Math 13800   Mathematics for Elementary Education II   Fall 2019

Instructor: Rachel Lynn   Course Coordinator: Brooke Max
Email: rvlynn@purdue.edu   Email: bmax@purdue.edu
Office: MATH B13   Office: MATH 808

Welcome (or welcome back) to Mathematics for Elementary Education 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. Elementary school teachers must understand how multiplication gives rise to exponents and how to represent, interpret, and compute exponents from problem situations. They must also understand how to represent practical situations using algebraic and fractional expressions, and verbally interpret graphs of functions. They have to know basic concepts of probability theory. This course covers conceptual and practical notions of exponents and radicals; algebraic and rational functions, algebraic equations and inequalities, systems of linear equations, polynomial, exponential, and logarithmic functions. Notions of probability.

I.   **Learning Objectives:**
1. To reason about algebra and change: To conceptually understand and correctly perform algebraic operations, solve algebraic equations of degree two, perform operations with exponents and radicals, sketch graphs of certain polynomial, exponential and logarithmic functions.
2. To describe relationships among time, distance, and rates.
3. To understand inequalities involving linear functions.
4. To quantify uncertainty in various formats: To understand and calculate basic notions of probability, including combinations, permutations, probability of one and/or another event and conditional probability.
5. To write functions when given data in various formats; represent, and interpret data in more than one variable.
6. To solve systems of equations with multiple methods (e.g., graphing, algebraic, quantitative reasoning)
7. To discuss mathematical concepts in written and oral forms.
8. To utilize manipulatives to understand and demonstrate mathematical concepts.
9. To recognize and describe connections among mathematical concepts involving algebra, data analysis, and probability.

II.   **Textbook:** <u>Reconceptualizing Mathematics</u> **3ʳᵈ Edition** by Sowder, Sowder, and Nickerson, W.H. Freeman, 2017. (Loose-Leaf preferred)
- This book provides activities, discussion ideas, and questions that stimulate a deep level of thinking. 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 <u>multiple pages should be stapled</u> (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, meaning 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.
  - o **Exam 1: Monday, September 16, 2019 from 6:30-7:30pm in RHPH 164**
  - o **Exam 2: Monday, October 21, 2019 from 6:30-7:30pm in RHPH 164**
  - o **Exam 3: Monday, November 18, 2019 from 8-9pm in RHPH 164**
  - o 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 (see contact info on page 1) 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**: **If you're struggling and need mental health services -** 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.
- Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: **drc@purdue.edu** or by phone: 765-494-1247.
- **For students certified by ODOS adaptive services**
  o 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.
  o In the event that you want to be certified by the DRC, we encourage you to review the procedures prior to being certified.
  o 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**
  o 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 13800   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		Lesson 10		Lesson 11
Week 5 09/16-09/20	Review Exam I		No Class		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					

- o **Exam 1: Monday, September 16, 2019 from 6:30-7:30pm in RHPH 164**
- o **Exam 2: Monday, October 21, 2019 from 6:30-7:30pm in RHPH 164**
- o **Exam 3: Monday, November 18, 2019 from 8-9pm in RHPH 164**

Math 13800   **Assignment Sheet**   **Fall 2019**

Text: <u>Reconceptualizing Mathematics</u>, 3rd Edition by Sowder, Sowder, & Nickerson. W.H. Freeman, 2017. (Loose-Leaf preferred)
Follow instructions written here in addition to instructions in the text. All documents referenced for printing can be found on Blackboard

Lesson	Section	Page	*Topic*	**Problems**
1	12.1/ 12.2	p. 263 & 270	*Algebraic reasoning in elementary school/Numerical patterns and algebra*	p. 263: #1aceg, 5b, 6, 7, 8, 9, 14, 15 p. 270: #1b, 1defgh,(Write a function rule for each of these), 2a, 3a, 4ac
2	12.3	p. 278	*Functions and algebra*	1, 5, 7, 10, 12bd, 20 ***Print out and bring worksheet for L3.***
3	12.4	p. 288	*Algebra as generalized arithmetic*	1, 2, 4, 5, 6, 7, 8, 12c, 13, 17, 18ac
4	12.5/6	p. 296	*Algebraic reasoning about quantities/Issues for learning: NAEP*	2, 4bc, 5, 11, 12, 14b, 15 p. 300: What is NAEP? Do items 1 & 4 and read pp.300-301
5	13.1	p. 307	*Using graphs and algebra to show quantitative relationships*	3, 4, 6, 7, 10
Note: Please print off or buy graph paper. Bring some to class and also use it for your homework unless you are making qualitative graphs. Please bring a ruler to class.				
6	13.2	p. 316	*Understanding slope*	1abde, 5, 6, 9, 10 *You will need 4 sheets of graph paper for the next class.*
7	13.4	p. 330	*Nonlinear functions*	1, 2, 3, 4a, 4b*, 6* (*Make a table.), supplementary ex 1a, Use graph paper and negative & positive *x*-values for supplementary 1d. Print off Lesson Materials for grades 6-8 "Patterns and Functions" – See BB
8	13.5/NCTM Illuminations		*Issues for learning: Algebra in the elementary grades*	Assignment #8: Worksheet Read p. 332-3: What grade do students solve two-step equations in CCSSM? Print off Lesson Materials for grades 6-8 "One grain of Rice" and for grades 9-12 "Drug Filtering" – See BB
9	NCTM Illuminations		*NCTM Illuminations*	Assignment #9: Worksheet

10		Inverse & Logarithmic Functions	*Inverse & Logarithmic Functions*	Assignment #10: Worksheet
11	14.1	p. 339	*Distance-time and position-time graphs*	2 (Label the 5 parts of the graph A, B, C, D, E. Label the 5 parts of your story and the 5 parts of your new graph with the same letters.), 3, 4, 9(Give answer in hours and minutes.), 10ab

Exam 1: Monday, September 16, 2019 from 6:30-7:30pm in RHPH 164

12	14.3	p. 348	*Graphs of speed against time*	2(Use the negative speeds.), 5, 6bd, 7b, 8, 9c, 10ab
13	14.4/ 14.5	p. 353 & 360	*Interpreting graphs/Common graphing errors*	p. 353: 1ab (Copy graph and explain.), 3, 4ab, 6, 7 p. 360: Activity 11 #2, 3
14	15.1	p. 365	*Finding linear equations*	3, 5, 7, 9, 11, 13, 16, 18, 19, 20bd, 21, 22bd
15	15.2	p. 372	*Solving two linear equations in two variables*	6, 9, 12, 17, 21, 22, 23, 25, 27a, 30
16	15.3	p. 380	*Different approaches to problems*	1*, 6, 7*, 11* (*Make graphs large enough to fill one side of a page of graph paper. Note that instructions for #7, 11 are at the bottom of page 381.)
17	15.4	p. 386	*Average speed and weighted averages*	1, 2, 4a*, 5, 9, 12* (*Use an entire side of graph paper for each.)
18	15.5 & 15.6	p. 392 & 397	*More about functions/Topics in algebra*	p. 392: 1c, 2bc, 3, 4 (Break down into a combination of two function machines.), 10 (Do only $3 \times 4 \times 6$.) p. 397: 2, 3, 4f
19	27.1	p. 646	*Understanding chance events*	1abcd, 2, 4, 5, 6
20	27.2/4	p. 654	*Methods of assigning probabilities/Research on the understanding of probability*	3, 4, 5, 6, 7, 8, 9bd, 13abdf, 15ab, 24a, 26 p. 665 "Think About"
21	28.1	p. 672	*Tree diagrams and lists for multistep experiments*	1, 2, 3, 7, 9
22	28.2	p. 676	*Probability of one event or another event*	2, 4, 6, 8, 10, 13

Exam 2: Monday, October 21, 2019 from 6:30-7:30pm in RHPH 164

23	28.3	p. 681	*Probability of one even and another event*	3, 6abcd, 7, 8, 10, 11, 12
24	28.4	p. 688	*Conditional probability*	2, 4, 6, 7, 9, 11
25	29.1 & 29.2	p. 696 & 702	*What are statistics?/Sampling: The why and the how*	p. 696: #2, 3; p. 702: 3, 4, 5, 6, 8, 9 *Please bring a compass and protractor to the next class. Have graph paper and unlined paper with you.*
26	29.4 & 30.1	p. 709 & 718	*Types of data/Representing categorical data*	p. 709: 1, 2, 3 p. 718: 2a (Show arithmetic with % to nearest 0.1 & angle to nearest degree.), 2b*, 3* (*Use whole side of graph paper.), 4 and 5 – Print out from Excel, 6, 7, 8bc.
27	30.2	p. 726	*Representing and interpreting measurement data*	2a, 3, 4, 5, 7 (Make a histogram by hand. Use 0-4, 5-9, 10-14, etc.)
28	30.3	p. 734	*Examining the spread of data*	3, 4*, 5*abcde (*Make up a data set when possible.), 6, 9
29	30.4	p. 742	*Measures of center*	1, 2 (Write data sets for each.), 3, 5, 9, 11, 13, 15, 16
30	30.5	p. 749	*Deviations from the mean as measures of spread*	1 (Do work by hand.), 2, 5, 8a(Subtract 5.), b(Divide by 5.). Use Excel or a calculator to do the calculations for problems 5 and 8. Do the standard deviation by hand for this set of numbers: 2, 3, 7, 9, 10, 11
31	30.6	p. 757	*Examining distributions*	1ab (Use a line plot.), 2, 3, 5, 6a (Use a line plot.)

Exam 3: Monday, November 18, 2019 from 8-9pm in RHPH 164

32	30.6 & 30.7	p. 758 & 762	*Examining distributions/ Understanding the mean*	p. 758: 4, 8, 9, 10, 11a(Show z-scores.), add part c: 400 six-year-olds: How many are taller than 48.6 in?; How many are shorter than 44.4 inches?, 13, 14, 16 p. 762: 1, 2
33	33.1	p. 808	*Expected value*	1, 2(Refer to the table on p.672, & make a new table of <u>sums.</u>), 3, 4, 6, 7, 8, 9
34	33.2	p. 815	*Permutations and combinations*	1, 2, 4ab, 5ab, 6b, 9
35	33.2	p. 815	*Permutations and combinations*	10, 11, 12, 13, 16, 17

Syllabus is subject to change with notification from the instructor.