

Math 414, Mathematics Curriculum and Instruction

Fall 2008, 7:25–8:40 MW, C-8

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Office hours: 3:35–4:35 MW, 5–6 Tu.

Prerequisites: Senior standing and 12 upper division units of mathematics. In particular, Math 521A is recommended.

Required text: Usiskin, Pereskini, Marchisotto, Stanley: Mathematics for High School Teachers.

Course objective: This course is intended for students who intend to become high school mathematics teachers. Its goal is to establish connections between the math you have learned in your college classes and the math you will teach in high school. Therefore it is essential that you have taken a number of college-level math courses—this means upper division courses. In particular, algebra (Math 521A) will be useful. Math 414 should be one of the last courses you take for your degree.

This is not a teaching methods course, but a math course. While we will discuss some principles and procedures of teaching, our focus will be on the math. In particular, we will be interested in how to convey an in-depth understanding of math to high school students and how to develop strong problem-solving skills.

Obviously, you will be expected to be able to solve the types of math problems we cover. Certainly, you must be able to do high school math in order to pass this course. You will also be expected to view the math we do from the perspective of a teacher: what does it teach, how does it teach it, and how does it fit into the great framework of mathematical thinking. You need to be able to solve problems in multiple ways, judge the correctness of a solution, understand and explain the principles that underlie the mathematics taught in high school. You will have to be able to come up with examples and exercises that illustrate specific ideas in math.

Website: www.rohan.sdsu.edu/~ituba/math414f08. I will also use Blackboard to post your exam grades periodically.

Class attendance This is not distance education. You are expected to attend and participate in every class. I will assume that you are an adult and are here to learn. I will not be policing your attendance, but if you keep skipping classes, you will find me unsympathetic to your cause.

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. Expect to spend about 8 hours a week on studying outside of class. (This is why 12 units are considered a full course load.) 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 are unlikely to succeed 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.

HW will not be collected. You will instead keep a notebook with all your HW solutions. I recommend a 3-ring binder, so you can keep your solutions neat and organized as you insert revised versions. Half of every exam will consist of exercises straight from the HW. You will **not** be allowed to use your HW notes during the exams, but a thorough familiarity with the exercises will obviously be an immense asset in doing them correctly on the exam.

That HW is not collected is not an indication that it is optional. Rather it is meant to instill in you a sense of independence and personal responsibility. You do not do the HW in order to turn it in and

have it graded. You do it so you learn the material. You can still turn in your HW for feedback. In fact, I strongly encourage you to do so. If you want more informal feedback, you can discuss your solutions with me during office hours.

This gives you 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 complete half of each exam with ease and move quickly onto the other half of the exam. The experience you gain by keeping up with your HW will be invaluable in doing the 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 during the exams. You will likely find this an impossibly daunting task.

Collaboration on the HW: Limited collaboration with your fellow students in the class is OK. 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—this may happen just before an exam—keep in the mind that the class is curved. By sharing your work with your friend, you raise the curve which determines your grade.

Discussion sections: I strongly encourage you to organize a weekly session to work with 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.

Exams: There will be three in-class exams as well as a final exam. Your two highest scores on the in-class exams and your score on the final will be used to determine your grade. The in-class exams will be on Oct 1, Oct 29, and Nov 24. If you skip an exam, it will become the dropped 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. 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 and, if your solution is deemed the best, a book. You will find a link to these problems on the class website.

Grading scheme:

Assignments	10%
In-class exams (two highest scores)	25% each
Final exam	40%
Problem of the fortnight	3% each

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

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: 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 proof 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.