Version Fall 2017

Math 661 – Introduction to algebraic number theory (3 credits)
University of Hawai'i at Mānoa

Course catalog description: Number fields and rings of integers; primes, factorization, and ramification theory; finiteness of the class group; Dirichlet's Unit Theorem; valuations, completions, and local fields. Further topics. Graduate students only.

Prerequisites: 611 (with a minimum grade of B−)

Recommended textbooks: J. Neukirch *Algebraic number theory*, A. Fröhlich and M. J. Taylor *Algebraic number theory*, Ş. Alaca and K. S. Williams *Introductory algebraic number theory*, S. Lang *Algebraic number theory*, ...

Extended description: Given the possible variation of the presentation of the material (as seen, for instance, in the possible textbooks listed above), a week-by-week schedule is not included. Instead, a list of topics to be covered, as well as some possible additional topics at the discretion of the instructor, are given.

Algebraic integers and integrality, discriminants, ideals in rings of integers and factorization, ramification theory, the decomposition group and the inertia group, finiteness of the class group, Dirichlet's Unit Theorem, completions and p-adic methods, examples: quadratic fields and cyclotomic fields. Further topics may include: further low degree examples, Dedekind domains, the structure of local fields, global function fields, adeles, the different and higher ramification groups, the regulator, zeta- and L-functions, Galois representations, diophantine equations.

Additional comments: The objective of this course is to introduce the student to the fundamental objects and results of algebraic number theory, thus providing a fairly standard foundation for further study.

Student learning outcomes: Upon successful completion of Math 661, the student will be able to read and comprehend more advanced material, provide common examples, carry out various standard computations in algebraic number theory, and use some of the fundamental methods of the subject on more advanced and specialized problems.