

## MATH 4010-2: Mathematics for Elementary School Teachers I Syllabus - Fall 2009

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**TEXT:** Mathematics for Elementary Teachers: A Contemporary Approach, 7<sup>th</sup> ed., by Musser, Burger, & Peterson; John Wiley & Sons, Inc, 2005. This text is used for both MATH 4010 and MATH 4020.

**PREREQUISITE:** MATH 1050-College Algebra with a grade C or higher. This prerequisite should not be taken lightly. The problem-solving skills developed in college algebra are fundamental to our course.

**SUPPLEMENTS:** We occasionally emphasize illustrations in some of our problems that require graph paper. Some students choose to use graph paper for all their homework assignments to assist in drawing diagrams. Calculators are not allowed on exams, but for some assignments you'll need a calculator that performs basic arithmetic operations (+, -, ×, ÷,  $\sqrt{\quad}$ ). Also for Chapter 6, you'll need to purchase a supplemental booklet on fraction arithmetic for about \$6.00 at the University Copy Shop in the Union. We'll discuss this later in the semester.

**COURSE CONTENT:** This is the first semester of the two-course sequence MATH 4010/4020 designed to prepare you to teach mathematics in grades K-6. MATH 4010 focuses on arithmetic, while MATH 4020 discusses on geometry, statistics, and probability. Both courses follow guidelines of the National Council of Teachers of Mathematics (NCTM) that have become the hallmark for pre-service programs around the country. They provide a conceptual framework for understanding and teaching early childhood and elementary school mathematics by examining the significance of major ideas that run throughout the mathematics curriculum. Both MATH 4010 and MATH 4020 include a six-hour practicum experience in a local school that provides an immediate opportunity to relate our coursework to the K-6 classroom. More on this below.

**NCTM:** Speaking of the National Council of Teacher of Mathematics, we are fortunate that they are having their annual national meeting in Salt Lake City April 9-12 at the downtown Salt Palace. They'll be need volunteers. You can find out more about how to volunteer at [www.nctm.org](http://www.nctm.org) and get information on gaining a student membership for only \$38. Lucky ducks! That's half the full membership fee that professional teachers pay - including me. Membership allows you to receive the monthly journal *Teaching Children Mathematics* or any one of their other journals for a year. If you plan to be a mathematics specialist as an elementary school teacher, I hope this is something you will consider.

**"Why can't we simply hear about mathematics taught at the grade level where we plan to teach?":** Several reasons. First, you may not end up teaching at the grade level for which you are preparing as an undergraduate. School budgets are changing; the job market changes with it. In addition, mathematics is one of the disciplines that the vast majority of elementary school teachers are expected to teach, regardless of grade level. With this in mind, the Utah State Office of Education (USOE) has outlined specifics for what should be taught in each grade so that the long-term mathematics curriculum is complete and well organized. It is important that as a teacher, you are given the opportunity to become familiar with the broad range of mathematics topics taught at your grade level. And more importantly, that you know what your students will have learned in the earlier grades, and what later teachers will be expecting your students to have learned from you. With this in mind, the USOE expects that even those teachers at the two extremes of our program, - the early childhood majors and those planning to teach 6<sup>th</sup> grade - be well-versed in the entire mathematics curriculum from Grades K-6 and be a participant in each of our activities. *Too much fun, Dennis!*

MATH 4010: A Content Course? MATH 4010 and MATH 4020 are *content courses*, while TL 5310 (taken later) is a *methods course*. Teaching methods are demonstrated here whenever appropriate, but they are not emphasized. Instead, we focus is on the mathematical underpinnings that teachers need to properly understand to be successful. For example, there are many arithmetic "rules" that can be so poorly understood by teachers that children are told to simply memorize them. For example, consider the rule that says we cannot divide by zero. No one likes being told to do something without being told why. Without further explanation, this suggests to students that arithmetic is no more than a set of rules that make no sense. They get easily confused, leading to math anxiety. Another such rule says that when dividing by a fraction, "invert and multiply", as in  $\frac{1}{3} \div \frac{5}{6} = \frac{1}{3} \times \frac{6}{5} = \frac{2}{5}$ . Even as I explain to you here not only what the rules are but WHY they are as they are, I hope you catch a glimpse of why your future students will want understand both the arithmetic "rules" and the motivation for them.

Teachers need to know why such a rule is valid (a content question). Once understood, teachers can decide how to explain this to children in ways that make sense to the pupils (a methods question). Both are important, but it should be clear that these are not the same questions. First, teachers find understanding, and then they consider how to help students to find their own understanding at a different level. (In this case, we address both aspects of this rule in our class.) In another area of arithmetic, we'll introduce various "models" for simple addition, subtraction, multiplication, and division that children typically see, or sometimes invent on their own(!). Don't be surprised if some of these models are new to you, even though they are used throughout elementary school texts today. We'll give each a name to help identify and apply them, because various models are used in specific instances to help us present more advanced ideas to children. Pay attention and you'll see how we do this. TL 5310 expects you to have a good sense of these models as you begin that course. I find it all fascinating. I hope you agree!

FREE TUTORING FOR MATH 4010: MATH 4010 students (and MATH 4020 students too) can see Thomas Petersen for help with our course on Tuesdays, 1:00-3:00pm, in the Math Lab. The Math Lab is on the first floor at the end of JWB nearest our classroom. It's only about 50 yards away(!). Thomas is a secondary school mathematics teaching major who will be graduating soon. I think you'll find him very helpful, quite friendly, and easy to talk with. Tell him Dennis sent you and see if he lol ... !!

EXAMS: There are three regular exams and a comprehensive final exam. Each is given in our classroom. Questions focus on our classroom discussions of principles related to teaching mathematics in early childhood programs and in elementary school, numerical problems similar to those discussed in class and assignments given throughout the course. If you take good notes and review them, pay attention to what is emphasized in class, and make sure you understand homework assignments, there typically are no surprises. No calculators or cell phones can be accessed during these exams. I want you to deal with the arithmetic in the same ways your students will. However calculations are generally quite simple.

ASSIGNMENTS: Take-home assignments that extend classroom discussions are given throughout the semester. Take care to write work neatly and legibly on one side of your paper for easier grading. Papers should be stapled with the original assignment sheet attached on front for easy recordkeeping. Grading will be based on correctness, thoughtfulness, completeness, and clarity of responses. Late assignments will not be accepted. The lowest two assignment scores will be dropped before averaging.

"Can we work together on our assignments?" This depends on the amount of assistance this might imply. Each student will to do his/her own work, writing out individual solutions and creating unique activities. There have been occasions in which students have submitted work copied from someone else,

and of course this is inappropriate. It's fine if you help others to get over a hurdle in a problem or even help to interpret instructions with them. But don't spoil their opportunities to learn by doing their work for them. By all means, do not give someone else your assignments to look over. After all, you're planning to be a teacher, and here's an excellent opportunity to teach mathematics to your peers. Teaching is not the same thing as working problems for other students. Teaching involves knowledge, reflection, and clear explanations. And it requires time. Learning is not memorized recitation. If you find something too difficult to explain, come to me for help. I'll look forward to seeing you.

PRACTICUM: For our practicum experience, you attend an elementary school classroom (Grade 1-6) of your choosing. You'll observe several mathematics lessons as they are taught, and then assess a student of his/her understanding of some topic in our course and teach two lessons to extend his/her understanding of the topic. You develop your two lessons based on your assessment results and on teaching ideas gleaned from our class. Students in MATH 4010 typically find this experience to be one of the most rewarding aspects of the course since it allows them to make direct connections between our discussions and an elementary school experience. Completion of the practicum experience is required to pass this course. More information will be posted shortly.

PORTFOLIO: The portfolio is your personal summary of ideas and materials from our course. My hope is that it will be something you'll save, allowing you to speak to your future self. It also provides an excellent review for the final exam. Begin now and keep it updated in a neat and organized manner, regularly contributing new materials and personal reflections that you'll want to pass along while the ideas are fresh in your mind. Waiting until late in the semester to get started takes the fun out of this activity. Guidelines will be posted shortly.

GRADING SCALE: All documents are graded as follows:

	87-89 B <sup>+</sup>	77-79 C <sup>+</sup>	67-69 D <sup>+</sup>	
93-100 A	83-86 B	73-76 C	63-66 D	0-59 E
90-92 A <sup>-</sup>	80-82 B <sup>-</sup>	70-72 C <sup>-</sup>	60-62 D <sup>-</sup>	

Your semester grade will be determined in the following manner:

Exams (3): 15% each	Practicum: 14%	Assignments: 10%
Portfolio: 6%	Final exam: 25%	

Notes: Avoid misspellings in the papers you submit for grading. Points may be deducted if this becomes excessive. Remember: Children are watching! Also be careful not to make inaccurate statements. For example  $\frac{1}{3} \neq 33\%$ . They're only approximate, right? It's better to write  $\frac{1}{3} \approx 33\%$  or  $\frac{1}{3} = 33\frac{1}{3}\%$ . Again points may be deducted, so be careful.

The Americans with Disabilities Act requires that reasonable accommodations be made for students with physical, sensory, cognitive, systemic, learning, or psychiatric disabilities. Contact me at the beginning of the semester to discuss accommodations that you may require in this course.

RESOURCES: At various times during this course you will need to refer to the Utah State Core Curriculum in mathematics. This is posted on an Internet website for the Utah State Office of Education (USOE) at [www.usoe.k12.ut.us](http://www.usoe.k12.ut.us). In addition, you'll find helpful materials for this course the Curriculum Library on the 2<sup>nd</sup> floor of the Marriott Library. We'll tour the library in February.

ADDITIONAL HELP? Please feel free to ask questions in class. Also, I look forward to talking with you outside of class. To give us time to talk, I've chosen a variety of office hours that I hope fit your schedule. I look forward to seeing you, so don't be a stranger.

Finally, I encourage you to seek out others in the class for assistance. I'll distribute a phone/e-mail list of students in our class who have agreed to make this information available. By doing so, you both develop a deeper understanding and appreciation for ideas from this course. But as mentioned above, do not copy someone else's responses or take credit for solutions that you don't really understand.

Now I always look forward to the beginning of a new class in MATH 4010 or MATH 4020. I see it as a very important course in your development as a teacher. I hope you enjoy it as much as I do!

Dennis Allison

### TENTATIVE COURSE SCHEDULE:

Week 01 (08/24): Chapter 1 & 2

Week 02 (08/31): Chapter 2

☺ Wednesday, 09/02: Last day to delete a course. No grade assigned.

Week 03 (09/07): Chapter 2

☺ Monday, 09/07: *Labor Day holiday! Life is good!*

Week 04 (09/14): Chapters 3

Week 05 (9/21): Chapters 3

Friday, 09/25: Meet at the Curriculum Library on the 1<sup>st</sup> floor of the Marriott Library

Week 06 (09/28): Chapters 4

Wednesday, 09/30: Review for exam  
Friday, 10/02: EXAM 1 - please plan to attend

Week 07 (10/05): Chapter 4

Friday, 10/09: Recommended completion date for practicum classroom observations

Week 08 (10/12):

☺ *Fall break ... all week long!*

Week 09 (10/19): Chapter 5

☺ Friday, 10/23: Last day to withdraw from a course with grade W. Does not affect your GPA.

Week 10 (10/26): Chapter 5

Friday, 10/30: Recommended completion date for practicum experience at elementary school

Week 11 (11/02): Chapter 5&6

Tuesday, 11/03: Review for exam  
Wednesday 11/04: EXAM 2 - please plan to attend

Week 12 (11/09): Chapter 6

Week 13 (11/16): Chapters 6&7

Friday, 11/20: Practicum reports due

Week 14 (11/23): Chapter 7

☺ *Thursday-Friday, 11/26-11/27: Thanksgiving holidays!*

Week 15 (11/30): Chapter 8

Tuesday, 12/01: Review for exam  
Wednesday, 12/02: EXAM 3 - please plan to attend

Week 16 (12/07): Chapter 9/final review

Monday, 12/07: Portfolios due in class

**Final Exam:** Tuesday, 12/15, 1:00-3:00pm in our classroom. Please do not ask to take the exam early. I'm here for the duration too ... *drats!*