

Math 413, Mathematics for the Middle Grades

Spring 2010, 7:25-8:50 MW, LA-4

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Office hours: 4:30-5:30 MW, 6-7 Tu.

Prerequisites: Senior standing and a grade of C or better in Math 312 or 313. If you earned less than a B in Math 312/313, you will find that this course is not appropriate for you.

Required texts: Driscoll: *Fostering Algebraic Thinking* and Mason, Burton, Stacey: *Thinking Mathematically*.

Course objective: This course is a teacher-level look at the mathematics taught in middle school. That it is teacher-level means that we are going to look at the material taught in middle school from the point of view of a teacher, who already knows and understands that material. This course is not a review of junior high school mathematics. The central topic of the course is what makes a successful mathematical thinker and how this should affect middle school teaching. We will discuss some aspects of pedagogy, but the focus of this course is mathematics.

Obviously, you will be expected to be able to solve the types of math problems we cover. Some problems will be familiar, others may be unfamiliar. You will be asked to give several different solutions to some problems. You will need to be able to come up with examples of problems that teach certain types of mathematical thinking. You will need to be able to discuss the mathematical thinking process that results in solving the problem, how that process leads to successful mathematical thinking, and what a teacher can do to teach/encourage that kind of thinking.

Website: www.rohan.sdsu.edu/~ituba/math413s10. I will also use Blackboard to post your exam grades periodically.

Furloughs: Due to the dramatic cuts to the CSU—the same cuts that have resulted in a 32% increase to your fees—every CSU faculty is required to take 9 unpaid days off per semester. My furlough days are Jan 26 (Tue), Feb 9 (Tue) and 23 (Tue), Mar 18 (Thu) and 24 (Wed), Apr 5 (Mon) and 15 (Thu), May 5 (Wed) and 12 (Wed). This class will not meet, and I will not be available for office hours, phone or email consultation on these days. Please, understand that these are not holidays. The amount of material we are expected to cover has not been changed. This means that you will have to do more work on your own and learn some of the material without my help.

It is obviously unreasonable to think that these furloughs will have no effect on your education. I know this and will take it into account when assessing your knowledge. But keep in mind that everything you do not learn, every skill you do not acquire will make you a less desirable employee, other than a less educated individual. It is particularly important that you do not skip class on the days that remain.

Class attendance: This is not distance education. You are expected to attend and participate in every class. If you skip class you will miss the chance to learn skills that will be tested on the exams. You may also miss a quiz and there are no make-ups. Finally, if you keep skipping class, I will think that you are not serious about your education and will remember that when I assign your grade at the end of the semester.

On work outside of class: Have you ever wondered why taking 12 units of classes qualifies you as a full time student? That's only 10 hours per week in class. The reason is that you are expected to do a lot of work on your own outside of class. In fact, the rule of thumb of college education is that for every hour you spend in class, you should expect to spend three hours studying outside of

class. That is how 12 units makes full time: 10 hours in class and 30 hours studying outside of class each week. That means you'll need to spend about 7.5 hours a week studying outside of class for this course. That is if you are well-prepared for the course. If your math background is lacking, then you'll have to spend more time. I am not kidding.

Homework and reading will be posted on the class website regularly. You will be able to follow the progress of the course using the website. HW is an essential part of your learning. Take it very seriously. It is extremely important that you keep up with the HW. If you do not, you will quickly find yourself lost in class and at a great disadvantage during exams. Treat the HW as a learning opportunity, rather than something you need to get out of the way. Reread, revise, and polish your solutions until they are correct, concise, efficient, and elegant. This will really deepen your understanding of the material. You won't do well in a math class without doing all of the HW. Attending class and reading your textbook are necessary but not sufficient conditions for passing the course. Expecting to learn math without doing exercises on your own is like expecting to learn to ride a bicycle without ever sitting on a bicycle.

Your performance on the homework will be tested on quizzes and exams. Every quiz and half of every exam will consist of exercises straight from the homework. You can turn in your homework to me any time for feedback. I will comment on it and turn it back to you as soon as I can. Clearly, if you don't turn in homework, I can't give you feedback on your work, no matter how much I want. There is an obvious winning strategy. Do the HW, seek feedback on it, revise it, and keep your HW notes neat and organized. The familiarity you gain with the exercises by doing this will let you do the quizzes with ease. It will also let you complete half of each exam quickly and move onto the other half of the exam. The experience you gain by keeping up with your homework will be invaluable in doing that other half of the exam. On the other hand, if you do not keep up with your HW, you will face the challenge of solving many unfamiliar problems under time pressure on the quizzes and the exams. You will find this an impossibly daunting task and your grade will reflect this.

Collaboration on the HW: Limited collaboration with your fellow students in the class is OK. But see the section in Academic Integrity! The idea is to let you discuss and critique each other's ideas and not to let you split the workload. Keep collaboration constructive and reasonable. You should fully understand the solution and write it up on your own. Your understanding of the material will be tested on the exams.

If you are approached by another student from the class who wants to copy your HW notes, think twice before generously sharing. You will feel very bad if your crafty buddy outscores you on an exam by exploiting your and everybody else's collective wisdom without doing work of his/her own.

Discussion sections: I strongly encourage you to organize a weekly session to work with (not copy from!) your fellow students on problems in class and on the homework. This will help you keep up with your work and get ideas and feedback from others who are grappling with the same exercises as you. You will find that the sense of companionship motivates and encourages you to work.

Quizzes: We will have a quiz about every week and a half to two weeks. It will be straight from the homework. It is your responsibility to come to class, so if you miss a quiz because you are not there, you will not be allowed to make it up. Your lowest quiz score will be dropped.

Exams: There will be two in-class exams as well as a final exam. The in-class exams will be on Feb 22 and Mar 22. If you skip an exam, you will normally not be able to make it up, unless you have a compelling (e.g. medical) and documented excuse. Forgetting that there is an exam or being unprepared for it are not considered compelling excuses.

Final exam: Time and place TBA.

Problem of the fortnight: The Mathematics Department in San Diego posts an interesting problem every two weeks. You will find a link to these problems on the class website. Working on these problems sharpens your problem solving skills. I will give you extra credit for every problem to which

you submit a correct solution to the organizers of the contest. You can also win a t-shirt by turning in a correct solution and, if your solution is deemed the best, a book. Keep in mind that the same rules of academic integrity apply to POF submissions as to any other work you submit for credit at SDSU. In particular, cheating and plagiarism are against the rules.

Grading scheme:

Quizzes	20%
In-class exams	20% each
Final exam	30%
Other assignments	10%
Problem of the fortnight	3% each

A score of 80% or more will guarantee an A- or better, 60% a B- or better, 40% a C- or better, and 20% a D- or better. The curve may be adjusted somewhat lower than this.

Grade	University policy	What this means in Math 413
A	outstanding achievement; available only for the highest accomplishment	You are thoroughly familiar with all concepts, definitions, and examples covered in class and in your reading. You have a firm understanding of the material and can do all of the homework exercises. You are adept at using what you learned in this course to solve unfamiliar problems comparable in complexity to those done in class and on the homework.
B	praiseworthy performance; definitely above average	You are familiar with all concepts, definitions, and examples covered in class and in your reading. You have a solid understanding of the material and can do most of the homework exercises. You can use what you learned in this course to solve most unfamiliar problems comparable in complexity to those done in class and on the homework.
C	average; awarded for satisfactory performance; the most common undergraduate grade	You are familiar with all definitions, and most concepts and examples covered in class and in your reading. You have a general understanding of the material and can do the majority of the homework exercises without major mistakes. You can use what you learned in this course to solve many unfamiliar problems comparable in complexity to those done in class and on the homework.
D	minimally passing; less than the typical undergraduate achievement	You are familiar with most definitions, and many concepts and examples covered in class and in your reading. You have some understanding of the material and can do the at least some of the homework exercises without major mistakes. You can use what you learned in this course to solve some unfamiliar problems comparable in complexity to those done in class and on the homework.
F	failing	You have difficulty stating definitions and coming up with examples, do not remember concepts from class and the reading and have at best a shaky understanding of the material covered. You can do few of the homework exercises, and lack the skills to attack unfamiliar problems of comparable complexity.

On academic integrity: Using unauthorized aids—including help from another person—on exams and to complete assignments constitutes cheating. Representing someone else’s work as your own—even if you make minor changes to it, or reword it—is called plagiarism. Cheating and plagiarism are violations of academic integrity and university policy. The consequences are serious, ranging from receiving a failing grade on an assignment in question to expulsion from the university. Don’t do it, it’s not worth it.

Quality of work: It is important that you work neatly on the assignments. The quality of your work will affect your grades on the exams. Quality has to do with how easy it is for someone else to read your solution to a problem. It is not enough to do the math right, you must also communicate it well.

Students with disabilities: If you need special arrangements, let me know well in advance so we can plan to accommodate your needs.

On independent work: Problem solving skills are developed by practicing a lot, not by watching other people solve problems. Learning math is much like learning to ride a bicycle in that you learn by doing it and not by watching someone else do it. Attending class and reading the textbook won’t be enough to do well on the exams. You should work through every example and argument in the book and in your class notes and expect to have to re-read everything several times. It’s slow, but then your reading list for this class is short.