

Quantitative Macroeconomics

University of Bern

Basic Information:

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| Instructor: | Nawid Siassi |
| E-Mail: | nawid.siassi@tuwien.ac.at |
| Office hours: | Thursday, 11:00-12:00 |
| Class dates: | September 16th - November 25th (see detailed schedule below) |

Course Description:

In this course you will learn how to obtain numerical solutions to macroeconomic models for which closed-form solutions are unavailable. The first part of the course focuses on basic numerical techniques, including root finding, optimization and function approximation methods. The second part of the course is devoted to solution methods for a variety of dynamic general equilibrium models which are widely used in macroeconomics. Throughout the course, the emphasis is on applications: you will learn how to implement numerical solution methods on the computer yourself by writing your own codes. I will not require any prior knowledge in programming. Familiarity with the theory of dynamic programming is beneficial, but not absolutely necessary.

Textbooks:

During the first part of the course, we will follow the book “Applied Computational Economics and Finance” by Miranda and Fackler (2002). A deeper and more comprehensive treatment is the book “Numerical Methods in Economics” by Judd (1998). We will not closely follow a textbook during the second part of the course. The book “Dynamic General Equilibrium Modeling” by Heer and Maussner (2005) is the closest to the approach of the course, and we will complement it with material from a variety of research articles.

Programming Language:

Throughout the course, we will perform numerical computations using Matlab, which is a popular and user-friendly language for scientific computations. I will not assume any prior experience with Matlab. I will give a brief introduction to Matlab in the first week.

Grades:

The final grade will be based on problem sets (30%) and a final project (70%). I will detail the grading policy in the first meeting.

Schedule:

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| SEP 16 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |
| SEP 17 | 12:15-15:00 | Room A019 | | | |
| SEP 30 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |
| OCT 1 | 12:15-15:00 | Room A019 | | | |
| OCT 14 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |
| OCT 15 | 12:15-15:00 | Room A019 | | | |
| OCT 28 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |
| OCT 29 | 12:15-15:00 | Room A019 | | | |
| NOV 11 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |
| NOV 12 | 12:15-15:00 | Room A019 | | | |
| NOV 25 | 14:15-16:00 | Room A019 | and | 16:15-18:00 | Room A322 |

Course Outline:

I. Basic Numerical Methods

- Linear and Nonlinear Equations
- Optimization and Function Approximation

II. Dynamic General Equilibrium Models

- Value Function Iteration
- Calibration and Stochastic Simulation
- Linear-Quadratic and Linear Approximation
- Projection Methods
- Incomplete Markets: Stationary Distribution
- Incomplete Markets with Aggregate Uncertainty
- Overlapping Generations Models