Content

The goal of this course is twofold. At first, students are introduced to using state of the art computational techniques for quantitative economic research. We learn about the programming language Fortran and how to apply numerical solution techniques to mathematical and economic problems. In particular, we study solution techniques to dynamic programming problems.

In the second part of the course, students will apply these techniques to study standard models in macroeconomics and life-cycle decision making. Depending on student demand, we analyze models of business cycles, economies with heterogeneous agents, life-cycle models of labor supply, consumption and savings and models of financial investment in bonds, equity and life-cycle products like annuities or retirement accounts.

After having followed this course, students have a sound knowledge of using computational techniques in economic research. They are able to formulate dynamic economic problems and solve them on a computer. Students have familiarized with the relevant literature in the field of quantitative macroeconomics and life-cycle decision making and are ready to develop their own ideas for research in this field.

Prerequisites

This course is open to students on the Master and PhD level. There are no formal prerequisites. Yet, a sound knowledge in mathematics as well as dynamic economics is an asset. There are no particular math skills needed. In the course, I provide all necessary details and slides.

Literature

This course is based on the book

**Organizational Details**

This course is worth 6 ECTS points.

Language is either English or German, depending on demand.

Grades are based on solving several problem assignments (75%) as well as doing a 15 min oral exam towards the end of the semester (25%). There is no exam for this course.

There are two sessions a week:

- Monday, 14:15-15:45, H 7 (ZHGB)
- Tuesday, 14:15-15:45, H12 (RWSG)

Lectures and tutorials take place in blocks, meaning that there is either a full week of lectures or a full week of tutorials. After each lecture block, students are assigned programming problems they will have to solve and hand in for grading. They can attend the tutorial sessions to ask questions and get help with the solution of their problems.

All relevant material will be provided either through either GRIPS or the website [www.ce-fortran.com](http://www.ce-fortran.com)

**Outline of the course**

1. Introduction to programming in Fortran
2. Numerical methods to solve root-finding, optimization and interpolation problems
3. Introduction to dynamic programming
4. Dynamic macroeconomics models
5. Life-cycle labor supply, savings and risky earnings
6. Portfolio choice and retirement savings

Topics 1 to 3 are mandatory. Topics 4 to 6 will be selected according to students’ interests.