Topics in Mathematics 1 (in English)

Course Syllabus

Spring Term 2018 — SNU

Course Title	Special lecture "Generalized Dirichlet forms Analysis and Probability on local Dirichlet spaces "
Course number	3341.721A
Instructor	Gerald Trutnau
E–Mail	trutnau@snu.ac.kr
Course homepage	`http://www.math.snu.ac.kr/~trutnau/teachingGDF-2018.html`
Prerequesites	Good knowledge in Analysis and Measure Theory. Some basic knowledge in Stochastic Analysis, Probability, Partial Differential Equations and Functional Analysis.
Course Objective	We will study generalized Dirichlet forms (e.g. symmetric, non-symmetric and non-sectorial Dirichlet forms as introduced in the references), the corresponding C_0-semigroups, generators and resolvents and consider the associated stochastic process, which exists under some regularity assumptions. We then study related topics, which could be: elliptic regularity and pointwise weak solutions to Stochastic Differential Equations, recurrence and transience, conservativeness or non-explosion, uniqueness of invariant measures, or heat kernel estimates, as presented in the references and in the references of the references. We may also study some other topics that will be precised later in some update or during the lecture.
Evaluation	- Attendance: (will not be checked). However, students are supposed to know the material taught in class. Students must accomplish two take home exams. - Take Home Exam I (5-7th week, 40 % of final score); - Take Home Exam II (12-13th week, 40 % of final score); Other: (20 % of final score)

References

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- Bouleau, N., Hirsch, F.: Dirichlet forms and Analysis on Wiener space, Walter de Gruyter, Berlin, 1991.

- Carlen, E. A.; Kusuoka, S.; Stroock, D. W.: Upper bounds for symmetric Markov transition functions. Ann. Inst. H. Poincaré Probab. Statist. 23 (1987), no. 2, suppl., 245–287.

- Fukushima, M.,Oshima, Y., Takeda, M.: Dirichlet forms and Symmetric Markov processes. Berlin-New York: Walter de Gruyter 1994 (or new edition 2011).

- Ma, Z.M., Röckner, M.: Introduction to the Theory of (Non-Symmetric) Dirichlet Forms. Berlin: Springer 1992.

- Oshima, Y.: Semi-Dirichlet forms and Markov processes, Walter de Gruyter, Berlin, 2013.

- Stannat, W.: The theory of generalized Dirichlet forms and its applications in analysis and stochastics, Mem. Amer.Math. Soc., 142 (1999), no. 678.

- Trutnau, G.: Stochastic Calculus of Generalized Dirichlet Forms and Applications, Osaka J. Math. 37 (2000).