

# FIM

# Minicourse

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## Stochastic Variational Analysis

May 9, 16 and 23, 2012

Wednesdays, 13:00 - 15:00, HG G 43, ETH Zürich, Rämistrasse 101

### Abstract

„Stochastic Variational Analysis“ emerged in response to the need of solving (generalized) equations systems, optimization and variational problems whose parameters are, in part, stochastic. Problems of this type arise in stochastic optimization, stochastic equilibrium problems, uncertainty quantification, statistical estimation problems that turn up in a broad variety of engineering, economics, finance, energy networks, signal processing, ecology and biological problems.

These lectures will be introductory in nature, and as much as time will allow, will concentrate on applications. Because the solutions to such systems aren't generally unique, one can't rely on classical probabilistic techniques to either describe their solutions or find (probabilistic) approximations that might, in turn, be based on standard laws of large numbers and associated asymptotic analysis.

The foundations of the theory lie in an understanding of the geometry and the analytic (topological) properties of random sets, including a suitable translation to a functional setting, coupled with both appropriate laws of large numbers, i.e., what can be learned from large samples, and fundamental inequalities, i.e., what can be learned from small samples. This dual approach is fundamental to the potential applications of the theory in practical settings.

Prerequisites: An open mind and a reasonable level of mathematical maturity

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