The course is devoted to continuous-time stochastic processes, with examples drawn from applications in finance.

The course will cover the following topics.

1. Introduction to continuous-time stochastic processes. Martingales, Gaussian processes, Markov processes, Levy processes.

2. Brownian motion, construction, properties, quadratic variation, Brownian functionals, including first hitting times, maximum and minimum, average, absorbed and reflected Brownian motion.

3. Stochastic calculus for processes adapted to a Brownian filtration. Stochastic integration with respect to Brownian motion, Ito’s formula, changes of probability measure, Girsanov’s theorem, time changes, Dambis-Dubins-Schwarz Theorem. Continuous semimartingales.


6. Processes with jumps II. Semimartingales and their stochastic calculus.