

## MATH 662 (SECTION 602), SPRING 2006

### DIOPHANTINE APPROXIMATIONS AND GEOMETRY OF NUMBERS

**Instructor:** Lenny Fukshansky, Milner 209, 845-7797, lenny@math.tamu.edu

**Time and place:** Tuesdays and Thursdays 3:55 - 5:10 pm in Blocker 155

**Prerequisite:** Some background in algebra and analysis is helpful; no knowledge of number theory will be assumed.

**Text:** No text is required. Notes and additional materials will be passed out in class. Suggested reading includes:

- (1) "Geometry of Numbers" by P. M. Gruber and C. G. Lekkerkerker, North Holland, 1987, 2-nd edition
- (2) "Diophantine Approximations and Diophantine Equations" by W. M. Schmidt, Springer, Lecture Notes in Mathematics 1467, 1991

**Course Description:** This course will treat a variety of topics in the general area of "Diophantine Problems in Number Theory". Geometry of Numbers is a beautiful subject, the classical foundations of which go back to Minkowski and have deep applications to modern mathematics. We will start with a discussion of lattices and convex bodies, including such topics as lattice points in compact domains, successive minima, theorems of Minkowski, inhomogeneous minimum, and related. We will then apply these ideas to Diophantine Approximations, a powerful area of Number Theory that developed strongly in the 20-th century, in particular leading up to two Fields medals: Klaus Roth (1958) and Alan Baker (1970). Here we will discuss Dirichlet's theorem, Liouville's theorem, Roth's theorem, absolute values, height functions, Siegel's lemma, and related. Further topics, if time allows, will largely depend on the interests of the audience and may include:

Geometry of Numbers: various connections to discrete geometry, geometric combinatorics, and introduction to sphere packings and coverings;

Diophantine Approximations: Mahler's measure, Lehmer's problem, connections to arithmetic geometry.

**Grading:** Based on class participation and student presentations.

**I will be happy to talk to anyone interested in this course!**