

Speaker: Sean Walsh
University of Notre Dame

Thursday, March 20, 2008
2:00 pm
356 Fitzpatrick Hall

Title: Henstock-Kurzweil Integration and Descriptive Set Theory

Abstract:

The Henstock-Kurzweil Integral is an integral which extends the Lebesgue integral and which can integrate any derivative. The Lebesgue integrable functions are a Polish space, i.e., a separable completely metrizable topological space, one of the basic objects of descriptive set theory. KeCHRIS and DOUGHERTY, building on earlier work of AJTAI and WOODIN, studied the derivatives and showed that unlike the Lebesgue integrable functions, they had a very high descriptive set theory complexity, and in particular that they were Π_1^1 but not Σ_1^1 . This raises the natural question of the descriptive set theory complexity of the Henstock-Kurzweil integrable functions themselves. In this talk we show that the relation f is Henstock-Kurzweil integrable and $F(x) = \int_0^x f$ also has very high descriptive set theory complexity, and in particular is Π_1^1 but not Σ_1^1 . [NOTE: for a version of the abstract that contains references, see <http://www.nd.edu/~dlippel/seminar/walsh.pdf>]