



M.Sc. Economics

Economics and Politics

Finance

Information Systems and Network Economics

Course title	Computational Finance		
Instructor	Dr. Ernst August Frhr. v. Hammerstein	Semester	Second year
ECTS (credit points)	6	Contact hours (SWS)	2+2 (lecture/tutorial)
Prerequisites	Principles of Finance Futures and Options Basic R knowledge (can also be acquired in a prep course)		
Learning target/ qualification	Application of the R programming environment and its application to various topics of financial mathematics, among others are the calculation and visualization of interest rates, option prices, loss distributions and risk measures.		
Content	We develop some programs for bootstrapping zero rates, pricing vanilla options in binomial trees and exotic options in time-continuous models via Monte Carlo methods. We also regard some aspects of hedging and convergence in this context. Further we discuss the implementation of risk measures, the sampling of loss distributions in elementary credit risk models. Depending on the time left, we may additionally discuss the simulation of (approximate) solutions to stochastic differential equations.		
Exam type	90 min. computer-based exam (some small programming exercises) at the end of the semester.		
Literature	<p>Hull, J.C.: <i>Options, Futures, and other Derivatives</i>, 7<sup>th</sup> 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>, 4<sup>th</sup> 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><a href="http://www.finance.uni-freiburg.de/studium-und-lehre-en/ws-2016-17/compfin">http://www.finance.uni-freiburg.de/studium-und-lehre-en/ws-2016-17/compfin</a></p> <p><a href="http://www.r-project.org/">http://www.r-project.org/</a> (official R homepage)</p> <p><a href="http://www.rstudio.com">http://www.rstudio.com</a> (RStudio-homepage, useful GUI for R)</p>		