1047-11-284 **Vitaly Bergelson*** (`vitaly@math.ohio-state.edu`), Department of Mathematics, Ohio State University, Columbus, OH 43210. *Polynomial extensions of Szemeredi's theorem on arithmetic progressions and ergodic theory.*

Polynomial Szemeredi theorem (joint result with A. Leibman) states that if p_i, i=1,2,...,k are polynomials with integer coefficients which satisfy $p_i(0)=0$, then any set A in N which has positive upper density contains "many" polynomial configurations of the form a, $a+p_1(n)$, $a+p_2(n)$,...,$a+p_k(n)$. (The classical Szemeredi theorem corresponds to the case where $p_i(n)= in$, i=1,2,...,k).

We will discuss two new extensions of the Polynomial Szemeredi Theorem.

One of these extensions (joint work with A. Leibman and E. Lesigne) establishes necessary and sufficient conditions for a set of polynomials to satisfy the Polynomial Szemeredi Theorem.

Another extension (joint work with R. McCutcheon) deals with the "upgrade" of the Polynomial Szemeredi Theorem to the so called generalized polynomials, namely functions which are obtained from regular polynomials via iterated use of the floor function. (Received January 30, 2009)