

Title: Analysis on metric measure spaces via energy

Abstract: On smooth manifolds we can do analysis by viewing them at sufficiently small scales, at which they appear to be locally flat. We can even allow some singularities. However, there is demand for analysis on spaces that are 'everywhere rough at any scale': Subjects like nanotechnology, condensed matter physics, molecular biology, polymer chemistry or membrane physics discuss phenomena for which local linearizations seem less appropriate than in classical mechanics, say. Dimensionally extreme objects like space filling curves or layers having extremely huge area motivate a general study of spaces that do not carry any differentiable structure. There are several approaches, for instance via Lipschitz functions and upper gradients (Cheeger, Heinonen et al). We follow an approach via energy forms, created in the 80's by Goldstein, Kusuoka, Barlow, Bass and others, connecting analysis, geometry and probability. The first part of the talk will give a gentle introduction. In the second part we will mention some of our own results, mostly on a corresponding vector analysis.