Instructor: Prof. Bruce Reznick, 327 Altgeld Hall, 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, during and after class. I enjoy answering questions by email (which you can get credit for, see below), and so that I can post the (anonymized) question and my answer on our webpage.

http://www.math.uiuc.edu/~reznick/math199F15.html
http://www.math.uiuc.edu/~reznick/F15links.html

The main page will have a “class diary” summarizing the class day by day, with links to handouts, and responses to all relevant questions sent to me by email. You are invited to contribute to the ongoing page of useful mathematical links. I’m terrible with names; please don’t take it personally.

General Orientation: I have taught number theory many times in many different formats here, but this is the first time I am doing so as part of the Campus Honors Program, and the first time in which significant numbers of the class are not math majors. The idea is a guided discovery process in which you work on problems and find patterns, which we will later verify and prove. The details of how the class proceeds will be strongly influenced by class interests and enthusiasms.

I’ll give short lectures to introduce important concepts, and you’ll spend much of class time actively engaged in mathematics (experimenting, formulating hypotheses, and proving these hypotheses). Emphasis will be placed on thinking in a way which is simultaneously creative, clear, elegant, and logical.

There are only two prerequisites. The first is an intellectual interest in math and a willingness to engage new ideas. The second is that you cannot be currently taking Math 347, and cannot have completed any math course at the 300 level.

Students have different mathematical backgrounds, and come with different mathematical skill sets. Assignments and grading will be based on the expectation that every student will expand their skill set and will put their skills to good use. My goal is that you each succeed in this course, and I am willing to do whatever it takes, up to redefining the meaning of the word “success”.

Syllabus and Textbook: Number theory studies profound and subtle relationships among the natural numbers 1, 2, 3, 4, 5, ....... These have fascinated all known human civilizations. It is famous for vast numbers of elegant problems which are very simple to state (for example, how many prime numbers are there?) Some of these have simple solutions which have been known for thousands of years, while others have frustrated the attempts of the most brilliant thinkers for generations. Very recently, there have been very important practical applications: every time you use a secure web page, you are using number theory.

The text is *A friendly introduction to number theory, 4th ed.* by Joseph Silverman, with home page http://www.math.brown.edu/~jhs/frint.html. I will provide supplementary notes for any topic not covered in Silverman. You can find many supplemental references on the material in the course, both as books in the Mathematics Library and in many online pages. You are encouraged to explore these, and make suggestions for the link pages.
But please remember that looking up the answer somewhere else is always less meaningful than discovering it yourself.

**Grading and evaluations:** Keep in mind that I am grading your work, not you as a person. It would not be surprising for students in a CHP course to receive high grades. There is no “quota” for A’s and your helping someone else will not put your own grade at risk!

The grade is based on several components. You’ll be happy to learn that none involve exams. As Woody Allen once said, 80% of life is just showing up. In Math 199, it’s 10%. You get two unexcused absences, and then it starts going down by 1% each time. The next part is also pretty easy. Send me at least five emails during the semester with questions about material from the lectures or the reading from the book (not pending homework), at least two weeks apart. Smart students tend to be both somewhat shy and somewhat reluctant to admit publicly when they don’t understand something. Your questions will be of great value to me in helping structure my explanations in class. Put “199 Class Participation” in the subject line. This part will top out at 10%.

The next part is working on problems, both as groups in class on structured worksheets, and in weekly homeworks assigned from the book and out of my head. It will also be an explicit assignment to read ahead in the textbook before class. Each class meeting will begin with a discussion of the assigned reading. We will work out any uncertainties in those topics before proceeding to new material. Please staple or paper-clip your homework sheets (no folding over corners), and consider writing more than one draft. You are expected to spell correctly and write complete, grammatical sentences when possible in this and all your University assignments. Homework solutions will be distributed when the assignment is due. There is no outside grader for this course. I do it myself. 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. **Collaboration in studying and working the homework is strongly encouraged!** **Collaboration without comprehension is a waste of time.** Even if someone else helps you find the answer, I want to see it in your handwriting and in your words. All components of this homework will add up to 50%.

The final part of the grade will be a semester project, solo or a small group. I will suggest a number of topics related to the course material, but you can also suggest something else that interests you and has something to do with numbers. I want to maintain maximal flexibility in this. You will prepare a written report and will also give a presentation to the class. This will count for 30%.

The Final Exam slot is Tuesday, December 15 from 8:00-11:00 AM. Maybe we’ll have a small (quiet-because-there’s-an-exam-in-the-next-room) party at 10am to celebrate the end of the semester.

**Philosophy:** It will be a privilege and a pleasure for me to spend the semester talking and listening to you. Education is not a zero-sum game when done correctly. I do not consider you my adversaries, and hope the feeling will be mutual. Number theory is one of my favorite topics in mathematics, and I hope to be able to convey some of my enthusiasm. I urge you to become an active participant in Math 199. Let the ideas of this course get under your skin and visit your dreams. These are serious steps towards being able to understand and appreciate advanced mathematics.