

March 30, 2009

MATH 285G - Spring 2009 - Topics in Analysis

Time and Place: MS 6201, MWF 11:00, starting March 30.

Office hours: John Garnett MWF 2:30 in MS 7941.

Texts:

Harmonic Measure, by Garnett and Marshall, (Cambridge University Press, 2008, cheaper in paperback) .

Harmonic Measure, Geometric and Analytic Points of View, by Capogna, Kenig and Lanzani, (American Mathematical Society, 2005, also \$28 for members).

Plan:

We will discuss harmonic measure in simply connected domains in the plane in and in \mathbb{R}^d , $d \geq 3$. The two theories are somewhat different and use different methods; univalent function theory in the case of two dimensions, and PDE and Geometric Measure Theory in the case of higher dimensions. We will spend about 1/2 of the course on each case, and use the well developed planar theory as a road map for what people should try to prove in higher dimensions.

Topics:

1. Brownian Motion and Harmonic Measure.
2. Simply connected plane domains, Koebe et. al.
3. $\log \varphi'$, Bloch functions, quasicircles, chord-arc curves, etc.
4. Makarov's theorems on Hausdorff measure.
5. Potential Theory for domains in \mathbb{R}^d , $d \geq 3$.
6. Reifenberg flat domains and chord-arc domains.

The first four topics come from the Garnett-Marshall book, and the last two come from Capogna-Kenig-Lanzani.

Homework:

There will be some homework problems to keep students alert.

- J. Garnett