

M316K – Foundations of Arithmetic

Spring 2009

Time and place: MWF, 10:00 – 11:00 AM, RAS 213 (56820); MWF, 12:00 – 1:00 PM, RAS 310 (56825)

Course text: *Mathematics for Elementary School Teachers*, Fourth Edition, by Tom Bassarear.

Important note: This textbook should have two components: the textbook proper, and an “Explorations” book. You will need both for this class.

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Welcome to M316K!

Greetings! This is the first course in a three-semester sequence in which you’ll develop the mathematical and pedagogical skills necessary to teach mathematics at the elementary school level. In this course, we’ll explore various topics related to arithmetic: numeration systems, algorithms for performing arithmetic operations, negative numbers and fractions, and some basic ideas in number theory. Throughout the course, we’ll discuss connections between mathematical concepts and “real-world” problems. We’ll also explore different ways of communicating mathematical information, including methods appropriate for young students.

Strictly speaking, the mathematical content we’ll cover in this course probably isn’t any more advanced than what you learned in middle school. Our goal in this course is to come to a deep understanding of how these “basic” mathematical ideas work – where they came from, why they are what they are, and what we can do with them. In order to achieve this goal, we’ll be spending most of our class time working on problems.

Grading and expectations

Your grade in this course will be determined by the following:

- Two midterm exams and a final exam – 15% each
- Homework (approximately 15 problem sets) – 15%
- In-class work and quizzes – 15%
- Two projects – 10% each
- Reading assignment (optional) – 8%

Note that the components other than the reading assignment add up to 95%. If you choose not to do the reading assignment, I’ll add an additional 5% weight to your final exam grade. If you choose to do the reading assignment, you can earn a grade of up to 103%; since I’ll be grading you on the standard 90%-80%-70%-60% scale either way, this is essentially an opportunity to earn some extra credit.

When deciding your final grade, I will be no stingier than the following scale: A = 90%–103%, B = 80%–89.9%, C = 70%–79.9%, D = 60%–69.9%, F = 0%–59.9%. I may be more generous than this if I feel that students’ grades are not indicative of their performance and effort. However, since your grade will be based almost entirely on skills and knowledge that are essential for future teachers, it is not likely that I will apply a curve to the final grades.

Exams

We’ll have three exams in this class. The first two will be given during class on **Monday, March 2** and **Monday, April 13**. The third will be given during the class’s designated final exam time and will cover material from the entire semester, with emphasis on material covered since the second midterm.

On exams, you’ll be tested over concepts covered in class, in the text, or on homework assignments. That doesn’t mean that exam questions will always be identical to homework problems or to problems you’ve done in class - in many cases I may ask you to do something that is different from what you’ve done before, but

that you should be able to do if you understand the material well. No books, notes, calculators, or other aids will be allowed on exams.

If for some reason you must miss an exam, please notify me as soon as possible so that we can arrange a make-up exam. Make-up exams will only be given for University-excused absences; you must provide documentation (such as a doctor's note) explaining your absence.

Homework

We will have homework due every Friday unless otherwise specified. Homework will be collected just after class begins; papers handed in at the end of class will not be accepted. If you expect to miss class, you may turn in your homework by sliding it under my office door **before** the class when it's due. (Please keep in mind, however, that I cannot guarantee that I will get every paper that is left under the door.) Late homework will not be accepted under any circumstances. To allow for unexpected absences, I plan to assign a large number of extra-credit problems which you may solve for bonus points.

I will grade your papers for the correctness and completeness of your work. I reserve the right to deduct points for sloppy work or for papers that are unstapled, so please be neat and staple your work.

In-class work and quizzes

In this course, we will spend most of our class time working on problems and activities from the Explorations text. In most cases, you'll be working in groups on the explorations, and I will ask you to turn in the work that you do in class. In addition, I will occasionally give unannounced quizzes over the reading that I have assigned.

If you miss class, you will not be able to make up any in-class assignments or quizzes that you miss. In order to allow for unavoidable absences on your part, I will drop your **five** lowest in-class grades. (This works out to about three or four absences, since you can expect to have an in-class assignment almost every day, and on some days you will also have a quiz grade.)

Projects

You will be asked to do two projects this semester. I'll give you the details later, but you should expect one project to be a mathematical investigation, and the other to be a lesson-planning assignment.

Academic dishonesty

You are encouraged to work together on the homework for this class, but the solutions you write down must be your own, not copied from a classmate's or from any other source. Obviously, no collaboration or unauthorized help is allowed on the exams. Cheating has a detrimental effect not only on the class in which the cheating occurs, but on the academic culture of the entire university. Accordingly, I will vigorously prosecute any instance of academic dishonesty that takes place in this class.

Students with disabilities

The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the office of the Dean of Students at 471-6259, TTY 471-4641.

One more thing...

As your instructor, I am committed to doing everything I can to help you make the most of this course. If you have questions, comments, or suggestions regarding our class, please do not hesitate to contact me.

"Always do the right thing. This will gratify some people and astonish the rest." – Mark Twain

Some Advice on How to Succeed in This Class

1. **Keep up with the work.** You'll have to multi-task a bit in order to be successful in this class. You'll have about ten pages of reading from Bassarear to do prior to each class. Each week, you will have a homework problem set. You'll also have two projects to complete during the course of the semester. You'll notice that I have already given you a schedule for all of the reading assignments; I may deviate from that, but only in your favor (*i.e.* only to push a deadline back or cut out a section). You'll have each homework assignment at least one week before it is due. You'll have at least a month to work on each project. I don't do these things in order to test your ability to procrastinate – I do them so that you have the opportunity to **pace yourself**. But it will be absolutely imperative that you spread the work out, rather than trying to do it all the day (or night) before it's due.
2. **Read the textbook.** The organization of Bassarear's book is a bit challenging to follow at times, but overall the textbook is very good. Read the examples (he calls them "Investigations") and try to understand not only what he is doing, but why he is doing it. Definitely read the "Classroom Connection" margin notes; these will give you a sense of how the issues covered in this course come up in the elementary classroom. Try to get a sense of the history and the mathematical context of the topics discussed in the book. Don't worry too much about remembering the details; I'm more interested in whether you get the main ideas out of each section. If I quiz you over the reading (and I will, probably fairly often), I won't be asking detail-oriented or tricky questions; I'll be asking idea-oriented, broad questions.
3. **Do the homework.** Hopefully I don't have to work too hard to persuade you to do the homework for this class, but I also hope I can give you some pointers on *how* to do the homework. I'll give you each assignment a week before it's due, so spread the work out; don't try to do it all in one day. I plan to assign homework problems that require careful thinking and well-written solutions. If you try to do them all in one sitting right before the assignment is due, you're likely to get stuck, get frustrated, and turn in a paper with a lot of solutions missing. Don't put yourself in that situation; start working during the weekend and keep a healthy pace throughout the week until you complete the assignment. Also, please keep in mind that I expect your homework solutions to be written **in complete sentences** unless the situation obviously just calls for a quick calculation or a very short answer.
4. **Study well.** When studying for an exam, keep in mind that I'm not going to be testing you over facts and definitions; I'm going to be asking you to do things. By "doing things" I mean that you're going to be asked to work some problems, explain ideas, and think about some questions that you may not have seen before. Trying to cram for a test by reading the textbook again probably isn't going to be very helpful (though it may help a bit). It will be much more useful for you to go over the homework problems and explorations we've done and make sure you can actually *do* the tasks you've been asked to do there – no notes, no calculators, no looking things up in the text. If you want to prepare yourself to deal with questions that aren't exactly like what you've done before (and you should expect at least one such question on each test), try doing some exercises in the text that I didn't assign for homework.
5. **Work together.** You'll be doing most of your in-class work in groups. I would like to encourage you to do the homework for this class in groups as well. I find that very few students are willing to reach out to their classmates and organize study sessions outside of class, but those who do are almost always more successful than those who do not. If you do choose to work on the homework with your classmates – and I hope you will – please make sure that everybody takes on a roughly equal share of the work. If you work in a group but don't pull your weight, chances are that you won't get the real benefit of working on the homework, which is an understanding of what you're doing. Similarly, if you work in a group and constantly feed answers to your teammates, you are denying them the opportunity to participate in what should be an enjoyable creative process.
6. **If you need help, see me early, and see me often.** I consider it a privilege to teach this class, and I want to do everything I can to help you get the most out of it. If you have questions, or just want to talk about the class or about math, please visit me during my office hours. If you can't make the office hours I have posted, e-mail me and I will happily set up an appointment with you. If you have questions that can be answered fairly briefly, e-mail me; I'm usually pretty quick to respond.

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Tentative Course Schedule

In the table below, the sections listed under “Reading” are sections in the main text that I expect you to have read **before** class on the day listed. The “Exploration” listed is the activity that we will do in class. These dates and activities are subject to change.

Date	Reading	Exploration	Notes
1/21		1.1(1)	
1/23	Prefaces	1.1(2)	
1/26	1.1, 1.2	1.3	
1/28	1.3	1.4(1, 4)	
1/30	1.4	1.5	Problem Set 1 due
2/2	1.5	1.6	
2/4	1.6, 1.7	1.6	
2/6	2.1	2.1	Problem Set 2 due
2/9	2.2 through p. 91	2.3	
2/11	2.2	2.4	
2/13		2.5, 2.6	Problem Set 3 due
2/16	2.3	2.8	
2/18		2.8, 2.9	
2/20		2.10, 2.11	Problem Set 4 due
2/23	3.1 through p. 142	3.1	Project 1 assigned
2/25	3.1	3.3, 3.4	
2/27	3.2	3.6, 3.7	Problem Set 5 due
3/2			EXAM 1
3/4	3.3 through p. 178	3.8	
3/6		3.10, 3.11	Problem Set 6 due
3/9	3.3	3.12	
3/11		3.13	
3/13	3.4 through p. 195	3.18	Problem Set 7 due
			Spring Break
3/23	3.4	3.19, 3.20	
3/25	4.1	4.1	
3/27	4.2	4.2	Problem Set 8 due
3/30		4.3	Project 1 due
4/1	4.3	4.5	
4/3	5.1	5.1, 5.2	Problem Set 9 due
4/6		5.2, 5.3	Project 2 assigned
4/8	5.2	5.7	
4/10		5.8	Problem Set 10 due
4/13			EXAM 2
4/15		5.8	
4/17		5.10	Problem Set 11 due
4/20	5.3	5.12	
4/22		5.13	
4/24		5.14	Problem Set 12 due
4/27	5.4	5.17	
4/29		5.18	
5/1		5.21	Problem Set 13 due
5/4	6.1	6.2	Project 2 due
5/6		6.3	
5/8	6.2	6.5	Problem Set 14 due
TBA			FINAL EXAM

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First-Day Questionnaire

Please answer the following questions. Your answers to some of these questions will help me make decisions about how I teach this course, so your input is important! If there is a question you do not wish to answer, you may skip it.

1. What is your name? (If you have a middle name or nickname you prefer, please indicate this.) If anyone has ever mispronounced your name, *ever*, please include a pronunciation guide for me, because I'm likely to mess it up too.
2. Please give me a current e-mail address where I can reach you. (This is important; I frequently use e-mail to communicate with students, and I will hold you responsible for receiving these e-mails.)
3. Do you plan to teach elementary school after you graduate? If so, where do you hope to teach? What grade level(s) would you like to teach? If you don't plan to teach, what do you plan to do after you finish school?
4. Give a brief definition (15 words or less) of the word "mathematics." Don't look up the definition; I'm really interested in what you think the word means. (Don't feel bad if you can't come up with a perfect definition! Most mathematicians can't do it either.)
5. Tell me about an experience you had during your childhood (say, between the ages of 6 and 12) that had a significant impact, positive or negative, on how you feel about mathematics.
6. Tell me something interesting about you that has little or nothing to do with school or your future career.

7. If you needed to, could you make it to my office hours from 1 PM to 2 PM on Monday, Wednesday, and Friday? If not, what would be a better time?

8. For each of the following statements, please indicate (by circling a number) to what extent you agree or disagree with the statement. 1 = strongly disagree, 2 = disagree, 3 = no opinion, 4 = agree, 5 = strongly agree.

1 2 3 4 5 I enjoy doing math.

1 2 3 4 5 I find mathematics to be challenging.

1 2 3 4 5 I am a visual learner.

1 2 3 4 5 I am an auditory learner.

1 2 3 4 5 In order to learn a new skill, I need to practice it myself.

1 2 3 4 5 I would rather work with others than work by myself.

1 2 3 4 5 To understand a theorem, I need to know why the theorem is true.

1 2 3 4 5 I understand an idea better if it can be expressed with a picture.

1 2 3 4 5 I want to know how mathematical ideas are used in real life.

1 2 3 4 5 I can do most math homework without a calculator.

1 2 3 4 5 I am anxious about taking tests, even if I have prepared for them.