

Presentation Topics

1. Radon-Nikodym Theorem [Bass, Ch. 13]; 1 unit.
2. Hausdorff outer measure (of any dimension) is a metric outer measure + 0-dimensional Hausdorff measure is the counting measure [hints in Falconer, p.7]; 1 unit.
3. Key Lemma + corollary on Hausdorff dimension [Lecture notes; hints in Falconer, p.7]; 1 unit.
4. A set $X \subset \mathbb{R}^n$ is Hausdorff measurable iff X is contained in a G_δ -set G with $G \setminus X$ of measure 0 iff X contains an F_σ -set F with $X \setminus F$ of measure 0 [cf. Falconer, Thm. 1.6]; 1 unit.
5. Vitali Covering Theorem (including lemmas) [Falconer, Thm. 1.10]; 2 units.
6. In \mathbb{R}^n , the n -dimensional Hausdorff measure coincides with Lebesgue measure [Falconer, Thm. 1.12]; 1 unit.

NB. Each unit should be presented by one student, and should take between 15 and 25 minutes.

References:

1. R. F. Bass, *Real analysis for graduate students*, online, 2016.
2. K. J. Falconer, *The geometry of fractal sets*, Cambridge University Press, 1985.