

Math 428 G MWF 2 341 Altgeld Hall Class Organization Fall 2017

Instructor: Prof. Bruce Reznick, 327 Altgeld, 333–4284, reznick@math.uiuc.edu. My phone has voice mail and I frequently check and reply to my email, including weekends. Office hours are by appointment. I take them seriously, and they can usually be arranged within 24 hours. You are also encouraged to ask me questions immediately before or (especially) during class. I enjoy answering questions by email, so that I can post the (anonymized) question and my answer on the webpage (see below) for all to see. This will also be a requirement (see below). I'm terrible with names; don't take it personally, even if we already know each other. It will be a privilege and a pleasure for me to spend the semester talking and listening to each and every one of you.

It makes me sad to see students with open electronic devices in class. I will do my best to be constantly “present” in 341 Altgeld, and request the same of you.

A phone and e-mail list will be distributed once the class stabilizes. It is my policy not to give individual homework help on pending problems. But if you ask a question in class or in email, I can further explain the underlying mathematics to *everybody*.

This page will have “class diary” summarizing the class day by day, providing links to handouts, and containing my responses to all questions sent to me by email. I also have an ongoing page of useful mathematical links, to which you are invited to contribute.

<http://www.math.uiuc.edu/~reznick/math428F17.html>

<http://www.math.uiuc.edu/~reznick/F17links.html>

Text and Syllabus: When I was asked to teach Math 428, the instructions were to teach a class that somehow uses both Math 425 and 427. What I decided to do is to do a version of a graduate topics course which I've offered a couple of times. The nominal object of study is the Stern sequence, which is in combinatorial number theory. But there are natural questions about it which can be answered using tools from algebra, analysis, combinatorics, number theory and probability, and maybe other things. A rough model is the classical *Bolero* by Ravel. The same melody is repeatedly played but with an ever-increasing set of instruments, with an ever-richer orchestration.

My plan is to distribute class notes I've already written and add material that might supplement it for undergrads. I'm not completely sure what direction the class will go. Previous classes give one guide, but your interest will seriously affect what we cover. Depending on class preference, I can either print them out, or make them readily downloadable. I will also give you access to relevant research papers.

Your work: My guess is that there will be maybe 7 or 8 homeworks in the first part of the semester. These will partially be on the Stern material and partly on the tools. I'm guessing that there should be one exam on this, but you could talk me out of that with persuasive arguments.

I also would like you to work on a project, and this is different from Math 496, because I want to limit the subject to something connected with the Stern sequence and because I'd

prefer people to work in self-constructed groups of two to four. The people who can't find a group to work in will be combined to work together! I'll also specifically suggest topics, but I think you'll get more out of it if you come up with them yourselves.

I will want you to write up the group project at the end of the semester and also present your results to the class.

Because of the nature of the course, you are expected to attend every day; please let me know if you have a reasonable excuse for missing class. ("Oversleeping" doesn't work for a class at 2pm!)

Participation: I've been doing this for the last few years and this activity has proved popular. A small portion of the grade is the easiest to achieve. Send me at least five emails during the semester (at least a week apart) with questions about material from the lectures or the reading from the book (but not the homework or exams). Your questions will be of great value to me in helping structure my explanations in class. Put "428 Class Participation" in the subject line!

Grading Policy: Let's say 5% participation, 10% attendance, 50% on the homework and the exam and 50% on the project and its presentation (so every member of the project needs to participate), with the lowest 15% dropped. I haven't thought this through very carefully, and welcome your suggestions. My intention is that reasonably diligent students will be pleased by their grades.

Philosophy: This course is a great opportunity for you as students and for me as an instructor. I'm not sure how things will work out. Any mathematics class should be designed for its students not its instructor, so please be proactive in giving me feedback on how things are going. It will be a privilege and a pleasure for me to spend the semester talking and listening to you. Become active, not passive in Math 428: the more you put in, the more you will get out. Let the ideas of this course get under your skin and visit your dreams. These are serious steps towards becoming a mathematician.

The Stern Sequence Since there seems to be some room here on the sheet, I thought I'd give the "array" version of the Stern sequence. You start with "01" and if " $a\ b$ " are consecutive in one row, then " $a\ a+b\ b$ " is consecutive in the next one.