V5F3 - Advanced Topics in Stochastic Analysis

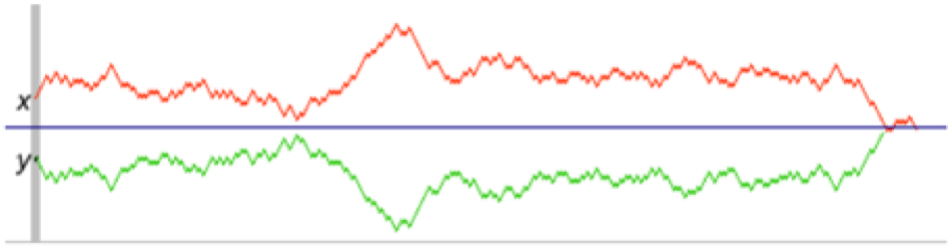
Probabilistic methods in geometry and analysis (Sommer 2017)

Montag	12.15 – 14	Endenicher Allee 60	Room $N0.003$ (Neubau)
Donnerstag	14.15 – 16	Endenicher Allee 60	Room $N0.003$ (Neubau)

We will talk about several techniques used to study diffusions on curved spaces. First part will be on what might be called *geometry of diffusion operators*. In particular, we will discuss classical results such as Bochner-Weitzenböck formula, as well as more recent developments such as curvature-dimension inequalities and related results due to Bakry, Emery, Ledoux *et al*. The focus of this part of the course is proving functional inequalities using the geometry of diffusion operators. This also leads to the heat kernel analysis on Riemannian manifolds whose Ricci curvature is bounded from below. Some of these topics (along with many others) are covered in a recent monograph *Analysis and geometry of Markov diffusion operators* by D. Bakry, I. Gentil, and M. Ledoux. One of the possibilities after this is to study very recent results in sub-Riemannian geometry with applications to hypoelliptic operators.

The second part of the course will deal with another technique called the *coupling method*. In particular, we will see how this method can be used in analysis to prove estimates such as gradient estimates etc. We will start with simple examples and then move to more geometric settings. If time permits we will talk about the Lindvall–Rogers and Cranston–Kendall couplings and recent developments for hypoelliptic diffusions.

The course assumes knowing basic real analysis, probability and stochastic processes, with no differential geometry background.



Questions? Email the instructor, Masha Gordina, at `maria.gordina@uconn.edu`.