# MATH 1118 Sect. 501

**Mathematics for Elementary and Middle School Teachers I**

Fall 2020

## Instructor Information:

Elaine W. Clark ewclark@unm.edu

I will check email Monday mornings through Thursday afternoons unless there is a university holiday, and usually on Sunday afternoons unless I am out of town. Expect a response within 24 hours to email messages sent Sunday afternoon through Thursday. If you send me a message on Friday or Saturday, expect a message no later than the following Monday.

## Help Sessions:

- Online scheduled help sessions (formerly known as office hours) will be in this Zoom room: https://unm.zoom.us/j/99893124116
- Password to enter Zoom room: OCDsquares
- Hours:
  - Mondays 2:00 to 4:00 PM
  - Tuesdays 12:00 to 2:00 PM
  - Wednesdays 11:30 AM to 1:00 PM
  - Thursdays 10:00 to 11:30 AM
- Other times by appointment
- ***Be sure to check my weekly schedule posted in Learn to make sure I have not changed availability. Occasionally I may have an unexpected or impromptu meeting come up that takes me away from "the office." It is a good idea to let me know you are coming so I don't run off.***

## Course Overview

Sybilla Beckmann, author of the text we will use in the second-semester class said, "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***." (emphasis mine)

This course is about what and why – the structure of mathematics – rather than about how. In particular, we will ***deconstruct*** basic arithmetic, look below the surface of the familiar algorithms, and ***reconstruct*** this arithmetic, based on models and representations. Similarly for basic geometry concepts. Thus, this course is not about doing so much as about explaining. Learning how to effectively explain and use representations will be the main things you will do in this class.

# Contents

## Course Prerequisites

To be eligible for this course you either need to place in based on the approved UNM-Valencia placement or have completed MATH 021/022 or MATH 100 with an RC or better. Be aware that some of you may need to take MATH 1215X as a co-requisite course in order to be eligible for MATH 2118 as your next class.

## Student Learning Outcomes

**Course Goal # 1:** Represent numbers and operations with models.

- **SLO 1:** Use visual models, including physical objects, drawings of counts, lengths, and area, number lines, and symbols to represent numbers and operations, and flexibly move between representations.
- **SLO 2:** Explain the relationship between contexts and the appropriate mathematical operations.

**Course Goal # 2:** Identify and use the deeper structures of arithmetic.

- **SLO 1:** Analyze and perform multiple methods for doing addition, subtraction, multiplication, and division.
- **SLO 2:** Analyze student work, assess the validity of arguments, and identify mathematical misconceptions in mistakes.
- **SLO 3:** Describe and use the relationships between operations to represent and solve problems.
- **SLO4:** Describe and use strategies for mental computation and estimation using fact families, the structure of base-ten numbers, and the properties of arithmetic.

**Course Goal # 3:** Explain concepts in arithmetic.

- **SLO 1:** Explain procedures for doing addition, subtraction, multiplication and division with base-10 numbers using correct mathematical terminology and notation.
- **SLO 3:** Explain why the commutative and associative properties of addition and multiplication and the distributive property of multiplication over addition make sense.
- **SLO 4:** Explain how estimation and rounding work using models and correct mathematical terminology and notation.

**Course Goal # 4:** Explain concepts in geometry.

- **SLO 1:** Describe, using appropriate vocabulary and representations, how points, lines, and angles relate to each other and to applications in the real world.
- **SLO 2**: Explain different ways to classify two-dimensional shapes based on their properties.

These outcomes will not necessarily be addressed sequentially, they are just numbered for ease of reference.

## Text and Tools

- **Required Text:** *Mathematics for Elementary School Teachers* (7th edition) by Bassarear and Moss (***inclusive access through UNM Blackboard Learn***). We will cover topics from chapters 1, 2, 3, 4 and 8. ***If I drop you from the class or***

***you drop yourself, you will still have to pay for access to the book unless you opt out by August 28.***

- **"How to Learn Math: For Students"** During this semester I would also like to complete this free online course through Stanford Online. The link to the course is: https://online.stanford.edu/courses/gse-yeduc115-s-how-learn-math-students You will need to create a profile and verify your login information via an email account. We will do this on the first day of class.
- **Internet and Computer (required):** You will need reliable access to a computer, high-speed internet, and the ability to upload free software to access the online materials. All the programs we use should be fully compatible with mobile devices – phones, tablets, laptops, etc. – but some programs just work better on a computer. You will also need administrative rights to download free software or plug-ins or add-ons on the computer you plan to use for this course, or make arrangements with UNM-Valencia IT to download those programs.
- **UNM Learn (required):** You will need access to Blackboard UNM Learn. This is the primary program we will use for communication in the class. You will use your UNM NetID to log into UNM Learn. You may access it directly via http://learn.unm.edu
- **Adobe Reader (required)** (a free download), preferably the Adobe Acrobat Reader DC version or better. If you have the full Adobe suite or Adobe DC, all the better!
- **Microsoft Office Suite or Compatible (required):** You should be able to use Word, Excel, and PowerPoint or the equivalent if you use Linux-based or Google products. We will also use MS Teams which comes with the MS Office 365 suite available to you as faculty at The University of New Mexico.
- **Paper, Pencil, and Eraser:** Some people can do mathematical calculations in their heads but the purpose of this course is to show and explain all the steps of the calculations you are asked to complete. Also, though some people may be able to do things perfectly the first time, for mathematics it is best to use a pencil. I usually carry along an extra eraser.

## Time for this Course

Plan to spend a minimum of ***6 to 9 hours per week outside of class*** for this class. This time should not all be lumped on the weekend or in one day; you will need to spread out the time you allot to this course.

## Course Grade

As a departure from the standard paradigm, my goal with determining your grade is to move away from the usual points for evaluated work. There is a lot of research out in the world to show that even positive reinforcement with external motivators (good grades for good work) in the long run is ineffective and can actually destroy the intrinsic desire to learn. For example, I provide you a link below to an article "Punished by Rewards? A Conversation with Alfie Kohn" by Ron Brandt in Educational Leadership (Sept. 1995) http://www.ascd.org/publications/educational-leadership/sept95/vol53/num01/Punished-by-Rewards%C2%A2-A-Conversation-with-Alfie-Kohn.aspx .

Unfortunately, I cannot completely depart from assigning you a course grade. I am working on a rubric to determine the grade you will earn based on your attendance, effort, and learning. This will be a contract between each of you and me about how we will agree your grade will be determined. There is no point in me awarding you an A for the course if you used Chegg or some other program on the computer to do your homework for you. Therefore, I want to explore other ways besides the usual written homework and tests for you to demonstrate that you are leaving this class knowing more than when you started this class.

**W grade:** Since most of you are not taking this course for credit, if you decide this is not the semester for you to complete this training course you will need to ask me to remove you from the course. You will not receive any sort of W grade since this class is not tied to the grading system in Banner (there may be some exceptions). If you are signed up in the credit-bearing EDUC 1996, then the W grade is the same as for regular for-credit courses. Since the EDUC 1996 course is "open learning" deadline dates are skewed. Plan to decide to drop in the first week or two in order to avoid the W grade.

**Reasons I will drop you from the course:**

- Student who does not log into Learn and complete course grade contract during the first week of regular classes.
- If you specifically request me to drop you from the course.
- If you have excessive absences without working out an arrangement with me, you ***may*** be dropped from the course. Do not just stop attending and expect me to automatically drop you.

***If you do not log into Learn and complete the course grade contract during the first week of class, you will be dropped.***

## How to Complete Work for This Course

There are some things I want you to complete in this class. Also, the only way to learn mathematics is by doing mathematics, sort of like riding a bicycle. You can watch people riding bicycles all day, but until you get on the bike and find your balance, you won't be able to ride. Here is the list of things I would like you to put your hand to, and that will show up in the rubric for your course grade contracts.

### Show up to class

I will do my best to make coming to class worth your time. I find that a lot of what we do in this class is discuss misunderstandings in mathematics and rethinking those basic skills to build a deeper understanding. You need to be part of that discussion in order to learn and rewire your brain away from incorrect models.

### Work on Homework Problems

Though it is good to think together, it is also important for you to build your own, individual understanding. I will assign some problems for you to struggle with in the homework. Do NOT go get someone else to do these problems for you. If you do not

struggle with the problems, your learning will be short circuited. Try them, pull your hair out, write down your questions, and bring those questions to class.

**How to Learn Math: For Students**

This is a short MOOC that is offered by Stanford University. Through this MOOC we will explore math myths, mindset, and other ways to think about how to learn mathematics.

**Show What You Know**

There are some key concepts we will explore in this class that I definitely want you to have down solidly. In your course grade contract, we will discuss the best way you can demonstrate to me what *you* have learned. If you want to demonstrate what you know with a short video explaining the concept like you would to a child, fine! If you want to demonstrate your understanding in a written format, great! If you want to discuss the questions in an informal, one-to-one chat with me, awesome! I will pose some questions for you and then you will show what you know. This will happen three times during the semester at about the times we would have regularly had exams.

**Discussions**

I would like each of you to create two discussion topics during the course of the semester which we will post in the discussion forum and then have everyone putting in their thoughts. Those topics should be conceptual in nature that can elicit a give-and-take, rather than some sort of computational problem. What concepts in mathematics have had you stumped all your life? What would you like to know more about? I will let you know when to propose your topics. They should be loosely aligned with the topics we are discussing at the time from the text.

**Final Project**

At the end of the semester, during finals week, you will have a chance to present a short lesson on a topic related to one we covered in class. This may be a good time for you to take the part of arithmetic or basic geometry that you have struggled with the most and see if you can "tame that lion." Make it your own, build your understanding. Pick something challenging, not something you already know well. We will all help you figure out where you still need to polish or rethink.

## Working Ahead and Late Assignments

It is conceivable that you may be able to work ahead on your assignments. For individual work, this is fine. If it is something that requires collaboration do not try to drive your group faster than they are comfortable going. Also, speed does not necessarily build understanding.

As for late work, if you get too far behind in the class you will not know your questions about the topic and your learning will suffer. If an assignment is more than two weeks late, it will not count as work completed in your course grade contract and I will no longer give you feedback on it.

***All assignments turned in to me for feedback will be returned within a week of receipt.***

## Support

### Office Hours

Feel free to come into the Zoom conference room for online office hours or make an appointment to get help. I can also be available online via Zoom in the evening or on Fridays or Sundays if you let me know ahead of time you would like to meet.

### Study Groups

You may work together with other members of our class. However, for work meant to be done individually, if the results are too much alike, all parties involved will lose points. Let me know if you want to collaborate so we can work out the logistics.

### Tutoring

By the nature of this course the tutoring offered at UNM-Valencia will likely not be appropriate. Most of our tutors know how to solve a problem but most cannot develop the sorts of explanations I would like you to come up with. Be sure to come to the help session hours if you can for help.

### Student Services

There are various services provided in our Student Services Department. See below about equal access. Also, we have a testing center, advising, and career placement available: http://valencia.unm.edu/students/student-services.html

## Other Important Information

### Equal Access

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. It is up to you to obtain documentation of a disability. If you are a Valencia campus student, contact Equal Access Services at Valencia Campus (505)925-8910 and http://valencia.unm.edu/students/advisement-and-counseling/equal-access-services.html. If you are a main campus student you can receive documentation from the main campus Accessibility Resource Center http://as2.unm.edu/ . I will not guarantee accommodation without the appropriate documentation.

### Netiquette and Behavior Expectations

One of the overriding principles in online conversations is to “craft your responses effectively.” It is sometimes difficult to remember that there are real people reading posted messages. This is especially true of online communication where others do not have the opportunity to see body language or hear tone of voice; therefore, misunderstandings are more likely.

Please, follow these guidelines in ***all*** of your online responses and discussion postings.

- Honor everyone's right to an opinion.
- Respect the right of each person to disagree with others.
- Respond honestly but thoughtfully and respectfully; use language which others will not consider foul or abusive. You may also use emoticons to convey a lighter tone.
- Respect your own privacy and the privacy of others by not revealing information which you deem private and which you feel might embarrass you or others
- Be prepared to clarify statements which might be misunderstood or misinterpreted by others.

***A Special Note about Anger***

- Do not send messages that you have written when you are angry, even anonymous ones. In the online world, angry messages are known as "flaming" and are considered bad behavior. Venting and flaming are two different things. It is possible to vent without becoming "ugly." Stick to the facts of what is causing you frustration.
- Do not send messages that are written all in upper case; this is the visual equivalent of SHOUTING. It is considered aggressive and is considered bad behavior. If you ever feel like shouting a message, take a deep breath and wait until you have calmed down before responding. Then, respond in a calm and factual manner.

In the discussion threads in Blackboard Learn I will provide a thread for venting. These postings will be anonymous and will allow you to vent any frustration you are feeling about the course, but netiquette rules still apply. Sometimes I may answer these posts if there is an issue that needs addressing.

**Plagiarism and Not Doing Your Own Work**

It is a bad idea to plagiarize or to have other people do your work for you. UNM has specific policies concerning academic dishonesty: https://policy.unm.edu/regents-policies/section-4/4-8.html There are various tools now developed to help determine if the person enrolled in an online course is actually the person completing the work. We will talk about them, but I will not implement any of these tools unless there is an obvious need to do so.

***Don't Cheat!*** Cheating, in my opinion, is any behavior that short circuits *your* learning. This can range from mindlessly mimicking what you see in the readings or examples, to simply copying someone else's solution, to paying someone to complete the course for you. I won't always be able to detect when you have cheated, at least not at the time you cheat, but the chance of you becoming an effective online teacher goes down considerably the more you cheat. Save yourself some time and money and put in the effort now to learn the material for the course.

**Title IX**

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of

Education (see pg 15 - http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html

## Semester Deadlines

### Fall 2020

- Monday, August 17: First day of class, classes available in Blackboard Learn
- Friday, August 28, by 5:00 PM: Last day to add a class or to change credit hours or grade mode in LoboWEB.
- Friday, September 4: Last day to drop without "W" grade and with 100% refund on LoboWEB
- Monday, September 7: LABOR DAY HOLIDAY
- Wednesday, October 7: FALL BREAK
- Tuesday, November 3: Election Day, no classes
- Friday, November 6: Last day to drop *without* Dean's permission on LoboWEB. Will receive "W" grade and will be responsible for tuition for the course.
- November 26-29: THANKSGIVING BREAK
- November 30 – December 4: All classes will convert to remote instruction if not already remote
- Friday, December 4: Last day to add sections and/or change credit hours with form, last day to drop *with* Dean's permission. Will receive "W" grade and will be responsible for tuition for the course.
- December 7-12: Finals week. All final exams given remotely.

## Course Outline: Tentative Schedule of Topics and Assignment Due Dates

| Dates | Due at Beginning of Class | We will do during class |
|---|---|---|
| 08/17 | Show up to class! | Intro, Sign up for Stanford Online Class, activities |
| 08/19 | Read Section 1.1 (p.1-20)<br>Attempt HW 1 and bring questions<br>HW 1: p. 20+ Exercises: 7, 8, 16 | Problem Solving Activities<br>Sect. 1.1 |
| 08/24 | Read Section 2.1 (p. 37-53)<br>Attempt HW 2 and bring questions<br>HW 2: p. 20+ Exercises: 17, 21, 28<br>**HTLM Lesson 1** | Whole Numbers Activities<br>Sect. 2.1 |
| 08/26 | Attempt HW 3 and bring questions<br>HW 3: p. 54+ Exercises 7, 8a,b, 10, 11<br>Turn in from HWs 1 & 2: # 8 and three other solutions you have polished with explanations | Whole Numbers Activities<br>Sect. 2.1 |
| 08/31 | Read Section 2.2 (p. 57-68)<br>Attempt HW 4 and bring questions<br>HW 4: p. 54+ Exercises 18, 20, 46, **and add'l problem in Learn**<br>**HTLM Lesson 2** | Fractions Activities<br>Sect. 2.2 |
| 09/02 | Attempt HW 5 and bring questions<br>HW 5: p. 78+ Exercises 2, 17, 18<br>Turn in from HWs 3 & 4:<br>Either 10 or 11, #20, and two other solutions you have polished with explanations | Fractions Activities<br>Sect. 2.2 |
| **September 7 is Labor Day – no class** | | |
| 09/09 | Read Section 2.2 (p. 69-77)<br>Attempt HW 6 and bring questions<br>HW 6: p. 79+ Exercises 19, 20, 21a,b,c,d<br>**HTLM Lesson 3** | Fractions Activities<br>Sect. 2.2 |
| 09/14 | Attempt HW 7 and bring questions<br>HW 7: p. 80+ Exercises 30, 36, **add'l problem in Learn**<br>Turn in from HWs 5 & 6: #18, 21, and two other solutions you have polished with explanations | Fractions or Dec. Activities |
| 09/16 | Read Section 2.3 (p. 82-middle of 92)<br>Attempt HW 8 and bring questions<br>HW 8: p. 95+ Exercises 1c,d,i,j, 2, 4, 5 | Decimals Activities<br>Sect. 2.3 |

| Dates | Due at Beginning of Class | We will do during class |
|---|---|---|
| 09/21 | **Show what you know**! Sections 1.1, 2.1, 2.2 | |
| 09/23 | Attempt HW 9 and bring questions<br>HW 9: p. 96+ 8, 9, 14, **add'l problem in Learn**<br>Turn in HWs 7 & 8: from HW 7 the additional problem from Learn and three others from either HW 7 or 8, polished with explanations | Decimals |
| 09/28 | Read Section 3.1 (p. 101-112)<br>Attempt HW10 and bring questions<br>HW 10: p. 125+ Exercises 3, 6h,i,j, 8a,b,c, 10<br>**HTLM Lesson 4** | Addition Activities<br>Sect. 3.1 |
| 09/30 | Read Section 3.1 (p. 113-125)<br>Attempt HW 11 and bring questions<br>HW 11: p. 125+ Exercises 15, 23, 26<br>Turn in HWs 9 & 10: #8 from HW10 and three other solutions you have polished with explanations | Addition Activities<br>Sect. 3.1 |
| 10/05 | **HTLM Lesson 5** | **Numeration System Project parts 1 and 2** |
| **October 7 is "Fall Break" – no class** | | |
| 10/12 | Read Section 3.2 (p. 128-141)<br>Attempt HW 12 and bring questions<br>HW 12: p. 142+ Exercises 1, 2, 15, 16<br>**"How to Learn Math" class should now be complete** | Subtraction Activities<br>Sect. 3.2 |
| 10/14 | Attempt HW 13 and bring questions<br>HW 13: p. 143+ Exercises 17 e,f,g,h, 22, 24, 34<br>Turn in from HWs 11 & 12: #15 from HW11, either #1 or 2 from HW12, and two more other solutions you have polished with explanations | Subtraction Activities |
| 10/19 | Read Section 4.1 (p. 169-190)<br>Attempt HW 14 and bring questions<br>HW 14: p. 190+ Exercises 1, 2, 6, 8 (at least two ways) | Multiplication Activities<br>Sect. 4.1 |
| 10/21 | **Show what you know!** Sections 2.3, 3.1, 3.2 | |
| 10/26 | Attempt HW 15 and bring questions<br>HW 15: p. 191+ Exercises 13 a, b, 17, 19, 23<br>Turn in from HWs 13 & 14: #17 from HW 13, #2 from HW 14 and two other solutions you have polished with explanations | Multiplication Activities |

| Dates | Due at Beginning of Class | We will do during class |
|---|---|---|
| 10/28 | Attempt HW 16 and bring questions<br>HW 16: p. 192+<br>Exercises 24, 40 (explain!), 53 | **Numeration System**<br>**Project Parts 3 & 4** |
| 11/02 | Read Section 4.2 (p. 206-211)<br>Attempt HW 17 and bring questions<br>HW 17: p. 212+ Exercises 2, 4, 6, **add'l problem in Learn** | Division Activities<br>Sect. 4.2 |
| 11/04 | Turn in from HWs 15 & 16:<br>#19 from HW 15, #24 from HW 16 and<br>one other solution polished with explanation | Division Activities<br>Sect. 4.2 |
| 11/09 | Read Section 8.1 (p. 436-451)<br>Attempt HW 18 and bring questions<br>HW 18: p. 452+ Exercises 4, 9, 11 a,b,c,d,e | Geometry Activities<br>Sect. 8.1 |
| 11/11 | Attempt HW 19 and bring questions<br>HW 19: p. 454 Exercise 18 and **add'l problem in Learn**<br>Turn in from HWs 17 & 18: any four solutions<br>you have polished with explanations | Geometry Activities |
| 11/16 | **Show what you know!** Sections 4.1, 4.2, 8.1 | |
| 11/18 | Read Section 8.2 (p. 455-467 mid-page)<br>Attempt HW 20 and bring questions<br>HW 20: p. 490+ Exercises 8, 10, 13, 14 | 2-D Geometry<br>Sect. 8.2 |
| 11/23 | Attempt HW 21 and bring questions<br>HW 21: p. 491+ Exercises 19, 30, 33, 34 | 2-D Geometry<br>Sect. 8.2 |
| 11/25 | Attempt problems on Topology handout | Topology |
| 11/30 &<br>12/02 | Work on Final Projects and complete<br>Portfolio for course grade contract | |
| 12/07 | Final Project presentations | |