

Syllabus

Topics in Probability: Controlled Diffusion Processes, Math 8660, Spring 2008

Lectures:	11:15-12:05 MWF VinH 213
Instructor:	Nicolai Krylov, VinH 225, tel. 625-8338, krylov@math.umn.edu http://www.math.umn.edu/~krylov
Office hours:	MWF, 12:20-13:10
Textbook:	Lecture notes will be provided
Prerequisites:	Itô stochastic integral, basics of martingales
Final examination:	Take home final due Tuesday, May 13.

Topics include

- Numerous examples of controlled diffusion processes including singular control problems arising in finance and problems with constraints like in finite fuel problem
- Connections with fully nonlinear elliptic and parabolic equations, in particular, elliptic and parabolic Monge–Ampère equations
- General properties of value functions (like Bellman’s principle)
- Linear controlled processes with quadratic cost functions
- Existence and uniqueness of solutions of Bellman’s equations
- L_p -estimates of distribution densities of stochastic integrals
- Finding optimal and ε -optimal policies
- Viscosity solutions approach to stochastic control
- Numerical approximations of the solutions
- Controlled processes in domains

I do not know yet how far we will be able to go.

A few homeworks will be assigned and will form part of the final grade.