

U430 – NUMBER THEORY (Fall 2008)

- Time:** Mondays, Wednesdays & Thursdays 4:35 pm – 5:40 pm
- Place:** 155 Ryder Hall
- Instructor:** Professor Egon Schulte
469 Lake Hall, 373-5511
schulte@neu.edu, www.math.neu.edu/~schulte
- Office hours:** M 2:50–3:55, W 2:50–3:55, Th 11:45-12:50, and by appointment.
- Text:** J.H.Silverman, *A Friendly Introduction to Number Theory*
(Third Edition), Pearson Prentice Hall, 2006.

Course Outline

The course covers most of Chapters 1–27 of the book.

- Week of September 8: Ch. 1 – What is Number Theory?
Ch. 2 – Pythagorean Triples
- Week of September 15: Ch. 3 – Pythagorean Triples and the Unit Circle
Ch. 4 – Sums of Higher Powers and Fermat’s Last Theorem
Ch. 5 – Divisibility and the Greatest Common Divisor
- Week of September 22: Ch. 6 – Linear Equations and the Greatest Common Divisor
Ch. 7 – Factorization and the Fundamental Theorem of Arithmetic
- Week of September 29: Ch. 8 – Congruences
Ch. 9 – Congruences, Powers, and Fermat’s Little Theorem
Ch.10 – Congruences, Powers, and Euler’s Formula
- Week of October 6: Ch.11 – Euler’s Phi Function and the Chinese Remainder Theorem
Ch.12 – Prime Numbers

Week of October 13:	Ch.13 – Counting Primes Ch.14 – Mersenne Primes
Week of October 20:	Ch.15 – Mersenne Primes and Perfect Numbers Ch.16 – Powers Modulo m and Successive Squaring
Week of October 27:	Ch.17 – Computing k^{th} Roots Modulo m Ch.18 – Powers, Roots, and “Unbreakable Codes”
Week of November 3:	Ch.19 – Primality Testing and Carmichael Numbers Ch.20 – Euler’s Phi Function and Sums of Divisors
Week of November 10:	Ch.21 – Powers Modulo p and Primitive Roots Ch.22 – Primitive Roots and Indices
Week of November 17:	Ch.23 – Squares Modulo p Ch.24 – Is -1 a Square Modulo p ? Is 2?
Week of November 24:	Ch.25 – Quadratic Reciprocity
Week of December 1:	Ch.25 (cont.) – Quadratic Reciprocity Ch.26 – Which Primes are Sums of Two Squares? Ch.27 – Which Numbers are Sums of Two Squares?
Week of December 8:	Review

Final Exam: Tuesday, December 18, 2008 at 8:00 am

Grading: There will be five 45-minute Tests counting 60% in all. Your lowest Test score will be dropped; only the highest four scores will count. There are no make-ups. The two-hour Final Exam will count 40%, or 50% if it helps your grade (in this case the Test scores are counted proportionally).

Final Exam: All students without legitimate conflicts must take the final exam at the scheduled time. Contact the Registrar if you have a time conflict or three finals in one day.

Attendance Policy: Your regular attendance is expected. It is your responsibility to know assignments and other class information including any changes to the syllabus the instructor may make as they are announced in class. Students are responsible to know about all information given, even when they are absent. Feel free to use e-mail to ask me.

To Talk to Someone Else: If you have a concern about the course or the instructor that cannot be resolved by speaking to the instructor, the next step is to speak with the Undergraduate Director, Professor Martsinkovsky (471 Lake Hall, x5510, alexmart@neu.edu).

Academic Honesty from Student Code of Conduct: see

<http://www.northeastern.edu/osccr/academichonesty.html>

“A necessary prerequisite to the attainment of the goals of the University is maintaining complete honesty in all academic work. Students are expected to present as their own only that which is clearly their own work in tests and in any material submitted for credit. Students may not assist others in presenting work that is not their own. Offenders are subject to disciplinary action.”

Changing grades, Incompletes: It is University policy that no grade, including an Incomplete, may be changed after one year. Exceptions must be authorized by the Academic Standing Committee. Note that an “Incomplete” grade request requires a written understanding (contract) between the Instructor and student with details about what material will be made up and how. They are normally appropriate only for a student who is doing well, but becomes ill, or has a family emergency late in the semester.

MTH U430 course description from Undergraduate Catalog:

Introductory course in number theory. The topics include: linear diophantine equations, congruences, design of magic squares, Fermat’s little theorem, Euler’s Formula, Euler’s phi function, computing powers and roots in modular arithmetic, the RSA encryption system, primitive roots and indices, the Law of quadratic reciprocity; also, as time permits: diophantine approximation and Pell’s equation, elliptic curves, points on elliptic curves modulo p , elliptic curves and Fermat’s last theorem.