting **Washington State mathematics K-12 learning standards** (https://www.k12.wa.us/student-success/resources-subject-area/mathematics/mathematics-k%E2%80%9312-learning-standards), the **National Council of Teachers of Mathematics (NCTM) principles and standards** (https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/), and the **State of Washington Professional Educator Standards Board (PESB) endorsement standards for Algebra and Functions** (https://www.pesb.wa.gov/preparation-programs/standards/endorsement-competencies/middle-level-mathematics/), this course emphasizes the conceptual development of algebra and associated procedures. Additional focus is placed on fostering algebraic thinking through the development of algebraic habits of mind. Middle level mathematics content is rediscovered through problem solving[1] and mathematical modeling in an inquiry-based learning[2] context to support the development of mathematical **processes** (https://www.nctm.org/Standards-and-Positions/Principles-and-Standards/Process/) and **practices** (http://www.corestandards.org/Math/Practice/).

Major content topics of the course include algebraic reasoning; interpreting the structure of expressions and rewriting expressions in equivalent forms; solving equations and inequalities using properties of equality and the concept of logical equivalence; and patterns, sequences, and functions. Connections will be made to elementary and high school mathematics concepts along relevant, standards-based learning progressions (e.g., elementary numbers and operations, solving systems of equations and inequalities, and polynomial algebra). Exploration of these topics will follow the outline:

Unit 1: Expressions and Variables

Unit 2: Equality, Equations, and Inequalities

Unit 3: Representing and Analyzing Functions

Upon successful completion of this **course** (http://catalog.acalog.cwu.edu), you will be able to:

- Reason using the language and structure of algebra to investigate, represent and solve problems including using algebraic expressions, equations, inequalities and systems of equations and inequalities.
- Examine and reason about functional relationships between various representations including graphs, tables, expressions, concrete models and context.
- Analyze, extend and generalize sequences, including arithmetic and geometric sequences, both geometrically and algebraically. Write both explicit and recursive definitions for generating a sequence.

- Use and explain the patterns of change in proportional, linear, inversely proportional, quadratic and exponential functions and the types of real-world relationships these functions can model.
- Use appropriate technology to investigate and represent concepts, methods and application of mathematical concepts.
- Use principles of mathematical thinking and problem solving to explore, solve, generalize and prove mathematical problems.

Required Materials

Textbooks:

- Driscoll, M. (1999). *Fostering Algebraic Thinking: A Guide for Teachers, Grades 6-10*. New York: Heinemann.
- Beckmann, S. (2018). *Mathematics for Elementary Teachers with Activities* (5th ed.). New York: Pearson.

Canvas Access: I will update the course site on Canvas frequently with announcements, assignments, handouts, and due dates. Check Canvas daily.

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
70%	Standards-Based Content Mastery Exams (7% each)
20%	Algebraic Habits of Mind Portfolio

Descriptions of Evaluation Components

Attendance and Professional Participation (10%)

Your grade in this category is the percentage of class sessions you attend and participate professionally while present, recorded using Canvas **Roll Call Attendance**. Regular attendance is essential for successful completion of this course.

You are allowed a **maximum of two unexcused absences** this quarter. Your third unexcused absence will result in an automatic grade of 0 in this evaluation category. Each unexcused absence after the second will result in an additional 10% off your overall course grade until your final course grade is 0.

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. I measure professional participation based on the following criteria:

- Arrive to class on time and stay for the entire class.

- Be present. Focus on learning by being an active participant. Limit side activities and put away cell phones. (If you are anticipating an emergency phone call, just let me know in advance.)
- Come to class prepared. You may need to finish up short activities between classes.
- Bring a positive and energetic attitude every day.
- Respect everyone, treat each other with dignity, and encourage all to participate.
- Participate in group work by asking questions, communicating your understanding to your groupmates, and completing the handouts.
- Present your ideas to the class and ask questions when other students present.
- Use a 3-ring binder to organize and promptly access class handouts, assignments, and notes.

A lack of professional participation will result in a loss of attendance/participation credit for the day. Severe or repeated lapses in professional judgment may result in disciplinary action up to and including failing the course.

Is my absence excused?

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 as determined by Central Washington University.

In compliance with **RCW 28B.137.010** **(https://apps.leg.wa.gov/rcw/default.aspx?cite=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.

What if I miss class?

- Communicate with me as soon as possible
- Get information about what will happen/happened in class
- If appropriate, send me supporting documentation for an excused absence
- For excused absences, make arrangements with me in advance for any adjustments to assignment deadlines

Standards-Based Content Mastery Exams (70%, 7% each)

The purpose of this evaluation component is for you to demonstrate mastery of course content standards. Each mastery exam will assess a set of standards. Your final mastery exam grade is based on the total number of standards for which you have demonstrated mastery. This means you will not receive a numerical score for each question, but a percentage of standards mastered and standards to-be mastered.

E	**Exceeds Expectations!**	Correct, complete, convincing, and clear.
M	**Mastered**	Demonstrates understanding of the relevant target. May include some errors, but no additional study or review is needed.
P	**Progressing**	Demonstrates partial understanding, but with a fundamental error, misunderstanding, or is incomplete. Needs review and revision.
X	**Not Assessable**	Not enough work to determine mastery: An insubstantial attempt, too many errors to correct each individually, or uses an inappropriate method or tool.

Exam Attempts

Learning happens over time, as we revisit ideas and reflect on them. Your final grade in this evaluation component will reflect how well you *eventually understand* each topic. This grading system rewards **growth**; you can make mistakes without penalty, as long as you eventually demonstrate mastery of the topic.

Your first attempt for each exam will take place in class. See Canvas for this quarter's exam schedule and the standards assessed on each exam. No make-up of this first exam is allowed for an unexcused absence. Each exam has two parts: Calculator Available and Calculator not Available.

You will be given additional opportunities to demonstrate your mastery of any standards not yet mastered after the first attempt. You may only retest if you took the first in-class attempt, once each day until the exam retake deadline (see Canvas). Retakes during testing hours do not need to be scheduled in advance.

Testing hours this quarter: M, Tu, W*, Th, F 12-2pm (*W until 1:45)

Algebraic Habits of Mind Portfolio (20%)

While mastery exams focus on progressions of content standards reflected in Common Core, this evaluation component focuses on the progression of students' thinking patterns toward productive algebraic thinking. We will use Driscoll (1999) to guide discussions around algebraic habits of mind. Your portfolio includes:

- **Regular reflections** based on chapter readings from Driscoll (1999)
- For each of the three algebraic habits of mind outlined in Driscoll (1999), a **selection of worthwhile^3 mathematical problems**, at least one aligned with content from each of the three course units, that are (1) solved completely by you, and (2) demonstrate the algebraic habit of mind. You will be asked to provide a brief justification of your choices.
- A **final representation** completed in teams that connects the two CCSS learning progressions for Expressions & Equations and Functions with a developmental progression of each of the three algebraic habits of mind.
- A **presentation** of the final representation and in-class **reflective discussion** during our final exam: Friday, March 20th, 8-10AM

Academic Honesty

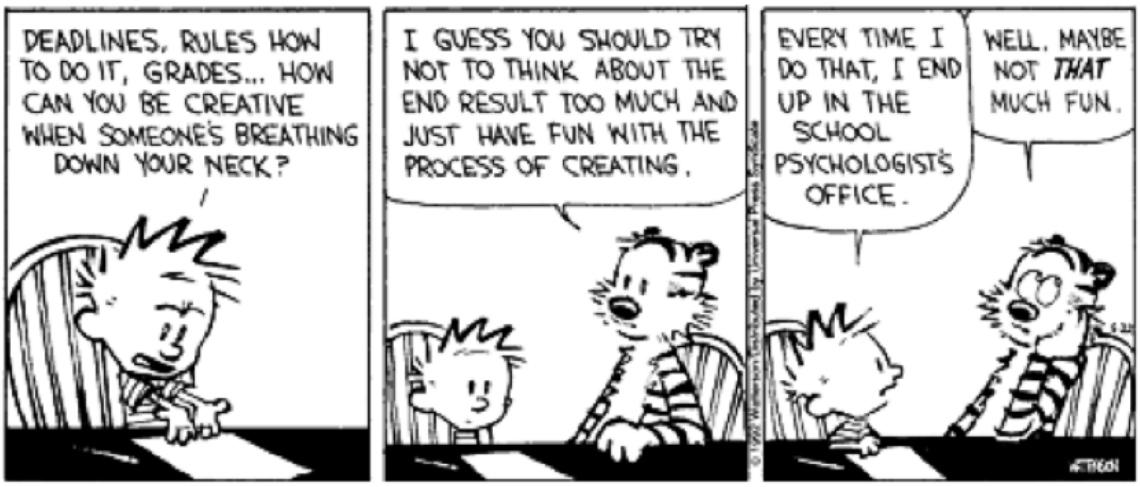
Consult university policies (**CWUP 5-90-040(22)** (http://www.cwu.edu/resources-reports/cwup-5-90-040-academic-and-general-regulations), **CWUR 2-90-040(22)** (http://www.cwu.edu/resources-reports/cwur-2-90-040-academic-and-general-regulations), and **WAC 106-125-020** (https://apps.leg.wa.gov/wac/default.aspx?cite=106-125-020)) 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.

Disability Support Services

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.** (mailto:DS@cwu.edu)

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. Ernst, D. C., Hodge, A., & Yoshinobu, S. 2017. Inquiry-based learning. Notices of the AMS, 64(6), p. 570-574.
3. 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.

Course Summary:

Date	Details	
Sun Jan 12, 2020	**Driscoll, Chapter 1 Reflection** (https://canvas.cwu.edu/courses/63634/assignments/788177)	due by 11:59pm
Wed Jan 15, 2020	**Mastery Exam 0: Prerequisite CCSS Standards for 6-8 Learning Progressions 'Expressions & Equations' and 'Functions'** (https://canvas.cwu.edu/courses/63634/assignments/786347)	due by 10am
Sun Jan 19, 2020	**Driscoll, Chapter 2 Reflection** (https://canvas.cwu.edu/courses/63634/assignments/788179)	due by 11:59pm
Tue Jan 21, 2020	**Mastery Exam 1A: Numerical Expressions** (https://canvas.cwu.edu/courses/63634/assignments/787007)	due by 10am
Sun Jan 26, 2020	**Driscoll, Chapter 3 Reflection** (https://canvas.cwu.edu/courses/63634/assignments/788182)	due by 11:59pm
Tue Jan 28, 2020	**Mastery Exam 1B: Expressions with Variables - Part 1** (https://canvas.cwu.edu/courses/63634/assignments/788425)	due by 10am

Date	Details	
Sun Feb 2, 2020	Driscoll, Chapter 4 Reflection (https://canvas.cwu.edu/courses/63634/assignments/788183)	due by 11:59pm
Tue Feb 4, 2020	Mastery Exam 1C: Expressions with Variables - Part 2 (https://canvas.cwu.edu/courses/63634/assignments/788426)	due by 10am
Sun Feb 9, 2020	Driscoll, Chapter 5 Reflection (https://canvas.cwu.edu/courses/63634/assignments/788181)	due by 11:59pm
Mon Feb 10, 2020	Unit 1 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Abstracting from Computation' (https://canvas.cwu.edu/courses/63634/assignments/788356)	due by 11:59pm
	Unit 1 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Building Rules to Represent Functions' (https://canvas.cwu.edu/courses/63634/assignments/788357)	due by 11:59pm
	Unit 1 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Doing-Undoing' (https://canvas.cwu.edu/courses/63634/assignments/788267)	due by 11:59pm
Tue Feb 11, 2020	Mastery Exam 2A: Equations - Part 1 (https://canvas.cwu.edu/courses/63634/assignments/788427)	due by 10am
Tue Feb 18, 2020	Mastery Exam 2B: Equations - Part 2 (https://canvas.cwu.edu/courses/63634/assignments/788428)	due by 10am
Tue Feb 25, 2020	Mastery Exam 2C: Equations - Part 3 (https://canvas.cwu.edu/courses/63634/assignments/788429)	due by 10am
Sun Mar 1, 2020	Driscoll, Chapter 6 Reflection (https://canvas.cwu.edu/courses/63634/assignments/788180)	due by 11:59pm
Mon Mar 2, 2020	Unit 2 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Abstracting from Computation' (https://canvas.cwu.edu/courses/63634/assignments/788409)	due by 11:59pm
	Unit 2 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Building Rules to Represent Functions' (https://canvas.cwu.edu/courses/63634/assignments/788407)	due by 11:59pm
	Unit 2 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Doing-Undoing' (https://canvas.cwu.edu/courses/63634/assignments/788408)	due by 11:59pm
Tue Mar 3, 2020	Mastery Exam 3A: Functions - Part 1 (https://canvas.cwu.edu/courses/63634/assignments/788430)	due by 10am
Sun Mar 8, 2020	Driscoll, Chapter 7 Reflection (https://canvas.cwu.edu/courses/63634/assignments/788184)	due by 11:59pm
Tue Mar 10, 2020	Mastery Exam 3B: Functions - Part 2 (https://canvas.cwu.edu/courses/63634/assignments/788431)	due by 10am
Fri Mar 13, 2020	Mastery Exam 3C: Functions - Part 3 (https://canvas.cwu.edu/courses/63634/assignments/788432)	due by 10am

Date	Details	
Mon Mar 16, 2020	**Unit 3 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Abstracting from Computation'** (https://canvas.cwu.edu/courses/63634/assignments/788412)	due by 11:59pm
	Unit 3 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Building Rules to Represent Functions' (https://canvas.cwu.edu/courses/63634/assignments/788413)	due by 11:59pm
	Unit 3 Worthwhile Problem Demonstrating the Algebraic Habit of Mind 'Doing-Undoing' (https://canvas.cwu.edu/courses/63634/assignments/788411)	due by 11:59pm
Thu Mar 19, 2020	**Final Representation** (https://canvas.cwu.edu/courses/63634/assignments/788414)	due by 11:59pm
Fri Mar 20, 2020	**Final Presentation** (https://canvas.cwu.edu/courses/63634/assignments/788416)	due by 8am
	Roll Call Attendance (https://canvas.cwu.edu/courses/63634/assignments/788149)	