Math 545 – Stochastic Partial Differential Equations

Course Description from Bulletin: This course introduces various methods for understanding solutions and dynamical behaviors of stochastic partial differential equations arising from mathematical modeling in science and engineering and other areas. It is designed for graduate students who would like to use stochastic methods in their research or to learn such methods for long term career development. Topics include: Random variables, Brownian motion and stochastic calculus in Hilbert spaces; Stochastic heat equation; Stochastic wave equation; Analytical and approximation techniques; Stochastic numerical simulations via Matlab; Dynamical impact of noises; Stochastic flows and cocycles; Invariant measures, Lyapunov exponents and ergodicity; and applications to engineering and science and other areas.

Enrollment: Elective for AM and other majors.

Textbook(s): G. Da Prato & J. Zabczyk: *Stochastic Equations in Infinite Dimensions*, Cambridge University Press, 1992.

f. Numerical simulation of stochastic differential equations via Matlab 4
g. Dynamical systems approach for stochastic partial differential equations 4
h. Liapunov exponents and ergodic theory 2
i. Stochastic bifurcation 2
j. Noise-induced phenomena 2
k. Invariant manifold reduction of random systems 4
l. Macroscopic modeling of random systems 2

Assessment:

Homework	10-30%
Computer Programs/Project	10-20%
Quizzes/Tests	20-50%
Final Exam	30-50%

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