

Math 420 – Introduction to the theory of numbers (3 credits)
University of Hawai‘i at Mānoa
Fall 2015

Course catalog description: Congruences, quadratic residues, arithmetic functions, distribution of primes. Emphasis is on teaching theory and writing, not computation.

Prerequisites: 321 or consent.

Recommended textbooks: *Elementary number theory*, Gareth A. Jones, Josephine M. Jones, Springer, or *Number theory*, George E. Andrews, Dover

Extended description: Elementary number theory contains many interesting ideas and results dating from antiquity to current research and these do not all fit into one semester. As such, the topics for this course include those listed in the catalog description, as well as optional topics selected according to the instructor’s tastes. These may include, but are not limited to: Pythagorean triples, sums of squares and integral quadratic forms, Diophantine equations (Pell’s equation, Fermat’s Last Theorem, elliptic curves, ...), perfect numbers, continued fractions, units modulo n , algebraic numbers, the partition function, primality tests, factorization, and cryptographic applications.

Additional comments: Math 420 is taught only in a writing-intensive format. Students will be required to do a substantial amount of mathematical writing. This course will be conducted so as to satisfy the hallmarks for writing-intensive classes, as described here: <http://manoa.hawaii.edu/mwp/faculty/hallmarks> .

Student learning outcomes: A successful student will:

- have an understanding of the major concepts of linear algebra,
- know the principal results and constructions in the theory,
- be able to compute examples,
- be able to apply techniques learned in 311 and 321 to write proofs beyond an introductory level.

Program objectives: The successful student in this Senior level course will study and learn Number Theory, a central topic of mathematics. The student will develop skill in writing direct proofs, proofs by contradiction, and proofs by induction. The student will formulate definitions and give examples and counter examples. The student will learn to read mathematics without supervision.