## 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
- Any introductory book to the R program, e.g.

See also the documentation on the official R homepage

## Additional Information & Links
- [http://www.r-project.org/](http://www.r-project.org/) (official R homepage)
- [http://www.rstudio.com](http://www.rstudio.com) (RStudio-homepage, useful GUI for R)