

Math 8001 meets on Fridays at 12:20pm-1:10pm in Vincent 16. We will not meet during the first week of the semester; the first session will be on January 27, 2012.

**Instructors.** Bryan Mosher and Jonathan Rogness. Our contact information is given below; note that Rogness has a separate office (Vincent 431) listed on the department webpage, but is rarely there.

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Email is generally the best way to reach either of us. Please send any messages about the course to both of us, and include “8001” in the title to facilitate any email searches or filters.

**Course Webpage.** <http://www.math.umn.edu/~rogness/math8001/>

**Textbook.** Krantz, *How to Teach Mathematics*. Make sure to get the **second edition**.

**Grades.** S/N. To receive a passing grade you are expected to: attend all class sessions; complete assigned readings before class begins; be an active participant during discussions throughout the semester; and complete the occasional assignments given in class. We will notify you if you are in danger of not passing the course, but you should always feel free to ask us about your status.

**Other Policies.** We will follow all University and College policies regarding academic honesty and other matters.

#### CLASS SCHEDULE

The following session schedule is tentative and may be updated throughout the semester.

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**1/27/12: Organizational Meeting.** During this session we will talk about the course and discuss future plans for a graduate student mentoring program.

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**2/3/12: Guiding Principles.** Chapter 1 of Krantz discusses broad issues involved in teaching, ranging from time management to use of technology and respecting one’s students. All of the topics here will be discussed in greater depth later in the semester, but this chapter provides a nice starting point for discussing our goals for teaching and how to achieve them.

*Before class:* Read Krantz, Prefaces and Chapter 1

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**2/10/12: Practical Matters.** Chapter 2 of Krantz gives advice on everything from blackboard technique to grading. The advice in this chapter is common sense and generally not controversial, but very helpful for teaching effectively.

*Before class:* Read Krantz, Chapter 2

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**2/17/12: How to Write and Deliver a Good Lecture.** Although many classes use groupwork and technology, lectures are still the bread and butter of mathematics teaching. Giving a lecture which is well organized, informative, and engaging is one of the most important skills you can develop.

*Before class:* Reflect on courses you've taken as a student. Which instructors have given the best (or worst) lectures? How so?

*After class:* Write a set of lecture notes for one 50 minute lecture on a textbook section designated by the instructor.

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**2/24/12: Spiritual Matters.** Krantz uses the phrase *Spiritual Matters* to refer to the philosophical issues connected to teaching: Why do we need mathematics teachers? How do students learn? How can we relate to and engage our students? The questions in this chapter have no definitive answers, but thinking through these issues and forming your own opinions is a hallmark of being a good teacher.

*Before class:* Read Krantz, Chapter 3

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**3/2/12: Groupwork.** Many courses at the University and other schools make extensive use of groupwork. This week we will discuss the rationale behind this movement, and what goes into creating effective groupwork activities and leading groupwork sessions.

*Before class:* Read Appendices by Davis, Dubinsky

*After class:* Create two groupworks, as described by the instructors. (One focusing on computational practice, the other involving more in-depth problem solving to extend ideas from class.)

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**3/9/12: Writing Exams.** New teachers (and many veterans) routinely give exams whose length and/or difficulty are off target. What goes into writing a good exam? What are the advantages and disadvantages to take-home exams?

*Before class:* Read appendix by Bill McCallum

*After class:* Write a 50 minute exam covering material designated by the instructors. We will provide you with a L<sup>A</sup>T<sub>E</sub>X template.

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Spring Break

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**3/23/12: Designing a Course and Writing a Syllabus.** Most first time lecturers in our department teach in a course with a fixed textbook and list of sections to cover, but must still write their own syllabus. Later in your career you'll have opportunities to choose your own textbooks, create your own schedule, design your own grading scheme, and so on.

*Before class:* Review Sections 2.12 and 2.13 in Krantz.

*After class:* Write a syllbus for a math department course of your choice. (Not including the homework for each week.)

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**3/30/12: Managing a Large Lecture Course.** Running a large lecture course with multiple sections and TAs is a challenging teaching assignment, but also requires a lot of administrative work.

*Before class:* Review Section 2.15 in Krantz

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**4/6/12: Teaching a Summer Course.** Summer school classes are often the first courses our graduate students teach autonomously. The compressed schedule, with multiple hours of class time per day, creates logistical and pedagogical issues.

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**4/13/12: Difficult Matters.** Teaching is full of potential frustrations, ranging from students who cheat on assignments those who plead for an incomplete. Fortunately these situations are relatively rare, but it pays to think in advance about how you will deal with them.

*Before class:* Read Krantz, Chapter 4

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**4/20/12: When Things Go Wrong.** Krantz's Chapter 4, discussed in Week , describes some of the worst case scenarios you can run across in teaching. However, there are plenty of smaller problems which can arise. What do you do if you realize that a lecture was ineffective and your students are lost? What if the whole class does poorly on an exam?

*Before class:* Read CBMS Case Study *What Were They Thinking? Coping With Poor Exam Results*

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**4/27/12: Teaching with Technology.** Math teachers have many technological tools available, including non-math specific course management websites (like Moodle) to online homework systems (like Webwork). Technology can also be incorporated directly into lectures or discussion sections, but this requires careful consideration and preparation.

*After class:* Complete the Webwork orientation assignment created for this class.

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**5/4/12: How to Give a Good Math Talk.** Speaking in a department seminar is similar to giving a lecture in a class, but a talk for a more general audience—e.g. a colloquium, public lecture, or job talk—should be organized and presented differently.

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**Additional Assignment:** During one of the weeks with no homework assignments, you will be paired and asked to attend and evaluate each others' discussion sections.