

M 234 Higher Math for K-8 Teachers – Spring 2020

**This syllabus (including grading schema) is subject to change. **

Basic Information

Instructor: Caleb Huber

Email: caleb1.huber@umontana.edu

Office Phone: N/A – I will be working remotely when not in class.

Office hours/location: 4-5 PM MW; <https://umontana.zoom.us/j/98062395557> ;
or by appointment

Class Meetings: 2-2:50 PM, MWF, Mlib410 - Θρ

- **Zoom:** <https://umontana.zoom.us/j/98721770717?pwd=RWJScWpwdEJ1dE9oSnRwTTd3dW9JQT09>
- **Password:** 019163

Required Materials and Aids: laptop or tablet, scientific calculator, grid paper, colored pencils

COURSE CONTENT

Course Description: This course is the study of algebra, probability and statistics for prospective elementary and middle school teachers. Topics include algebraic representations, proportional reasoning, functions, statistical modeling and inference, and elementary probability theory.

Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Apply algebra in many forms (e.g., as a symbolic language, as generalized arithmetic, as a study of functions, relations, and variation) and use algebra to model physical situations and solve problems;
2. Use and explain proportionality and its invariant properties;
3. Apply number theory concepts and theorems, including greatest common factors, least common divisor, properties of prime and composite numbers, and tests for divisibility;
4. Represent, analyze and interpret data;
5. Simulate random events and describe expected features of random variation;
6. Distinguish between theoretical and experimental probability and describe how to use one or both to determine a probability in a given situation

Required Textbook:

Mathematics for Elementary Teachers with Activities with MyMathLab, 5th ed., Sybilla Beckmann, ISBN 978-0-348-00196

Course Calendar:

Date Material is Covered	Section or Topic Covered	Homework
Jan 11	Syllabus	Read Section 15.2 p681-684

Date Material is Covered	Section or Topic Covered	Homework
	Statistics Day 1	<p>Read pages 1-7 of the following link: http://www.amstat.org/asa/files/pdfs/GAISE/GAISEPr eK12_Intro.pdf</p> <p>Homework</p> <ol style="list-style-type: none"> 1. Written Homework: 15.2 #3, #8 2. Download some kind of whiteboard or graph paper technology to your computer or homework device.
Jan 13-15	Statistics Day 2 Pictograph, Bar Graph, Dot Plot, Range, Data Varies, Categorical, Numerical	<p>Read Section 15.1 & 15.2 and pages 8-15 of the following link: http://www.amstat.org/asa/files/pdfs/GAISE/GAISEPr eK12_Intro.pdf</p> <p>Homework</p> <ol style="list-style-type: none"> 1. Complete Class Activity 15G (found on page CA-317 I believe) 2. In a clear paragraph, list 2 critiques and 1 pro for both of the following graphical displays (6 total). <ul style="list-style-type: none"> - Percentage of Veterans in Adult Population, Data Link: www.census.gov/library/visualizations/2018/comm/percentage-veterans.html - Poverty Rates/Medium Income by County Type, Data Link: www.census.gov/library/visualizations/2018/comm/acs-5yr-poverty-type.html
Jan 18, M	No Class MLK	
Jan 20-22	Statistics Day 3 Mean, Mean Absolute Deviation	<p>Read Section 15.3 but stop on p.695 15.4 p. 703-706, 709-712</p> <p>Homework</p> <ol style="list-style-type: none"> 1. 15.3 #1, 7 2. 15.4 #15

Date Material is Covered	Section or Topic Covered	Homework
		<p>3. Create a graph, calculate the mean and MAD, and use these items to analyze the following lengths of shower times in minutes: 2, 3.5, 3.5, 4, 5, 5, 5, 5.5, 6, 7.</p>
<p>Jan 25-27</p>	<p>Statistics Day 4 Median, Mode, Histogram</p>	<p>Read Section 15.4 p. 706-709, 712-713 Read pages 16-21 of the following link: http://www.amstat.org/asa/files/pdfs/GAISE/GAISEPr eK12_Intro.pdf</p> <p>Homework</p> <ol style="list-style-type: none"> 1. <ul style="list-style-type: none"> - Create a histogram for the average high daily temperature in Helena, MT for July. Data link: www.usclimatedata.com/climate/helena/montana/united-states/usmt0163 Click the history tab, select 2019, and July. - Analyze the data using mean, median, mode, MAD, and the general histogram shape. 2. Learn how to use Tinkerplots by going to www.tinkerplots.com On the left, select Movies, and watch the following: <ul style="list-style-type: none"> - TinkerPlots Basics - Making Common Graphs - Exploring Relationships 1 - Exploring Relationships 2 3. Install Tinkerplots on your homework device. You can just use the preview version. DO NOT PAY.
<p>Jan 29 – Feb 1</p>	<p>Statistics Day 5 Box Plot, Interquartile Range, Outlier, Tinkerplots, Comparing</p>	<p>Read Section 15.4 again Homework</p> <ol style="list-style-type: none"> 1. 15.4 #13 for part b analyze the data using the quartiles, median, interquartile range, and range in the overall comparison. 2. TinkerPlot Activity: Men’s & Women’s 100-Meter Dash at the Olympics p35-36. Use sentences and strong analysis skills. The activity can be found in the attached

Date Material is Covered	Section or Topic Covered	Homework
		pdf. When it asks you to include a copy of your graph, feel free to take a picture of your program's graph rather than reconstructing it by hand. Almost all computers have a "snipping tool" which you can find by typing "snipping tool" in your program search bar on the bottom left of your screen. This tool makes adding your graph to a word document remarkably easy. Regular pictures submitted as jpegs are also fine, as long as they are legible! The data set can be found at http://www.tinkerplots.com/activities/data-analysis-and-modeling-activities
Feb 3-8	Statistics Day 7 (6 got skipped) Sampling	Read Section 15.1 HW: 1. 15.1 #1, #11 2. 15E (note there are 6 questions)
Feb 3-8	Statistics Day 8 Probability, Frequency, Relative Frequency, Uniform, Table	Read Section 16.1 stop on p725 HW: 16.1 #2, #3a & b, #5
Feb 10-12	Statistics Day 9 Trees, Tables, Compound Events, At Least, At Most	Read Section 16.2, 16.3, 16.4 HW: 1. 16.3 #9,10 for #10 also explain why the answers to parts a and b are different 2. 16.4 #18 3. Complete Probability Wksht. #1-4
Feb 15	No Class: Presidents Day	
Feb 17-19	Statistics Day 10 Experimental/Observed, Theoretical, Simulation	Skim 16.4 HW: 1. Class Activity 16M #1 & #3 2. Complete probability Worksheet #5-6. For both problems also answer the following: What is the sample space? How many outcomes are there? Is this situation independent or dependent?
Feb 22	Review for Exam 1	

Date Material is Covered	Section or Topic Covered	Homework
Online Assignment	Exam 1	Due Friday Feb 26 at midnight
Feb 24-26	Sections 7.1 and 7.4 Proportions	Read Sections 7.4 Homework <ol style="list-style-type: none"> 1. 7.1 #8 2. 7.4 #2 3. 7E #1, 2
Mar 1-3	Sections 7.2 and 7.3 Unit Rate	Read Section 7.2 & 7.3 Homework: <ol style="list-style-type: none"> 1. Section 7.3 #2, 7, 9 <ul style="list-style-type: none"> - For #9 also create a table, double number line, coordinate graph, and an equation as part of the solution and explanation.
Mar 5-8	Section 7.5 and 7.6 Inversely Proportional Relationships Percent Increase and Decrease	Read Section 7.5 and 7.6 Homework: <ol style="list-style-type: none"> 1. 7.5 #1, 9 2. class activity 70
Mar 10	Section 7.1-7.5 Review and Extensions	Written HW: 7.1 #6 7.2 #19 7.3 #10 7.5 # 5 7.6 #22
Mar 12	Review for Exam 2	
Online	Exam 2: Chapter 7	Due Tue. Mar 16 at midnight
Mar 15	Section 9.1 (w/o proofs) Numerical Expressions	Read Section 9.1 Homework <ol style="list-style-type: none"> 1. Section 9.1 #9,10, #13, #14 <ul style="list-style-type: none"> - For #9 also write an algebraic expression.
Mar 17-19	Section 9.2 and Algetiles Algebraic Expressions	Read Section 9.2 Homework: 9.2 #11, 14, 19

Date Material is Covered	Section or Topic Covered	Homework
Mar 22-26	Section 9.3 Equations	<p>Read Section 9.3</p> <p>Homework</p> <ol style="list-style-type: none"> 1. A student incorrectly solved an equation. Identify their errors and explain to the student what they should have done and why. Use a visual balance scale along with your explanation. $10 + 2(x - 3) = 4(x - 3)$ $10 + 2x + 6 = 4x + 12$ $2x + 4 = 4x + 12$ $2x + 4 = 12$ $2x - 8$ $x = 4$ 2. 9.3: #3, Use a balance scale in your explanation. 3. 9.3 #7: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Label each as having the form $x=a$, $a=a$, or $a=b$
Mar 22-26	Section 9.4 Strip Diagrams	<p>Read Section 9.4</p> <p>Homework:</p> <ol style="list-style-type: none"> 1. 9.4 #4, 5, 25 2. Class Activity 9K #5

Date Material is Covered	Section or Topic Covered	Homework
Mar 29	Insert Number Theory	
Mar 31 – Apr 5 (No Class April 2nd)	Insert Number Theory	
Apr 7	Review for Exam 3	
Online	Exam 3: 9.1-9.4	Due by Sunday April 11th at midnight.
Apr 9 – Apr 12	Section 9.6 Functions	Read Section 9.6 HW: Section 9.6 #6, 10, 11
Apr 14-19	Section 9.7	Read Section 9.7

Date Material is Covered	Section or Topic Covered	Homework
	Linear Functions	Homework: HW: section 9.7 #6, 16, 26
Apr 14-19	Insert Number Theory	
Apr 21	Insert Number Theory	
Apr 23	Review	
Online Final	Exam 4	Due by Tuesday April 27th at midnight.

Grading Policy: Grades will be kept in Moodle.

Participation (20% of course grade): Class sessions require students to daily interact with each other and the instructor, manipulatives, and mathematics. This engagement requires each student to be an active participant. If you are attending remotely, you will be expected to occasionally share your screen with the class. Class attendance will be taken and participation noted. Any absences must be approved ahead of time and will be considered according to my discretion. To help me keep track of people's attendance. I will also have a weekly check in which students will need to state one concept they learned that week and one area in which they were confused.

Scoring Daily Class Participation

# of points	Characteristics
4	Attended, interacted with the material and classmates or instructor for entire class session.
3	Attended, interacted with the material and classmates or instructor for entire class session, but absent for 10 minutes of class.
2	Attended, interacted with the material and classmates or instructor for less than 1/2 of the time.
1	Attended, interacted with the material but not classmates nor instructor.
0	Did not attend or attended but sat alone, did not participate with material, classmates, nor instructor.

Written Assignments (40% of course grade): Each homework assignment will be due at midnight approximately one week after posting. Late work receives a 15% deduction for each day late. Submissions must be pdf's or clear jpegs. When writing responses, students are expected to use full sentences. Homework can always be correct for up to full credit, but corrective annotations must be completed in a different color.

Exams (40% of course grade): Each exam is equally weighted and 10% of the course grade. Exams will be similar in nature and content to the written assignments. However, the first late exam will only be accepted for 50% credit. Any other late exams will not be accepted.

A student is permitted to turn in an exam on an alternative date (with no penalty to the exam score) ONLY under the following two circumstances:

In advance of the scheduled due date, the student provides the instructor with documentation from the appropriate business or organization that identifies a conflict with the scheduled item because of a medical reason (personal or family), the student has jury duty, military service, or personal or work-related travel. After receiving and reviewing this documentation, the instructor will advise the student whether the absence has been pre-approved.

Following the scheduled date, the student provides the instructor with documentation from a medical provider that identifies that the student or student's family suffered a medical condition that required emergent medical attention on the scheduled date or during the 24 hours preceding the scheduled exam date.

Instructor will consider the student's situation and communicate the new due date for the quiz/exam through email.

Grading Scale:

Letter grades for the course are assigned based on the following percentages. An 89.9% is a B+, it does not round up to a 90%.

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

Classroom and Course-related Behavior: University policy requires that all of us in the classroom treat each other with respect, and refrain from behavior that will disrupt the educational process. Please refrain from using any electronics during class that are not directly related to what we are doing.

Student Conduct Code: All students need to be familiar with the Student Conduct Code. You can find it in the "A to Z" index on the UM home page. In particular, discrimination and harassment are not tolerated at the University of Montana. If you feel that you have been subjected to discriminatory or harassing behavior, please contact the Office of Equal Opportunity and Title IX at 243-5710 or read UM's

Policy on Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation for help in addressing the situation. You can also report the discrimination or harassment to me or to another faculty member or advisor you trust.

Academic Honesty: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. Disability Modifications The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Statement on Digital Access: Digital devices (like laptops and cell phones) are becoming increasingly important to success in college. In this course, you will need digital devices to access readings, complete and submit written assignments, complete tasks, verify your attendance, participate remotely, and more. I recognize that some students are unable to afford the cost of purchasing digital devices and that other students rely on older, more problem-prone devices that frequently break down or become unusable. I also recognize that those technology problems can be a significant source of stress for students. Given those challenges, I encourage students to contact me if they experience a technology-related problem that interferes with their work in this course. This will enable me to assist students in accessing support.