This thesis is dedicated to selected stochastic methods used in finance, which are applied to the software Mathematica 6. It also contains analysis of the outputs in the form of graphs and derivations of mathematic formulas. We deal with the basic theory of Wiener process, stochastic integrals and Itô formula, modeling of the development of stock price, options and the valuation of options using Black-Scholes model. This work includes the derivation of Black-Scholes formula and the subsequent derivatives of this formula in the form of Greeks.