Math 13700 Mathematics for Elementary Education I Spring 2025

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Welcome to Mathematics for Elementary Education Teachers courses at Purdue!

Course goals are to prepare you to:

- Be a knowledgeable and confident math teacher in the elementary classroom
- Have a deep understanding of the reasoning behind math processes
- Be able to clearly articulate math ideas with correct vocabulary

What is Mathematics? In this course, you will experience mathematics as a sense-making activity that **ALL** of you (and your future students) are capable of learning. You will make meaning of the mathematics in this course and help your future students do the same.
In this class, you will often be asked to explain your thinking or describe the process you use to solve a problem. Be prepared to detail and explain your thinking clearly. Homework, quizzes, and exams will be graded accordingly.

Official Course Description:
Credit Hours: 3.00. Designed for prospective elementary school teachers with a focus on number and operations with real numbers and elementary number theory. This course approaches mathematics from a teacher and student perspective where students will be pressed to find multiple methods and explanations for situations, select and evaluate mathematical tasks and children's approaches, and utilize manipulatives and models to give meaning to symbolic mathematics. Numerical reasoning including self-generated and conventional algorithms are also included in this course.

I. Learning Objectives:

1. **To approach mathematics from both a teacher and student perspective in the content areas of number and operations through the following:**
   i. Analyze and evaluate their own understanding and children's understanding of mathematics in the content areas of number and operations.
   ii. Anticipate multiple methods (correct and incorrect) for arriving at given conclusions involving number and operations concepts.
   iii. To create and/or select appropriate problems for elementary children when given number and operations concepts.
   iv. To utilize manipulatives and models to demonstrate procedural and conceptual understanding of mathematical concepts.
   v. To identify types of problem situations (e.g., put together, take away, repeated subtraction, sharing).
2. **To reason about number and operations and be able to:**
   i. Recognize and describe connections among number and operations concepts in oral and written form (e.g., quantitative analysis).

ii. Model and perform arithmetic operations in base ten and other bases (mental estimates and computations).
iii. Use properties of addition and multiplication to facilitate arithmetic with real numbers in various formats with multiple methods (e.g., mentally, array method, repeated addition).
iv. Determine when two fractions are equivalent, convert fractions to decimals and percentages and know which format is helpful for given situations, perform operations with fractions using various formats (e.g., decimal squares, number line).
v. Compare fractions, determine relationships with "close to" fractions, and give models for operations with fractions.

3. To reason about number theory and number relationships and be able to:

i. Demonstrate understanding of the characteristics of our base ten system in various formats (e.g., face value, place value, powers of ten).
ii. Recognize when a fraction would result in a terminating or repeating decimal and convert terminating and repeating decimals to fractions with mathematically sound justification.
iii. Use divisibility rules to determine greatest common factors, least common multiple, and to decide whether numbers are prime and/or how many factors a number has (including Fundamental Theorem of Arithmetic).
iv. Recognize the magnitude of large and small numbers and compare or give context for them in various formats.
v. Work flexibly with ratios, proportional thinking, and other methods for representing and solving mathematical problems and for evaluating solutions.

Textbook: Reconceptualizing Mathematics **4th Edition** by Sowder, Sowder, Nickerson, & Whitacre. W.H. Freeman, 2023. Loose-Leaf with Achieve access ISBN: 9781319554903; $119.99 at MacmillanLearning.com

- This book provides activities, discussion ideas, and questions. We will use this workbook daily in class, and reading the section in the text before class is recommended to assist in achieving the goals of this course.
- We will also use manipulatives to help us understand or demonstrate concepts. These manipulatives will appeal to different learning styles, and you may find them useful in clarifying ideas. Because it will be important to use them in your teaching for the benefit of your students, you will gain valuable experience using manipulatives in this course.

II. Grading: Grades consist of three (3) evening exams (100 points each), quizzes (100 points total), homework (50 points), and a comprehensive final exam (150 points). An instruction sheet for determining your grade is available on Brightspace. Note that a point on homework or quiz is not equivalent to a point for the course. The following will note the grading scale, description of graded assignments, and academic integrity expectations:

- **Homework:** You will turn in homework every class period. *Late homework is not accepted.* **Students are encouraged to work together on homework, but the work submitted should be their own and not match other students' work.** Your 4 lowest

homework scores will be dropped. Homework should be done neatly and with care and all steps must be shown. Correct answers without work or with incorrect work may not receive credit. The instructor will decide which problems or parts of problems the grader will grade. Only a few problems on each assignment are graded. This means that sometimes the problems selected are the ones you have incorrect or they might be ones that you have correct. Students are encouraged to work together on homework, but the work submitted should be their own and not match other students' work. Students are also encouraged to attend office hours as a way of getting help with assignments or checking answers. It is important to check your feedback on homework assignments so that you can learn from your mistakes. **If you feel that an assignment has been graded incorrectly, you have one week from the date that it was graded to request a regrade.** You may request a regrade by emailing your instructor. Be sure to include the HW number and which problem(s) you would like the instructor to regrade in your email.

- **Quizzes/Projects:** Quizzes will be given frequently. Some will be traditional answering of questions and others may be projects or take-home quizzes. In-class quizzes cannot be made up without notice from a Purdue-governed body. It is wise to review recent lessons as a way of studying for quizzes. Two quiz scores will be dropped to allow for absences. No make-up quizzes are given. **In-class quizzes cannot be made up without notice from a Purdue-governed body.**

- **Exams:** Exams are intended to cover the ideas from the text but not to mimic the homework questions. Questions may require thinking or problem solving not represented by the homework questions.
    - **Exam I is Tuesday 2/11/25 from 8:00-9:00pm in UC 114.**
    - **Exam II is Thursday 3/13/25 from 8:00-9:00pm in UC 114.**
    - **Exam III is Thursday 4/17/25 from 8:00-9:00pm in UC 114.**
    - Put these dates and times on your calendar. Make-up exams will be given only if you have a valid excuse and the course coordinator Jennifer Fitch has been notified prior to the exam by you or your instructor. If you are unable to notify her prior to the exam, *a valid explanation with documentation for the missed exam must be provided*. Unexcused absence from an exam may result in a zero on the exam.

Course grades are based on the following scale:

%	Grade	Points (out of 600)
98 – 100	A+	≥ 585
90 – 97	A	≥ 540
80 – 89	B	≥ 480
70 – 79	C	≥ 420
60 – 69	D	≥ 360
< 60	F	< 360

At the end of the semester, students whose total points out of 600 are within 6 points of an A, B or C, will be *considered* for the higher grade with a minus if they have missed 5 or fewer class sessions.

Purdue Honor Pledge:

As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – we are Purdue.

- **Academic honesty** is expected at all times. Academic dishonesty could result in a 0 for the assignment or exam or an F in the course. It also may result in a disposition form (D-2) filed with the College of Education. Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breeches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

III. Logistical Information

- **Course Schedule:** This course will meet Monday, Wednesday, and Friday each week for 50 minutes each day. See the course calendar later in the syllabus for the semester's schedule of class dates.
- **Office Hours:** The instructors of MA 137, 138, and 139 welcome students of any of the three courses to their office hours. A list of those weekly hours and location can be found on Brightspace.
- **Attendance:** This course follows Purdue's academic regulations regarding attendance (see link in Brightspace), which states that students are expected to be present for every meeting of the classes in which they are enrolled. It is common courtesy to let your instructor know if you are going to miss a class. However, it is not required. Please discuss illnesses or circumstances that lead to excessive absences privately with the instructor to make appropriate accommodations. With 4 homework scores and 2 quiz scores dropped, most absences should be accounted for.
- **Calculators:** Another goal of the Mathematics for Elementary Education courses is to be competent doing arithmetic of whole numbers, decimals, fractions, and percentages by hand. Because of this, **No calculators are allowed on quizzes and exams.** Occasionally, a calculator will be useful for homework problems or in-class work. There will also be three quizzes given during the semester called "Arithmetic Skills Quizzes." To be prepared for those, a study guide is available on the course web page.
- **Course Evaluation:** During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor. At that time, you will receive an official email from evaluation administrators with a link to the online evaluation site.
- **Campus Emergencies:** In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. If a fire alarm sounds, leave the building immediately and collect by the fountain outside. You may dial 911 for a campus emergency.
- **Quiet Period:** Per university regulations, the week preceding the final exams week is designated as the "Quiet Period." During this time, no assignments (including homework) can be assigned or collected, unless your course has no exams scheduled for the final exam week. Further details regarding this policy can be found at: https://catalog.purdue.edu/content.php?catoid=16&navoid=19719#c-quiet-period
- **Last Day to Drop a Course with a W or WF grade:** April 18, 2025

IV. Resources

- **Mental Health**
  - If you find yourself beginning to feel some stress, anxiety, and/or feeling slightly overwhelmed, try **WellTrack, https://purdue.welltrack.com/** Sign in and find information and tools at your fingertips, available to you at any time.
  - **If you need support and information about options and resources,** please see the Office of the Dean of Students, http://www.purdue.edu/odos for drop-in hours (M-F 8am-5pm).
  - **CAPS**: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and http://www.purdue.edu/caps/ during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

- **For students certified by ODOS adaptive services**
  - Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.
  - If you have been certified by the Disability Resource Center (DRC) as eligible for academic adjustments on exams or quizzes see www.math.purdue.edu/ada for exam and quiz procedures for your mathematics course. If you have questions please send email to Stephanie Foster (foster80@purdue.edu)
  - In the event that you are waiting to be certified by the Disability Resource Center we encourage you to review our procedures prior to being certified.
  - For all in-class accommodations please contact your instructor as soon as possible. Here are instructions for sending your Course Accessibility. Letter to your instructor: https://www.purdue.edu/drc/students/course-accessibility-letter.php

- **Basic Needs**
  - Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday.

- **Non-Discrimination Statement**
  - A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies and Statements.

MA 13700 Calendar Spring 2025

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 01/13-01/17	Lesson 1		Lesson 2		Lesson 3
Week 2 01/20-01/24	MLK Jr Day No Class		Lesson 4		Lesson 5
Week 3 01/27-01/31	Lesson 6		Lesson 7		Lesson 8
Week 4 02/03-02/07	Lesson 9		Lesson 10		Lesson 11
Week 5 02/10-02/14	Review	**Exam 1**	No Class		Lesson 12
Week 6 02/17-02/21	Lesson 13		Lesson 14		Lesson 15
Week 7 02/24-02/28	Lesson 16		Lesson 17		Lesson 18
Week 8 03/03-03/07	Lesson 19		Lesson 20		Lesson 21
Week 9 03/10-03/14	Lesson 22		Review	**Exam 2**	No Class
Week 10 03/17-03/21	**Spring Break**				
Week 11 03/24-03/28	Lesson 23		Lesson 24		Lesson 25
Week 12 03/31-04/04	Lesson 26		Lesson 27		Lesson 28
Week 13 04/07-04/11	Lesson 29		Lesson 30		Lesson 31
Week 14 04/14-04/18	Lesson 32		Review	**Exam 3**	No class
Week 15 04/21-04/25	Lesson 33		Lesson 34		Lesson 35
Week 16 04/28-05/02	No Class		No Class		Review
Final	Exam	Week	05/05-05/10		

Exam I is Tuesday, 2/11/25 from 8-9PM in UC 114
Exam II is Thursday, 3/13/25 from 8-9PM in UC 114
Exam III is Thursday, 4/17/25 from 8-9PM in UC 114

Math 13700 Assignment Sheet Spring 2025

Text: Reconceptualizing Mathematics, 4th Edition by Sowder, Sowder, Nickerson, & Whitacre. W.H. Freeman, 2023. (Loose-Leaf preferred)
Follow instructions written here in addition to instructions in the text.

Lesson	Section	Page	*Section Title/Topic*	Problems
1	1.1-1.3	p. 6, 9, &13	*Ways of Thinking About Solving Story problems; Quantitative Analysis*	Sec 1.1: p. 6; #1abd, 3ab, 6 Sec 1.2: p. 9; Write out all relevant quantities and values and the solution. #5, 7, 8 Sec 1.3: p. 13; #1, 2
2	1.4	p. 14 &17	*Issues for Learning: Ways of Illustrating Story Problems*	Sec 1.3: p. 14; #3, 4, 5; Sec 1.4: p. 17; #1-4, 7, Also, make up your own problem that is similar to these and show your diagram and solution.
3		p. 25	*Base-Ten Place Value*	PDF on Brightspace: #2 – 5, 7, 8, 10, 13, 14, 16, 18; p. 25 #6
4		p. 30	*Different Place Values*	PDF on Brightspace: #1, 2, 4, 5, 9, 12, 13, 14, 16 p. 30 #5, 8, 12, 18
5			*Large Numbers*	PDF on Brightspace: #2, 3ab, 4, 5ac, 7 (seconds only), 9, 10, 14abdf, 16
6			*Decimals – Part 1*	PDF on Brightspace: #2ab, 4, 7 – 11, 13, 16, 17
7			*Decimals – Part II*	PDF on Brightspace: #1, 2, 3, 9, 12, 13, 14, 15, 17
8			*Decimals – Part III*	PDF on Brightspace: #3, 5 – 9, 11b, 12
9	3.1	p. 44	*Ways of Thinking About Addition and Subtraction*	#2bc, 3 (Write out the incorrect work a students might do for each example and also the correct work needed.), 4b, 6bcd, 7, 8a
10	3.2	p. 49	*Children's Ways of Adding and Subtracting*	#2 (For Cases A, B, C you do 26 + 57. For Case E you do 86 – 9 using both methods. For Case G: you do 700 – 359.), 5 (Do two different number lines for each problem. Start with a different first jump each time.), 7, 8
11	3.3	p. 55	*Ways of Thinking About Multiplication*	#2, 4, 5, 6, 7, 11, 12 (Identify type for 7, 11, 12), 15abc

Exam I is Tuesday, 2/11/25 from 8-9PM in UC 114				
12	3.4	p. 59	*Ways of Thinking About Division*	#2, 3, 4, 5acd, 7 (Write two different types of division problems. Solve.), 8abcd (Indicate which division concept is used, make a diagram, and solve.), 9, 10
13	3.5/3.6	p. 64 & 66	*Children Find Products and Quotients; Issues for Learning: Developing Number Sense*	Sec 3.5: p. 64; #2, 3, 4 (Use $2973 \div 14$), 5 (Use $56 \div 8$) Sec 3.6: p. 66; #2, 4cd, 6ef, 7b
14	4.1/4.2	p. 71& 75	*Operating on Whole Numbers and Decimal Numbers*	Sec 4.1: p. 71; #1ab, 2, 3, 5 Sec 4.2: p. 75; #2, 5, 8ad, 11 Read p. 78. Describe MP5 and list 3 ways your students will use MP5.
15	5.1	p. 84	*Mental Computation*	#1, 2bcef, 3bcef, 4bd, 5, 6, 7ce
16	5.2	p. 87	*Computational Estimation*	#1 – 5, 6acde, 7bcd, 8bcdefg
17	5.3	p. 90	*Estimating Values of Quantities*	#1, 2(Assume a constant speed of 50 mph.), 3, 4(Determine the cost per person to pay for AIDS research – round to the nearest penny.), 5 (No minimum number of words – any number will do.)
18			*Making Sense of Arithmetic with Decimals*	Worksheet 18 on BS #3, 4, 5, 7, 8, 9, 11
19	6.1	p. 98	*Understanding the Meanings of* $\frac{a}{b}$	#2abcd (Use rectangular regions.), 3, 4, 5, 8bc, 9abde, 10ab, 12, 13, 14, 15b, 18, 22cd, 23
20	6.2	p. 104	*Comparing Fractions*	#1, 2, 6, 8bcd (Don't use common denominators. Use your number sense.), 9, 10, 11a, 14
21	6.3	p. 109	*Equivalent Fractions*	#1ab, 2c, 3ab, 5bc, 6abe (Tell how you know.), 7bc, 8bc, 9, 10, 11cde, 12a, 13
22	6.4/6.5	p. 114	*Relating Fractions, Decimals, and Percents; Issues for Learning Understanding Fractions and Decimals*	Sec 6.4: p. 114; #1ab (Show how you know.), 2bf, 4bd, 6, 8 (Make a neat list,), 9, 10, 12, 14, 15 Sec 6.5: Read p. 117; #1-4

Exam II is Thursday, 3/13/25 from 8-9PM in UC 114				
23	7.1/7.2	p. 120	*Problem Solving with Fractions/Making Sense of Addition and Subtraction of Fractions*	Sec 7.1: p. 120; #1ac, 2 Sec 7.2: p. 124; #2, 3ab, 4bcd, 5a, 7, 8, 10, 13, 15bdg, 16c, 19, 21
24	7.3	p. 129	*Making Sense of Multiplication of Fractions*	#1, 2, 3, 4, 5efgh, 9, 10, 11ad (Use pattern block pieces.), 12abc, 13ab, 15abc, 19
25	7.4	p. 136	*Making Sense of Division of Fractions*	#2, 4, 5, 6, 8df (Use pattern block pieces.), 9, 11, 14acf, 16 (Use fractions in part c.), 18
26	8.1/8.2	p. 145 & p. 150	*Quantitative Analysis of Multiplicative Situations; Fractions in Multiplicative Comparisons*	Sec 8.1: p. 145; #1, 5, 8abcde Sec 8.2: p. 150; #1, 5, 6, 7, 9, 10 ,12
27	9.1/9.2	p. 155 & 163	*Ratio as a Measure; Comparing Ratios*	Sec 9.1: p. 155; #1, 5, 6, 7 Sec 9.2: p. 163; #2, 4, 5, 7 (Answer questions A and B as well as the question in the text.), 11, 14, 18, 19, 21
28	9.3	p. 169	*Percents in Comparisons and Changes*	#1, 3, 4, 5, 6, 8, 9, 11, 13, 16, 21, 27 ; Read p. 172
29	10.1-10.3	p. 178 &184	*Big Ideas and Children's Reasoning About Signed Numbers; Other Models for Signed Numbers*	Sec 10.1: p. 178; #1a, 2, 4abc, 5 Sec 10.3: p. 184; #1, 2, 3def, 4cd, 5
30	10.4	p. 189	*Operations with Signed Numbers*	#1efgh, 2cdefgh, 3, 4defgh, 5, 6 (no number line for absolute value), 7(3 problems), 9bc, 10b
31	10.5	p. 193	*Multiplying and Dividing by Signed Numbers*	#2abcdefghijk, 3cd, 4, 5, 6 (Write a word sentence to answer the question.), 9bcdefgh
32		p. 206	*Factors*	Packet: #1ace, 3ab, 4, 5, 7acd, 8, 9 p. 206 #1, 7
Exam III is Thursday, 4/17/25 from 8-9PM in UC 114				
33		p. 210	*Prime Factorization*	Packet #1 – 6 Sec 11.2: p. 210; #4, 7, 8
34		p. 217	*Divisibility & Divisibility Rules*	Packet: #1ac, 2, 6 Sec 11.3: p. 217; #2ab, 4ac, 6ac

35		p. 223	*Greatest Common Factor and Least Common Multiple*	Packet part 1: #1, 2, 4 (on 4c, list the new tile size) Packet part 2: #1, 2, 4, 5, 6, 7 p. 223 # 5aei, 6aei, 8ace, 10, 13, 16, 21acf

Syllabus is subject to change with notification from the instructor.