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Master's course

Advanced Methods in Dynamic Macroeconomics

Summer 2023

- Summary:

  Obtaining solutions and time-series of contemporaneous macroeconomic frameworks requires the implementation of numerical algorithms. This course guides students in the implementation of routines necessary to solve and simulate DSGE models. Students will be familiarized with principal concepts in the intersection of dynamical systems and computational economics.
  By completion of the course, students have obtained programming expertise that extends to problems arising in monetary economics, public policy, and other fields of economics. Successful students are able to develop methods for models used in economic advisory, central banks, and research.

- Contents:

  Ch. 1: **Fundamentals: dynamic systems and stochastic processes**
  Ch. 2: **Solving recursive models using functional methods**
  Ch. 3: **Solving RBC-models using log-linearization**
  Ch. 4: **Solving New-Keynesian DSGE models using Dynare**
  Ch. 5: **Solving non-stationary models using projection and shooting**
  Ch. 6: **Recursive methods for models of heterogeneous agents**

- Grading: the course rewards **6 ECTS**, comprised of
  - 50%: submitted solutions to the problem sets (min. 50% of problem sets to pass).
  - 50%: presentation of extension & solution of one of the models studied in class.

- Prerequisites:
  - Successful participation in Advanced Macroeconomics 1 or 2.
  - willingness to engage in coding assignments
  - attendance of lectures and tutorials

- Course meeting times and rooms:
  - Weekly lectures & tutorials on Fridays, 10-14 in PC Pool 9 (Werthmannstraße 4)

- Organization:
  - numerical routines will be implemented in Matlab (installation link)

- slides, problem sets, book chapters, and relevant articles are provided via ILIAS.
- problem sets will be discussed **interactively**.
- students' presentations take place at the end of the semester.

- Areas of study/profiles (a.o.):
  - Economics and Policy
  - Finance
  - Information Systems and Network Economics
  - Public sector economics
  - ...
- Literature:

  Main readings:

  - Miao, Jianjun. *Economic dynamics in discrete time.* MIT press, 2020.
  - Galor, Oded. *Discrete dynamical systems.* Springer Science & Business Media, 2007.
  - Heer, Burkhard, and Alfred Maussner. *Dynamic general equilibrium modeling: computational methods and applications.* Springer Science & Business Media, 2009.
  - Sargent, Thomas J., and Lars Ljungqvist *Recursive macroeconomic theory.* Massachusetss Institute of Technology, 2000.
  - Dynare manual: Adjemian, S., Bastani, H., Juillard, M., Karamé, F., Mihoubi, F., Mutschler, W., ... & Villemot, S. (2022). *Dynare: Reference Manual Version* 5 (No. 72). CEPREMAP.

  Further readings:

  - Stachurski, John. *Economic dynamics: theory and computation.* MIT Press, 2009.
  - Stokey, Nancy L., R. E. Lucas, and E. Prescott. *Recursive methods in dynamic economics.* Cambridge, MA: Harvard University, 1989.
- Details and ILIAS passwords will be communicated during the first meeting.