**Math 505**  
**Stochastic Analysis I**  
**MWF 9:00 – 9:50**  
**Fall 2017**

**Instructor:** Professor Alexander Melnikov  
CAB 589, Ph. 492-0568, e-mail: melnikov@ualberta.ca

**Syllabus:**
The main aim of this course is to give an accessible introduction to the main ideas, methods and techniques of stochastic analysis (stochastic calculus, general theory of stochastic processes) in discrete time. The course will also present interconnections among disciplines of stochastic analysis, probability, statistics, mathematical finance and insurance encouraging students to further study of the subject.

The course will cover:
-Martingales and martingale-like stochastic sequences, related notions and results: stochastic basis, filtration, stopping times, predictability, conditional expectations, absolute continuity of probability measures, Doob’s decomposition, inequalities, convergence of martingales, discrete time stochastic integration and discrete time stochastic differential equations, first knowledge about martingale representations and transformations of probability measures (Girsanov’s theorem), strong law of large numbers for martingales, strong consistency of the least squares estimates in regression models with martingale errors, boundary value problems for stochastic sequences and their connections with mathematical finance, transition from discrete time to continuous time stochastic analysis.

**Prerequisite:** STAT 471 or consent of the Department.

**Textbooks:**
A.N.Shiryaev, Probability, Springer, 1996 or later (main textbook).

**Grading:**
Final exam 50%, Midterm exam 30%, Homework 20%. 