Math 13700 Mathematics for Elementary Education I Fall 2019

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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? Mathematics is 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 in your career) and help your 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. Problem solving. Numerical reasoning including self-generated and conventional algorithms. Whole and fractional number systems, elementary number theory.

I. Learning Objectives:

1. Analyze and evaluate their own understanding and children's understanding of mathematics in the content areas of number and operations.
2. Anticipate multiple methods (correct and incorrect) for arriving at given conclusions involving number and operations concepts.
3. To create appropriate problems for elementary children when given number and operations concepts.
4. To recognize and describe connections among number and operations concepts in oral and written form.
5. To model and perform arithmetic operations in base ten and other bases.
6. To use properties of addition and multiplication to facilitate arithmetic with real numbers.
7. To determine when two fractions are equivalent, convert fractions to decimals and percentages, and perform operations with fractions using various formats (e.g., decimal squares, number line).
8. To use divisibility rules to determine greatest common factors, least common multiple, and to decide whether numbers are prime.
9. To utilize manipulatives to understand and demonstrate mathematical concepts.

II. **Textbook:** Reconceptualizing Mathematics **3rd Edition** by Sowder, Sowder, and Nickerson, W.H. Freeman, 2017. (Loose-Leaf preferred)

- 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 a high grade in the 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.

III. **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 Blackboard. 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:

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.

- **Homework:** You will turn in homework every class period. *Late homework is not accepted.* Occasions arise to prevent students from attending class. Therefore, your 4 lowest homework scores will be dropped. Homework should be done neatly and with care, all steps must be shown, and multiple pages should be stapled (one point will be deducted from each homework assignment not stapled). 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 attend office hours as a way of getting help with assignments or checking answers.

- **Quizzes:** Quizzes will be given frequently. 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. Class participation will count towards one quiz grade. Be prepared to volunteer your ideas during class discussions.

- **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 1: Thursday, September 12, 2019 from 8:00-9:00pm in PHYS 114.**
    - **Exam 2: Tuesday, October 22, 2019 from 8:00-9:00pm in PHYS 114.**
    - **Exam 3: Tuesday, November 19, 2019 from 8:00-9:00pm in PHYS 114.**
    - Put these dates and times on your calendar. Make-up exams will be given only if you have a valid excuse *with documentation* and Brooke Max has been notified prior to the exam. 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 grade penalty.

- **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. 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.

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.

IV. 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 Blackboard.
- **Attendance:** 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. Your feedback is vital to improving education at Purdue. You are strongly urged to participate in the evaluation system.

- **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.
- **Last Day to Drop a Course:** Tuesday, October 22, 2019 @ 5:00 pm

V. Resources

- **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**
    - If you have been certified by the Disability Resource Center (DRC) as eligible for academic adjustments on exams or quizzes, see http://www.math.purdue.edu/ada for exam and quiz procedures for your mathematics course or go to MATH 202 for paper copies.
    - In the event that you want to be certified by the DRC, we encourage you to review the procedures prior to being certified.
    - For all in-class accommodations, please see your instructor outside class hours – before or after class or during office hours – to share your Accommodation Memorandum and discuss your accommodations as soon as possible.
- **Non-Discrimination Statement**
    - Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue's nondiscrimination policy can be found at http://www.purdue.edu/purdue/ea_eou_statement.html.

MA 13700 Calendar Fall 2019

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1 08/19-08/23	Lesson 1		Lesson 2		Lesson 3
Week 2 08/26-08/30	Lesson 4		Lesson 5		Lesson 6
Week 3 09/02-09/06	Labor Day – No class		Lesson 7		Lesson 8
Week 4 09/09-09/13	Lesson 9		Review	Exam I	No Class
Week 5 09/16-09/20	Lesson 10		Lesson 11		Lesson 12
Week 6 09/23-09/27	Lesson 13		Lesson 14		Lesson 15
Week 7 09/30-10/05	No Class (ICTM)		Lesson 16		Lesson 17
Week 8 10/7-10/11	Fall break – no class		Lesson 18		Lesson 19
Week 9 10/14-10/18	Lesson 20		Lesson 21		Lesson 22
Week 10 10/21-10/25	Review	Exam II	No Class		Lesson 23
Week 11 10/28-11/1	Lesson 24		Lesson 25		Lesson 26
Week 12 11/4-11/08	Lesson 27		Lesson 28		Lesson 29
Week 13 11/11-11/15	Lesson 30		Lesson 31		No Class (PME-NA)
Week 14 11/18-11/22	Review	Exam III	No Class		Lesson 32
Week 15 11/25-11/29	Lesson 33		Thanksgiving	Break	No Class
Week 16 12/2-12/6	Lesson 34		Lesson 35		Review
Final Exam Week 12/09-12/13					

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Math 13700 Assignment Sheet Fall 2019

Text: Reconceptualizing Mathematics, 3rd Edition by Sowder, Sowder, & Nickerson. W.H. Freeman, 2017. (Loose-Leaf preferred)
Follow instructions written here in addition to instructions in the text.

Lesson	Section	Page	*Section Title/Topic*	Problems
1	1.1/1.2	p. 10	*Ways of Thinking About Solving Story problems; Quantitative Analysis*	p. 10 Write out all relevant quantities and values and the solution. 2b (You can purchase a fraction of a meter of wire mesh.), 3, 5, 8; p. 16 #1 – 3 *See assignment 1 examples on Blackboard for help.*
2	1.4	p. 16 &21	*Issues for Learning: Ways of Illustrating Story Problems*	p. 16 #4, 5, 7; p. 21 #5 – 8, Also, make up your own problem that is similar to these and show your diagram and solution.
3			*Base-Ten Place Value*	PDF on Blackboard: #2 – 5, 7, 8, 10, 13, 14, 16, 18
4			*Different Place Values*	PDF on Blackboard: #1, 2, 4, 5, 9, 12, 13, 14, 16
5			*Large Numbers*	PDF on Blackboard: #2, 3ab, 4, 5ac, 7 (seconds only), 9, 10, 14abdf, 16
6			*Decimals – Part 1*	PDF on Blackboard: #2ab, 4, 7 – 11, 13, 16, 17
7			*Decimals – Part II*	PDF on Blackboard: #1, 2, 3, 9, 12, 13, 14, 15, 17
8			*Decimals – Part III*	PDF on Blackboard: 3, 5 – 9, 11b, 12
9	3.1	p. 49	*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
Exam 1: Thursday, September 12, 2019 from 8:00-9:00pm in PHYS 114.				
10	3.2	p. 55	*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. 62	*Ways of Thinking About Multiplication*	2, 4, 6bcf, 8, 12ab (NO, they are not the same.), 14
12	3.4	p. 69	*Ways of Thinking About Division*	2, 3, 4, 5acd, 7 (Write two different types of division problems. Solve.), 8 (Indicate which division concept is used, make a diagram, and solve.)

13	3.5/3.6	p. 75	*Children Find Products and Quotients; Issues for Learning: Developing Number Sense*	p. 75: #2, 3, 4 (Use $2973 \div 14$), 5 (Use $56 \div 8$) p. 78: #2, 4cd, 6ef, 7b
14	4.1	p. 88	*Operating on Whole Numbers and Decimal Numbers*	1ab, 2, 5, 6, 8a. Read pp. 91-92. Describe MP5 and list three ways you expect students to demonstrate it.
15	5.1	p. 96	*Mental Computation*	1ac, 2bcef, 3bcef, 4bd, 5, 6 – Make a photocopy of the bottom of p. 96, 7ce
16	5.2	p. 100	*Computational Estimation*	#1 – 5, 6acde, 7bcd, 8bcdefg
17	5.3	p. 103	*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	6.1	p. 112	*Understanding the Meanings of* $\frac{a}{b}$	2abcd (Use rectangular regions.), 3, 4, 5, 8, 9abde, 10ab, 12, 13, 14, 15b, 18, 22cd
19	6.2	p. 120	*Comparing Fractions*	1, 2, 6, 8bcd (Don't use common denominators. Use your number sense.), 9, 10, 11a, 14
20	6.3	p. 125	*Equivalent Fractions*	1ab, 2c, 3ab, 5bc, 6abe (Tell how you know.), 7bc, 8bc, 9, 10, 11cde, 12a, 13
21	6.4/6.5	p. 131	*Relating Fractions, Decimals, and Percents; Issues for Learning Understanding Fractions and Decimals*	1ab (Show how you know.), 2bf, 4bd, 6, 8 (Make a neat list,), 9, 10, 12 Read p. 135 #1-4
22	7.1	p. 139	*Adding and Subtracting Fractions*	2, 3ab, 4bcd, 5a, 7, 8, 10, 13, 15bdg, 16c
Exam 2: Tuesday, October 22, 2019 from 8:00-9:00pm in PHYS 114.				
23	7.2	p. 145	*Multiplying by a Fraction*	1, 2, 3, 4, 5efgh, 9, 10, 11ad (Use pattern block pieces.), 12abc, 13ab, 15abc, 19
24	7.3	p. 153	*Dividing by a Fraction*	2, 4, 5, 6, 8df (Use pattern block pieces.), 9, 11, 14acf, 16 (Use fractions in part c.), 18
25	8.1/8.2	p. 162 & p. 166	*Quantitative Analysis of Multiplicative Situations; Fractions in Multiplicative Comparisons*	p. 162: 1, 3, 4, 5a; p. 166: 1, 3, 6, 7ae, 9a; Read pp. 169-171, section 8.3. What is NCTM? Name two publications.

26	9.1/9.2	p. 174 & 181	*Ratio as a Measure; Comparing Ratios*	p. 174: #1, 6, 7 p. 181: #2, 4, 5, 7 (Answer questions A and B as well as the question in the text.), 11, 18, 21
27	9.3	p. 189	*Percents in Comparisons and Changes*	1, 3, 4, 5, 6, 8, 9, 11, 13, 16, 21, 27 ; Read pp. 194-195, section 9.4. #1 – 8. *Print off worksheet for L28 and bring with you to class.*
28	10.1-10.3	p. 200-205	*Big Ideas and Children's Reasoning About Signed Numbers; Other Models for Signed Numbers*	p. 200: #1a, 2, 4abc, 5 p. 204: #1, 2 p. 205 #1, 2, 3def, 4cd, 5
29	10.4	p. 211	*Operations with Signed Numbers*	1efgh, 2cdefgh, 3, 4defgh, 5, 6, 7(3 problems), 9bc, 10b
30	10.5	p. 216	*Multiplying and Dividing by Signed Numbers*	2abcdefghijk, 3cd, 4, 5, 6 (Write a word sentence to answer the question.), 9bcdefgh *Print off and bring worksheet for Lesson 31 to class.*
31			*Factors*	Packet: #1ace, 3ab, 4, 5, 7acd, 8, 9
Exam 3: Tuesday, November 19, 2019 from 8:00-9:00pm in PHYS 114.				
32			*Prime Factorization*	Packet #1 – 6
33			*Divisibility & Divisibility Rules*	Packet: #1ac, 2, 6 Book: p. 241 #2ab, 4ac, 6ac
34			*Greatest Common Factor*	Packet: 1, 2, 4, 6
35			*Least Common Multiple*	Packet: #1 – 7

Syllabus is subject to change with notification from the instructor.