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+1 (lecture/tutorial)
Prerequisites	Principles of Finance Futures and Options		
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	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 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	Hull, J.C.: *Options, Futures, and other Derivatives*, 7th ed., Prentice Hall, 2009 Lai, T.L., Xing, H.: *Statistical Models and Methods for Financial Markets*, Springer, 2008 Seydel, R.U.: *Tools for computational finance*, 4th ed., Springer, 2009 Any introductory book to the R program, e.g. Braun, J., Murdoch, D.J.: *A first course in statistical programming with R*, Cambridge University Press, 2007 See also the documentation on the official R homepage		
Additional Information & Links	http://www.prim.uni-freiburg.de/lehre/ss-2015/computational-finance http://www.r-project.org/ (official R homepage) http://www.rstudio.com (RStudio-homepage, useful GUI for R)		