

Syllabus

Name:			
Computational Economics			
Responsible:			
Professor Hans Fehr, Chair of Public Finance			
Program:	Type:	Term:	ECTS:
Bachelor	Lecture	Summer	6 CP
Contents & Objectives:			
<p>This course introduces the numerical implementation of economic models. Students will first learn to program in FORTRAN and to apply numerical methods for solving equation systems and integrals. Then these methods are used in three areas: tax policy analysis with static general equilibrium models, portfolio choice analysis and option pricing, life-cycle decision making and overlapping generation models.</p> <p>The course will consist of a series of lectures and exercises classes. The teaching sequence is divided into five units each consisting of several lecture and exercise classes:</p> <p>In the first unit, students will learn how to program in FORTRAN and acquire some basic skills in applying numerical methods. FORTRAN is a free, fast and easy to learn programming language that is used quite frequently in modern quantitative macroeconomic research.</p> <p>Unit 2 will be concerned with solution techniques to solve linear and nonlinear equation systems, optimization problems and numerical integration.</p> <p>Unit 3 will develop a simple static general equilibrium model in order to discuss the command optimum and the equilibrium in a market economy. In addition we will also introduce the public sector and simulate various tax policies.</p> <p>The fourth unit will deal with two topics in finance. Given time series data on stock return we compute minimum variance portfolios with alternative approaches. In addition we introduce a specific process for the future realization of the stock price and compute the resulting option prices applying the Black-Scholes formula and Monte-Carlo methods.</p> <p>The last unit will introduce the life-cycle model of intertemporal choice which will be used to discuss optimal consumption plans without and with uncertain labor income. Finally, the overlapping generations model (OLG) is introduced in the most basic version.</p>			
Prerequisites:			
Students that attend this course should have some basic knowledge in microeconomic and macroeconomic theory. It is not required to already have programming skills. Yet, students should know how to use a computer. In addition, they should bring along the willingness to learn programming (which requires that they will program a lot themselves).			
Course Structure:			
Week	Content		
1-3	FORTRAN 90: A simple programming language		
4-5	Numerical solution methods Linear and nonlinear equation systems, Function minimization, Numerical integration, Function approximation and interpolation		
6-7	The static general equilibrium model		
8-10	Topics in Finance – Portfolio choice and option pricing		
11-12	Life-cycle and OLG models		

Literature:

Fehr, Hans & Fabian Kindermann (2015): Introduction to Computational Economics using FORTRAN.

Relevant lecture notes will be provided.

Grading:

There will be three graded assignments which are solved in groups during the semester.

Contact:

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