Math 112: Mathematics for Elementary and Middle School Teachers II
Spring 2016   Section 501   CRN 22908
Syllabus

Instructor: Elaine Clark   **Office:** Academic Bldg. Room 142A

Office Hours:
> **Face-to-Face:** Monday 10:30 AM to 2:45 PM, Wednesday 3:00 to 4:30 PM, Tuesday and Thursday 1:30 to 2:45 PM
> **Online:** Monday 10:30 AM to 1:00 PM and Wednesday 3:00 to 4:30 PM, and by appointment. We will use Skype for Business for online office hours. I can be available in the evenings and sometimes on Sundays for online office hours but you will need to schedule ahead for these.
> **Other hours by appointment**

Phone: 925-8618 (my office, yes I have voice mail), 925-8600 (Academic office)
email: ewclark@unm.edu or send a message in BbLearn. I will check email Monday through Friday afternoon unless I am out of town. Expect a response within 24 hours to email messages sent Sunday afternoon through Thursday evening. If you send me a message on Friday afternoon through Sunday I may not see it until Monday.

Course Prerequisite
In order for you to enroll in this course you need to have passed Math 111 with a C or better. If you have not met this prerequisite you will be dropped from the course.

Course Overview
> In this course we will continue our exploration of the underpinnings of mathematics, finishing our work on division of real numbers. We will then delve into the meanings and application of measurement and geometry. In particular we will be concerned with questions like:
> - What is division? Where do we use it? Why do the various algorithms work?
> - What are we doing when we measure something? Why do we measure things the way we do? What other procedures would work just as well?
> - What is geometry? How do the structures of geometry lead us to an understanding of the world around us?

What is the purpose of this course?
The author of our primary text, Sybilla Beckmann, says in the foreword to our book, "It is easy to think that elementary school mathematics is simple and that it shouldn't require college-level study in order to teach it well. But to teach mathematics well, teachers must know more than just how to carry out basic mathematical procedures; they must be able to explain why mathematics works the way it does."

So this course is all about what and why – the structure of mathematics. In particular we will *deconstruct* division of real numbers, geometry, and measurement, look below the surface of the

familiar algorithms, and *reconstruct* these mathematical concepts, based on models and representations, and an understanding of the structure of mathematics. Thus this course is not about doing so much as about explaining.

Course Learning Objectives
This course develops concepts of division; length, area and volume; systems of measurement; and connections to coordinate geometry. Problem solving is emphasized throughout. **Chapters: 6, 10, 11, 12, 13, and 14 out of our text by Sybilla Beckmann and Chapters 2, 3, and 4 in the Pearson Custom booklet.** A complete list of Student Learning Objectives for this course is at the end of the syllabus.

Text and Tools - Required
- The primary text for this course (and for Math 215) is "Mathematics for Elementary Teachers," 4th Edition, by Sybilla Beckmann. We will cover most of Chapters 10 through 13.
- As a second text you also need to purchase "Pearson Custom Education: Elementary and Middle School Mathematics" UNM-Valencia Custom Ed. This is a selection of four chapters from the book "Elementary and Middle School Mathematics: Teaching Developmentally" 7th Edition, by John a. Van de Walle and others. We will use part of Chapter 2 and all of Chapters 3 and 4 in Math 112.

In addition, you should purchase the following tools:
- Ruler (with both American Standard and Metric units)
- Grid or graph paper
- Colored pencils
- Paper, pencil and eraser.

Internet access is required. I will be posting all homework assignments, projects, as well as many additional readings, messages, and other communications in BbLearn.

Course Grade
Your Course Grade will come from:
- Homework assignments   25%
- In-class participation   15%
- Unit tests   30%
- Projects/papers   15%
- Portfolio   5%
- Final assessment   10%

Check BbLearn regularly for postings or changes of assignments and due dates.

Depending on the grading option you have chosen, your final course grade will be determined as follows:
- You will receive an A in the course if you have a weighted average of 90% or better.
- You will receive a B in the course if you have a weighted average of 80% to 89%.
- You will receive a C in the course if you have a weighted average of 70% to 79%.

- You will receive a D in the course if you have a weighted average of 50% to 69%.
- You will receive an F in the course if you have a weighted average less than 50%.
- You will receive a CR in the course if you have a weighted average of at least 70%.
- You will receive an NC in the course if you have a weighted average less than 70%.

I do not usually give a + grade unless you are on the borderline between two letters in which case I may give the C+ for example instead of the B-. I give the D+ instead of the C- because a C- is not a passing grade. **You must earn a C or better to pass this course.**

You can resubmit any graded assignment for a higher score if you would like, this includes all but the last unit test, but resubmissions are due within a week of when you received it back graded. Due dates for all assignments are on the preliminary schedule. Be sure to check in BbLearn in case there is a change in due date.

In-Class Activities and Attendance – 15% of your course grade
I will take roll each day and your attendance will count in this portion of your grade. Also, we will spend many class sessions with some sort of problem solving exercise or activity that you will complete in groups. These activities are designed to build on what you have read and what we have discussed in class. If you do not do the assigned reading for that class you will not fully understand the purpose of the activities. If you miss class you can still do the activity for that day but it is up to you to ask what we did in class.

Also, for some of the sections I will ask each of you to take turns presenting the material for the day to the best of your understanding. The homework assignments will aid you in presenting and understanding the material so you will need to complete the homework on time. Do not skip the homework just because it is not your time to present, be prepared so you can help your classmates build understanding of the material. Of course, I will not let you flounder or grope around in the dark. I will be nearby as an aid and a support. Also, do not be afraid to say, "I didn't really understand this part." That is where everyone will pitch in to make sense of what is in the texts. **It is imperative that you come to class prepared.**

If you miss three (3) consecutive class periods, you may be dropped from the course. Do not assume I will drop you, especially after the third week of class, but be aware it is an option I may exercise if warranted. If you miss any classes in the first week of a closed section, you *will* be dropped. If you show no or little progress, have not purchased your book, or have not made other arrangements for completing the homework by the end of the third week of class you *will* be dropped.

The last day to drop without being assigned a grade is Friday, February 5 by 5:00 pm.

Homework – 25% of your course grade
Because we focus on the underpinnings of mathematics, the why, rather than just computations, you will be asked to do more reading and writing than calculation.

Your homework will be two types:
- Questions and problem after sections of the reading, and,

- Class Activities that go with the reading (these are printed in the back portion of your book). Ideally you should do the class activities *while* you are reading the section.

I will give extensions for three assignments without need for documentation, meaning you can turn them in one class period late for full credit. ***I will not accept original assignments that are more than a week late.***

Unit Tests – 30% of your course grade
There will be three unit tests which will collectively count for 30% of your course grade. These will be take-home rather than in-class tests so that you have time to think about your answers. I encourage you to work in study groups outside of class, but the final product you turn in for your tests must demonstrate your own, individual understanding of the material, not simply a parroting of the group consensus. If you do not show your own work and thought processes on the test, you may not receive credit. If you simply copy answers directly from the board when we review the test, you will receive at most half credit for the question. For the take-home tests you will receive no credit if you copy from a classmate, and the person you copy from also risks receiving no credit. Do not share your test papers! You MUST demonstrate that *you* have thought about the explanations given in class and have made them your own. Any papers for which I suspect cheating or copying, ***both parties*** will receive no credit.

Projects and Papers: 15% of your course grade
You will be assigned at least two term papers or projects to complete during the semester, each worth 100 points. One of these will have to do with Pi Day and the number Pi. For the projects you may work with a partner or in a group of no more than four people, but the term papers must be completed individually. I will be giving you more information about each of these separately. ***Term papers must be completed individually***.

Time to allot for out-of-class assignments: Plan right now to spend an average of 9 hours per week outside of class doing homework and working on your unit tests. This time cannot all be lumped on the weekend; you will need to spend some time during the week as well. There is no guarantee you will pass if you dedicate this amount of time, you still need to demonstrate understanding of the material and use your time wisely, but you may not pass if you don't.

Portfolio – 5% of your course grade
Please collect all assignments, in-class and out-of-class, in a portfolio. You will be asked to organize these assignments in a way that is meaningful to you. At the end of the semester you will also be asked to complete a final self-assessment of your work based on these assignments.

Final Assessment – 10% of your course grade
During finals week you will be asked to present a lesson based on a mathematical concept pertinent to the course. Details for this will be given separately

Tools for Success
We have a tutor assigned for this course and I will post more information about her in BbLearn.

Study groups are a good option. But again, do not copy assignments from each other that are to be done individually.

I have posted face-to-face office hours and am also available online. If the posted times are not convenient for you, let me know and we can schedule a mutually agreeable time. Let me know if you plan to attend office hours so I don't run off to the copy room or something.

Plagiarism and Not Doing Your Own Work
It's a bad idea to plagiarize or to have other people do your work for you. Refer to the UNM-Valencia Catalog for the campus policy on "Dishonesty in Academic Matters." If I receive assignments from two or more people that are supposed to be done individually (for example, the homework assignments), and that are basically identical, you will *all* receive a zero for that assignment.

Classroom Behavior
Texting during class is not permitted. If you have a cell phone it must be silenced or set to vibrate. If you must take a call, please step out of the classroom even during group work. Some people like to have a laptop, netbook, I-pad, or tablet in class to take notes and look up information on the Internet. As long as your use of a computer device does not disturb those around you, and as long as what you are doing is pertinent to the class, this is acceptable. If, however, you are doing something on the computer that does not have to do with what is happening in class, I will ask you to put the device away.

No food is allowed in the classroom and only drinks that are in closed containers.

If you exhibit any behavior that is disruptive or I consider as endangering myself or other students, you will be asked to leave and I will report the incident to the Dean.

ADA and Students with Disabilities
If you have a documented disability, please provide me with a copy of your letter from Equal Access Services as soon as possible to ensure that your accommodations are provided in a timely manner. The person to call for evaluation and documentation is Jeanne Lujan at (505)925-8910. Also, here is their web site so you can check out accommodations and support that is available to you: http://www.unm.edu/~vcadvise/equalaccess.htm .

Title IX Statement
In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees." This designation requires that any report made to a faculty member, TA, or GA regarding sexual misconduct or gender discrimination must be reported to the Office of Equal Opportunity and the Title IX Coordinator. For more information on the campus policy regarding sexual misconduct see:
https://policy.unm.edu/university-policies/2000/2740.html

Student Learning Outcomes for Math 112

<u>Course Goal #1</u>: Understand concepts related to division.

    <u>SLO 1</u>**:** Explain procedures for division with base-10 numbers using correct mathematical terminology and notation.

    <u>SLO 2</u>**:** Explain procedures for division with fractions using correct mathematical terminology and notation.

<u>Course Goal # 2</u>: Represent geometric concepts.

    <u>SLO 1</u>**:** Draw points, lines, line segments, rays, angles, and perpendicular and parallel lines.

    <u>SLO 2</u>**:** Build and draw two- and three-dimensional figures from a description or with given properties.

    <u>SLO 3</u>**:** Draw the image of a polygon under a specified transformation.

<u>Course Goal # 3</u>: Understand and use the principles of measurement.

    <u>SLO 1</u>**:** Explain what it means to measure length, area, volume, and time. Measure objects with appropriate tools and by iterating standard and non-standard units.

    <u>SLO 2</u>**:** Describe the metric system and the US system and convert units within a system.

    <u>SLO 3</u>**:** Estimate and measure angles and relate them to benchmark angles.

    <u>SLO 4</u>**:** Decompose polygonal regions into simpler polygons to find the area.

<u>Course Goal # 4</u>: Communicate about geometric concepts.

    <u>SLO 1</u>**:** Explain why multiplication applies to the area of a rectangle and the volume of a rectangular prism. Explain perimeter and area formulas for parallelograms and triangles.

    <u>SLO 2</u>**:** Identify and describe rectangular solids, prisms and other polyhedra, cylinders, and spheres using correct mathematical terminology and notation.

<u>Course Goal # 5</u>: Apply measurement and geometric concepts in contexts.

    <u>SLO 1</u>**:** Solve problems involving measurements of time, length, area, volume, and mass.

    <u>SLO 2</u>**:** Apply perimeter and area formulas for rectangles, parallelograms, and triangles and volume of rectangular prisms.

    <u>SLO 3</u>**:** Solve problems involving congruent and similar figures.

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Preliminary Schedule (subject to change as needed)

Week	Date	Day	Topic(s)	To Complete at Home	Will Do In Class
Martin Luther King Holiday, Monday, January 18					
1	1/19	Tues.	Introduction, Review Multiplication, Intro. To Division		Activities with Multiplication and Division
	1/21	Thurs.	Interp. of Division & Problem Structure	**READ**: Beckmann, Sect. 6.1 **Turn in:** Act. 6A, p. CA-108	Act. 6B, 6C, Problem Structures
2	1/26	Tues.	Division and Fractions; Remainders	**READ:** Beckmann, Sect. 6.2 **Turn in:** S.6.1 p. 227 #3,4; Activity 6D, p. CA-112	Division with zero, Act. 6E
	1/28	Thurs.	Division Algorithms	**READ:** Beckmann, Sect. 6.3 **Turn in:** S. 6.2 p. 233 #3,4; Activity 6G, p. CA-117	Act. 6F, 6J Alternative Algorithms
3	2/2	Tues.	Dividing Fractions "How Many Groups?"	**READ:** Beckmann, Sect. 6.4 **READ:** Pearson Cust. p. 39-40 **Turn in:** S. 6.3 p. 246 #1,5; Pearson Cust. P&R p. 40	Act. 6N, 6M Common Denominator Algorithm
	2/4	Thurs.	Divide Fractions: "How Many in One Group?"	**READ:** Beckmann, Sect. 6.5 **READ:** Pearson Cust. p. 37-38 **Turn in:** S. 6.4 p. 255 #1,6,10 Pearson Cust. P&R p. 38	Act. 6P Problems from Pearson Custom
Last day to drop without a grade is February 5 by 5:00 PM					
4	2/9	Tues.	Review Dividing Fractions; Dividing Integers	**Turn in:** S.6.5 p. 263 #7,8	Hand out in Class **Begin Unit 1 Test**
	2/11	Thurs.	A Taste of Toplogy	**READ:** Handout posted on BbLearn	Mobius Valentine and other activities
5	2/16	Tues.	Fundamentals of Measurement	**READ:** Beckmann, Sect. 11.1 **READ:** Pearson Cust. p. 45-49 **Turn in:** Act. 11A, p. CA-261	Act. 11C **Unit 1 Test due**
	2/18	Thurs.	Measurement and Dimension, Length	**READ:** Beckmann, Sect. 11.2 **READ**: Pearson Cust. p. 49-52 **Turn in:** S. 11.1 p. 492 #1,2; Act. 19.6 p. 51	Act. 11D Make Your Own Ruler
6	2/23	Tues.	Area	**READ**: Beckmann, Sect. 12.7 **READ:** Pearson Cust p. 52-55 **Turn in:** S. 11.2 p. 498 #4	Area informal units; why square units? Irregular shapes
	2/25	Thurs.	Length and Area	Out-of-Class Measurement Project	No class on this day
7	3/1	Tues.	Area; Moving and Additivity	**READ:** Beck. S. 12.1, 12.2 Activity 12A #1,2, p. CA-272	Act. 11A, 12A, 12B **Unit 1 Test Corrected** **Project 1 due**

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Week	Date	Day	Topic(s)	To Complete at Home	Will Do In Class
7 cont.	3/3	Thurs.	Formulas for Area	**READ:** Beck. S. 12.3, 12.4 **READ:** Pearson Cust p. 67-70 **Turn in:** S. 12.2 p. 522 #3; Act. 12D, p. CA-276	Developing area formulas
8	3/8	Tues.	Circles and Spheres	**READ:** Beckmann, Sect. 10.4 **Turn in:** S. 12.4 p. 537 #9; Activity 10N, p. CA-245	Act. 10O
	3/10	Thurs.	**Pi Day Celebration!**		**Term Paper 2 due**
9			**Spring Break Monday, 03/014 thru Sunday, 03/20**		
10	3/22	Tues.	Measurements for Circles; More Pi	**READ:** Beckmann, Sect. 12.6 **Turn in:** S. 10.4 p. 465 #2	Act. 12M **Midterm Port. Check**
	3/24	Thurs.	Area/Perimeter	**READ:** Beckmann, Sect. 12.8 **READ:** Pearson Cust p. 56 **Turn in:** S. 12.6 p. 548 #3; Activity 12R, p. CA-290	Activities comparing area and perimeter
11	3/29	Tues.	Volume	**READ:** Beckmann, Sect. 13.1 **READ:** Pearson Cust p. 56-58 **Turn in:** S. 12.8 p. 557 #3,4 Activity 13B, p. CA-298	Volume of a box; Volume informal units **Begin Unit 2 Test**
	3/31	Thurs.	Time, Weight, Mass, & Other Measurements	**READ:** Pearson Cust p. 59-61 **Turn in:** S. 13.1 p. 574 #1	one-handed clock, weight in Am. Standard and metric units
12	4/5	Tues.	Geometry: Van Hiele Levels	**READ:** Pearson Cust p. 75-81 Pearson Cust. P&R p. 76	Attribute sorts **Unit 2 Test Due**
	4/7	Thurs.	Shapes and Properties Level 0	**READ:** Beck. S. 10.2, 10.5 **READ:** Pearson Cust p.81-85 **Turn in:** Act. 10R, p. CA-249	Tangram puzzles, What's my shape?
			Choose book for final project		
13	4/12	Tues.	Shapes and Properties Level 1	**READ:** Pearson Cust p. 85-90 **Turn in:** S. 10.2 p. 452 #1; Act. 10T, p. CA251-252	Subdivide shapes; Properties lists; Triangle sort
	4/14	Thurs.	Informal Proofs; Angles	**READ:** Pearson Cust p.91-95 and p. 62-63 **Turn in:** S. 10.5 p. 476 #2,9	Sum of angles in triangle; Angle worksheet with informal units
14	4/19	Tues.	More Informal Proofs	**READ:** Beckmann, Sect. 12.9 **Turn in:** Act. 12U, p. CA-294	Act. 12B; Two polys from one **Unit 2 Test Corrected**

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Week	Date	Day	Topic(s)	To Complete at Home	Will Do In Class
14 cont.	4/21	Thurs.	Symmetry, Congruence	**READ:** Beck. Sects. 14.2,14.3 **Turn in:** S. 12.9 p 563 #1; Activity 14E, p. CA-319; Activity 14G, p. CA-321	Symmetry activities
15	4/26	Tues.	Transformations - Rigid Motions	**READ:** Beck. Sect. 14.1 **READ:** Pears. Cust p.95-100	Transformations; Escher Tesselations
	4/28	Thurs.	Transformations - Dilations and Similarity	**READ:** Beck. Sect. 14.5	Perspective Drawings, Similar figures **Project 3 due**
16	5/3	Mon.			Work on Unit 3 Test
	5/5	Wed.		**Portfolios due**	**Unit 3 Test Due**
5/12			**Final Project Presentations**		