THE MATHEMATICS DEPARTMENT PRESENTS

A MATHEMATICS COLLOQUIUM

FRIDAY, May 30, 2008
BOND HALL 428
3:00 pm

Title: **Algebraic Number Fields and the Equation** $x^3 + y^3 = z^3$

Speaker: **Elisabeth Briggs**, Western Washington University

Abstract:

An algebraic number field is a subfield of the field $\mathbb{A}$ of algebraic numbers. A quadratic field is of the form $\mathbb{Q}(\alpha)$, where α is a zero of an irreducible quadratic polynomial over $\mathbb{Q}$. With some work, one can establish that a quadratic field is of the form $\mathbb{Q}(\sqrt{d})$, where d is a square-free rational integer. We are interested in the case when $\mathbb{Q}(\sqrt{d})$ is a unique factorization domain. This will be established by means of the theory of Euclidean fields. The goal is to prove that $x^3 + y^3 = z^3$ has no solutions in positive rational integers using quadratic fields. When Euler first attempted to prove this result he incorrectly assumed that $\mathbb{Z}[\sqrt{-3}]$ is a unique factorization domain. His second proof used a completely different method, that of infinite descent. In this talk I will prove the result using a unique factorization domain that is actually a field, specifically $\mathbb{Q}(\sqrt{-3})$.

Refreshments will precede the talk at 2:30pm in Bond Hall 300
courtesy of Ms. Sandy Briggs