

M.Sc. Economics

Economics and Politics

Finance

Information Systems and Network Economics

Course title	Computational Finance		
Instructor	Prof. Dr. Eva Lütkebohmert-Holtz, Dr. Ernst August Frhr. v. Hammerstein	Semester	Second year
ECTS (credit points)	4	Contact hours (SWS)	2+1 (lecture/tutorial)
Prerequisites	Principles of Finance Futures and Options (can also be attended parallel to this course)		
Learning target/ qualification	Introduction to the R programming environment and its application to calculate and visualize interest rates, option prices, loss distributions and risk measures.		
Content	<p>In this course we first give a concise introduction to the R programming environment. With help of the provided tools, we then develop some programs for bootstrapping zero rates, pricing vanilla options in binomial trees and exotic options via Monte Carlo methods. We also regard some aspects of hedging and convergence in this context.</p> <p>Further we discuss the implementation of risk measures, the sampling of loss distributions in elementary credit risk models, and the simulation of (approximate) solutions to stochastic differential equations.</p>		
Exam type	90 min. written examination (computer-based) at the end of the term		
Literature	<p>Hull, J.C.: <i>Options, Futures, and other Derivatives</i>, 7th ed., Prentice Hall, 2009</p> <p>Lai, T.L., Xing, H.: <i>Statistical Models and Methods for Financial Markets</i>, Springer, 2008</p> <p>Seydel, R.U.: <i>Tools for computational finance</i>, 4th ed., Springer, 2009</p> <p>Any introductory book to the R program, e.g. Braun, J., Murdoch, D.J.: <i>A first course in statistical programming with R</i>, Cambridge University Press, 2007</p> <p>See also the documentation on the official R homepage</p>		
Additional Information & Links	<p>http://www.finance.uni-freiburg.de/studium-und-lehre/ws-2013-2014/computational-finance</p> <p>http://www.r-project.org/ (official R homepage)</p> <p>http://www.rstudio.com/ (RStudio-homepage, useful GUI for R)</p>		