MATH 522: Number Theory Spring 2013

Tu/Th 4-5:15 GMCS 328

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Office: GMCS 511 4-6176, Office Hours: Tu/Thu noon-2pm, and by appointment

Overview:
Number theory is the study of the divisibility properties of the natural numbers.

"Mathematics is the queen of the sciences and number theory is the queen of mathematics."
Carl Friedrich Gauss, 1856
"God invented the integers; all else is the work of man."
Leopold Kronecker, 1893
"Music is part of number theory. Nowadays when a number-theorist applies for a grant, he says that it is good for security, but in those days, way before America, he would say that it's good for music. I will not comment whether we have progressed..."
Hendrik W. Lenstra Jr., 2002

Learning Objectives:
Students will master some major theorems of number theory, including the Fundamental Theorem of Arithmetic, Fermat's Little Theorem, the Chinese Remainder Theorem, and (time permitting) Chebychev's Theorem. Students will be able to prove these theorems, and apply them to solve problems.

Textbook:
Number Theory, by George E. Andrews, ISBN 0-486-68252-8
This course will cover most of Part I of the text, at a pace of one and a half sections per class meeting on average.

Portfolio:
Students are expected to keep a portfolio in a three-ring binder or something similar, containing a detailed and complete solution to every exercise in the text (those marked $\star$ are optional). These portfolios will not be collected or checked, except upon a student's request; however, they will be an invaluable resource during exams. The exams are structured so that there will be just enough time to mimic a solution from a portfolio but not enough time to create it fresh.

Students are NOT required to personally solve every exercise appearing in their portfolios; they are strongly encouraged to collaborate with classmates. However, before accepting a classmate's solution into their portfolio, students are expected to carefully check it for completeness and correctness.

Attendance:
Students are expected to attend every class; otherwise, they are personally responsible for copying notes from a classmate. *Makeup exams are not given under any circumstances.* Two exam scores are dropped, to account for the unexpected (not to artificially raise grades).

Course Mechanics:
Each Thursday class there will be a 30 minute exam on the material since the previous exam. A typical exam will have a proof and a calculation. A calculator is necessary. Of the 12 exams, the lowest two scores will be dropped. Each exam will count 5% of the course grade. The final exam will be held on Tuesday, May 14, 3:30-5:30pm. It will be worth 30%, and class participation (based on attendance) will be the remaining 10%. The grading policy is as follows: A 92-100, B 82-87, C 72-77, D 62-67, $\pm$ as obvious

Extra Credit:
On the Tuesday after an exam (before the exam is returned), students may submit extra credit to improve their grades. To do this, they submit a revised solutions to the *entire* exam. The grade they earn on this revised exam will be averaged with the original grade (rounding down). Students may do this *at most three times*.