



MODERN METHODS

January 24 – February 25, 2005

in RAMSEY THEORY

PROGRAM FOR THE 1ST WEEK JANUARY 24 - JANUARY 28

All lectures are held in S5 unless noted otherwise

Mo, Jan 24

09-12 *E. Friedgut* MODERN METHODS IN RAMSEY THEORY
14-17 *M. Schacht, Z. Dvořák* EXERCISES

Tu, Jan 25

09-12 *E. Friedgut* MODERN METHODS IN RAMSEY THEORY
14-17 *M. Schacht, Z. Dvořák* EXERCISES

We, Jan 26

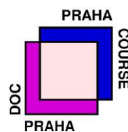
10 *J. Matoušek* GEOMETRIC SELECTION AND OTHER GEOMETRY RAMSEY-TYPE THEOREMS

Th, Jan 27

10.30 THE ANNUAL REVIEW OF ITI
14 ITI DAY

Fr, Jan 28

10 *J. Nešetřil* CHARACTERIZATION OF RAMSEY CLASSES



DocCourse Prague 2005

MODERN METHODS IN RAMSEY THEORY

Programme coordinators:

Jiří Matoušek and Jaroslav Nešetřil

COMBSTRU / DIMATIA

KAM ITI MFF UK

Malostranské náměstí 25

118 00 Praha 1

<http://dimatia.mff.cuni.cz/doccourse>

Let us consider n segments in the plane. By Ramsey's theorem for graphs, we can find k segments among them such that either every two intersect or every two are disjoint, where k is about $\log n$. But this result actually holds with k about $n^{1/5}$. Geometry can thus be used to strengthen the Ramsey-type result considerably. We will discuss several results of this type and some methods of achieving them. In particular, we will state the so-called selection lemma and call attention to a general lack of knowledge about quantitative bounds in it. It should be remarked that this lecture touches only a small part among many issues that deserve to belong to "geometric Ramsey theory".

Ramsey classes (defined first in 70ties) are classes of structures for which a Ramsey-type theorem holds for partitions (i.e. colorings) of all subobjects in any number of classes. Thus Ramsey theorem amounts to saying that finite complete graphs are a Ramsey class. Also (multi-dimensional) Hales-Jewett theorem induces a Ramsey class. We show a relationship of Ramsey classes with notions from model theory and with homogeneous structures in particular. This allows us to characterize all Ramsey classes in several important instances. Many problems remain.