Dr. Matthias Rottner SS 2025

Preliminary Syllabus for
Seminar: Monetary Economics and Numerical Methods
(Master of Science in Economics)

Lecture & Exercise - 5 ECTS[1]

Lecture: 23.5 (13:15 – 14:45 & 15:00 – 16:30) and 6.6 (13:15 – 14:45 & 15:00 – 16:30)
Exercise: 24.5 (9:45 – 11:15 & 11:30 – 13:00) and 7.6 (9:45 – 11:15 & 11:30 – 13:00)
Presentations: 28.6 (9:45 – 11:15 & 11:30 – 13:00)
Language: English
Office hours: by appointment (will take place online)

Learning Objectives:

The course repeats the New Keynesian Model (NKM) from "Macroeconomics: Business Cycles" and covers how to extend the NKM model (e.g. by financial frictions, alternative monetary policy strategies, heterogeneity). Students learn how to apply different solution techniques to operate such models. It enables students to reflect how central banks use these models for developing their monetary policy strategy and how to react to macroeconomic crises.

Structure of Lectures and Exercises (Preliminary):

1. **Introduction: Background and Motivation for the New Keynesian Model**

2. **Refresher on the Basics of the New Keynesian Model**

3. **Numerical Methods and Software to Solve such Models**

4. **Extensions and Potential Future Directions for the Monetary Model**

5. **Application of the Theory and Model to Selected Topics**

    - Monetary policy after the financial crisis of 2008 (zero lower bound, negative interest rate policies and unconventional monetary policies)
    - Strategy review of the FED and ECB
    - High inflation environment after the Corona pandemic
    - Income inequality and monetary policy

6. **Numerical Methods to solve Models with Nonlinear Dynamics**

7. **Primer on the Role of Artificial Intelligence (Machine Learning/Neural Networks) in Macro Modelling**

    - *This last part is optional, not required for the seminar work and only provided in case of sufficient interest*

[1] The scheduled meeting dates are subject to change.

References will be provided in the course and are also available on request.

Potential Topics for Seminar Work (preliminary, subject to change):

- Average Inflation Targeting (AIT) in a High Inflation Environment
- Patient monetary policy in a high inflation environment
- Average Inflation Targeting (AIT) and Income Inequality
- Asymmetric Monetary Policy and Income Inequality
- Learning new monetary policy frameworks: A cost approach
- Target Ranges in a High Inflation Environment
- Carbon emissions and its impact on monetary policy
- Monetary policy in a world with a digital euro
- Artificial Intelligence in Macro Modelling: An Application to The Workhorse Monetary Model
- The costs of restricting rate increases: An Effective Upper Bound
- Chat GPT and Economic Modelling: A Case Study
- Own project ideas are possible (need to be discussed in advance and approved)
    - Proposal should either focus on DSGE modelling or (advanced) macroeconometrics

Examination and Grading:

The method of examination is a written seminar work (15 pages) and a presentation (15 – 30 minutes). Groups of up to two students can write together the seminar paper. The seminar work requires that numerical methods are applied to produce new results, which should be discussed and put in a broader context. More detail on the exact structure will be provided in the course. The seminar work determines to 100% the grade. Students can improve their grade through one assignment during the summer term: one programming assignment with Matlab/Dynare. This requires the seminar work to be graded not worse than 4.0; the maximum improvement is 0.3 grades.

** The views and materials in this course are solely those of the instructor and should not be interpreted as reflecting the views of the Bank for International Settlements, the Deutsche Bundesbank, or the Eurosystem.*