Math 13900 Mathematics for Elementary Education III Fall 2024

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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. Geometric, measurement and spatial reasoning in one, two and three dimensions as the basis for elementary school geometry. Metric and non-metric geometry, transformation geometry.

I. Learning Objectives:

1. **To approach mathematics from both a teacher and student perspective in the content areas of geometry and measurement through the following:**
   - i. Analyze and evaluate their own understanding and children's understanding of mathematics in the content areas of geometry and measurement.
   - ii. Anticipate multiple methods (correct and incorrect) for arriving at given conclusions involving geometry and measurement concepts.
   - iii. To create and/or select appropriate problems for elementary children when given geometry and measurement concepts.
   - iv. To evaluate mathematical tasks with or without student work for mathematical potential by discussing mathematical concepts related to geometry and measurement in written and oral forms.
   - v. To utilize manipulatives and models to demonstrate procedural and conceptual understanding of mathematical concepts.

2. **To reason about geometry and be able to:**
   - i. Differentiate within and among various polygons and other 2-D shapes based on various attributes (e.g., regularity, concavity).
   - ii. Create a hierarchy of polygons (e.g., quadrilaterals, triangles).
   - iii. Create multiple representations of 3-D figures (e.g., isometric, orthographic, nets) and compare properties among solids.
   - iv. Create constructions with straightedge and compass that include but are not limited to: angle bisectors, perpendicular bisectors, angle copies, midpoints.
   - v. Recognize, draw, and mathematically justify shapes that have symmetry and could tessellate the plane (regular and semi-regular tessellations), naming them with proper notation.
3. **To reason about measurement and be able to:**

i. Determine area of plane figures, with the ability to prove the area formulas of parallelograms, triangles, and describe elementary methods to show the formulas.
ii. Calculate surface area and volume of solid figures in various representations and justify mathematical formulas for those.
iii. Find the sum of the measures of the interior angles of a polygon in multiple ways, supporting conceptual understanding with drawings.
iv. Quantify other types of measurement (e.g., purity, weighted averages) and use models to find values (e.g., double number line)

4. To reason about angles and lines and be able to:

i. Define angle in at least two ways, determine and estimate angle measures with traditional and alternate methods (e.g., using pattern blocks).
ii. Use properties of lines (e.g., parallel, perpendicular) and angles (e.g., complementary, supplementary) to find unknown values or prove properties.
iii. Construct and describe triangles based on various properties (e.g., angle size, side length).
iv. Describe attributes of quadrilaterals and use properties to define them.

II. Textbook & Other Materials: 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 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 understanding the materials for class discussion.

Ang-Legs

- We will use manipulatives (i.e., attribute blocks, pattern blocks, cubes, Ang-Legs, GeoBoards) to help us understand or demonstrate concepts. These manipulatives will appeal to different learning styles, and you may find them useful in clarifying ideas. You will need to purchase a set of Ang-Legs (at least 48 pieces, can be 74 pieces) before Lesson 4.

Compass & Ruler – You will need a both this semester; please purchase them (the safe-T style compasses are great to use as a ruler, compass, and protractor!)

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 and Excel sheet for determining your grade are 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 for every lesson on Brightspace, and it is due by 3pm EST on the day of the next lesson. *Late homework is not accepted.* Your 4 lowest homework scores will be dropped. Correct answers without work or with incorrect work may not receive credit. Only a few problems on each assignment are graded. The instructor will decide which problems or parts of problems the grader will grade. 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.

- **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.

- **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 Monday, 9/16/24 from 6:30-7:30 PM in BRNG 2280**
    - **Exam II is Thursday, 10/17/24 from 6:30-7:30 PM in BRNG 2280**
    - **Exam III is Thursday, 11/14/24 from 6:30-7:30 PM in BRNG 2280**
        - Put these dates and times on your calendar. Make-up exams will be given only if you have a valid excuse *with documentation* and Jennifer Fitch 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 will result in a grade penalty.

Course grades are based on the following scale:

%	Grade	Points
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 or assignments.

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.

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.
- **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 covered.
- **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 unless otherwise**

instructed. 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. Information will be available on Brightspace. 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:** 11/19/24

V. 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 http://www.purdue.edu/odos for drop-in hours (M-F 8am-5pm).
  - **CAPS**: 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 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.
- **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.
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MA 139 Calendar Spring 2024

	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 1**		No Class		Lesson 12
Week 6 09/23-09/27	Lesson 13		Lesson 14		Lesson 15
Week 7 09/30-10/04	Lesson 16		Lesson 17		Lesson 18
Week 8 10/07-10/11	No Class Fall Break	Fall Break	Lesson 19		Lesson 20
Week 9 10/14-10/18	Lesson 21		Review	**Exam 2**	No Class
Week 10 10/21-10/25	Lesson 22		Lesson 23		Lesson 24
Week 11 10/28-11/01	Lesson 25		Lesson 26		Lesson 27
Week 12 11/04-11/08	Lesson 28		Lesson 29		Lesson 30
Week 13 11/11-11/15	Lesson 31		Review	**Exam 3**	No Class
Week 14 11/18-11/22	Lesson 32		Lesson 33		Lesson 34
Week 15 11/25-11/29	Lesson 35		No Class	Thanksgiving Break	No Class
Week 16 12/01-12/06	No Class		No Class		Review
Final Exam Week 12/9 - 12/14					

Exam I is Monday, 9/16/24 from 6:30-7:30 PM in BRNG 2280
Exam II is Thursday, 10/17/24 from 6:30-7:30 PM in BRNG 2280
Exam III is Thursday, 11/14/24 from 6:30-7:30 PM in BRNG 2280

Math 13900 **Assignment Sheet** **Fall 2024**

Text: 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. Follow instructions written here in addition to instructions in the text.

Lesson	Section	Title	Page	Problems
1		*Intro to Attributes/Pre-Test*	Packet	1, 2 (use the set of 30 pieces from the packet – including rectangles), 3, 4
2		*Attributes*	Packet	7, 10, 12, 13a, 15
3		*Angles Part I*	Packet	1, 2, 3ac, 4, 5
4		*Angles Part II*	Packet	7, 8, 9ac, 10, 12, 13, 14
5		*Parallel and Intersecting Lines*	Packet	1bf, 4, 5, 8, 9, 11ac, 12abcd (just 2 pairs of each)
6		*Polygons*	Packet	2, 3, 4, 5c, 6, 8acd, 9, 10, 11ac
7		*Classifying Triangles*	Packet	1a, 2, 3, 6, 7, 9, 12
8		*Constructing Triangles Part I*	Packet	1, 2, 4, 5
9		*Constructing Triangles Part II*	Packet	6, 7, 9, 11, 12, 13
10		*Classifying Quadrilaterals Part I*	Packet	1, 2, 3ac, 4aceg, 6, 7aceg, 9 (Riddle 1 only)
11		*Classifying Quadrilaterals Part II*	Packet	3bd, 4bdfh, 5b, 7bdf, 8, 9 (Riddle 2 only), 12
Exam I is Monday, 9/16/24 from 6:30-7:30 PM in BRNG 2280				
12		*Interior Angles of Polygons*	Packet	3, 5, 6, 7, 9, 13, 15
13		*Tessellations*	Packet	2 (use at least ½ sheet of unlined paper), 3 (use at least ½ sheet of unlined paper), 6a, 7, 8
14		*Visualization Part I*	Packet	2, 3a, 4a, 7ac, 8
15		*Prisms*	Packet	1, 2, 3 (draw just 2 of them), 4, 5a, 6, 8ad, 11 *Bring isometric dot paper for Lesson 16*
16	17.1	*Shoeboxes have faces and nets!*	p. 381	1, 2, 3, 4, 5ab (Draw front, right, top, and left for each.), 6ab, 7 (go to the website listed but do not click

				on interactives – instead type "isometric drawing tool" in the search box that comes up); Also do p. 382 Activity 3 – follow the instructions *Bring isometric dot paper for Lesson 17*
17	17.3	*Representing and visualizing polyhedra*	p. 384 p. 391	#1, 11, 14 #3, 4abc, 5cd, 7, 8, 10ac, 16a, 17a, 19bc *Bring isometric dot paper for Lesson 18*
18	17.4	*Congruent polyhedra*	p. 395	1(Use isometric dot paper; Shade 2 cubes to right in I and 2 cubes on top in J), 3, 4, 6, 9(Use unlined paper to draw a LARGE quadrilateral with no equal sides or angles, each side length 5 cm or greater. Draw the second figure upside down.)
19	18.1	*Symmetry of shapes in a plane*	p. 405	1, 2, 3, 4bdf, 5bde, 6, 7bd, 8bd, 11, 12
20	22.6 & 23.1	*Issues for learning: Promoting visualization in the curriculum*	p. 484 & 489	p. 484: 1, 2, 4(Label the pictures 1, 2, 3 for reference.), 6 p. 489: 1, 3
21	23.2	*Conceptualizing & Measuring Length*	p. 494	1bdfhj, 2bdfhj, 4bcfhjln, 5bdf, 6b, 7, 8bcd, 9efgh, 10, 12(no exp), 13, 14acd, 15, 16bdfh, 17bd, 18bd, 19, 22bdf, 23
Exam II is Thursday, 10/17/24 from 6:30-7:30 PM in BRNG 2280				
22	23.3 & 23.4	*Further Exploration of Angles*	p. 502	1c, 2, 3bdfh, 5ac, 9b, 11, 12bdf, 13defg, 14de, 18, 21a, 22, 26bdf, 27bdf, 30
23	21.1	*Constructions*	p. 449	#1, 5cd, 6, 8xy, 9, 12, 19, 20bc
24		*Area Concepts*	Packet	1, 2ace, 3ae, 4, 6a, 8, 10
25		*Area and Perimeter*	Packet	1, 3, 5, 8, 10
26		*Parallelograms, Triangles, & Trapezoids*	Packet	Parallelograms and Triangles: #1, 2, 4ace, 5ab, 7 Trapezoids: #1, 2, 3
27	24.1	*Area and surface area*	p. 517	5ab, 6bdfh, 7b, 9bd, 11bd, 12acegi, 13a, 14ab, 15a, 16, 21a, 28d
28		*Surface Area I/II*	Packet p. 517	#1, 2, 3 #5c, 9ac, 12bdfhj, 13b, 14b, 17, 19ab, 26, 28abce
29		*Volume*	Packet	1, 2a, 3, 4, 7, 8, 10, 11, 12
30	24.2	*Volume*	p. 523	1bdfjl, 2bd, 3bdf, 4ac, 6, 7bd, 8bc, 9b, 10bd, 12, 14b, 17, 18bdfhjl, 20abd

31	24.3 & 25.1	*Issues for learning: measurement of area and volume*	p. 529 & 536	p. 529: 1, 2 p. 536: 2bd, 3, 4b, 5, 6, 8b, 9bce, 14, 16ab, 17, 18acegi
Exam III is Thursday, 11/14/24 from 6:30-7:30 PM in BRNG 2280				
32	25.1	*Circumference, area, and surface area formulas*	p. 538	18ijkl, 19b, 21acfg, 23ab, 24b, 25bd, 26, 29, 35, 37(let r = 10)
33		*Circles*	Packet p. 536	1, 2, 3, 4 p. 536 #2c, 10, 18k
34	26.2	*Some other kinds of measurement*	p. 555 p. 561	2, 3adf(Give exact answer only.), 4bd, 7, 8, 9 (Hint: draw the net ☺) 4bc, 9, 10ac, 11, 12, 13ab, 16ab, 18a, 20, 23bde, 27b *Download GLOBE Observer app for next class.*
35		*GLOBE/Biometry*	Wkst	Read Article on Brightspace and complete the Reflection Questions

Syllabus is subject to change with notification from the instructor.