Computational Macroeconomics

Fall 2020

Instructor:	Stepan Gordeev	**Time:**	TR 2:10–4:10
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Course Description. This is a mini-course designed for 2nd year graduate students taking the macro and/or international sequence classes. We will cover the fundamentals of solving homogeneous agent macroeconomic models. This will prepare you for the quantitative homeworks in the 2nd year sequences as well as for Jay Hong's mini-course in the Spring semester, which should cover heterogeneous agent model solution methods.

Schedule. The class meets twice a week for three weeks, each Tuesday and Thursday at 2 pm. The first class will be on September 1 and the last will be on September 17.

Prerequisites. The first year macro sequence and some basic knowledge of programming.

Requirements. There will be three computational homeworks that will ask you to write code that implements the methods covered in class. You can write the code either in MATLAB or Julia. You should submit a pdf with your results and an .m or .jl file with your code. This course isn't graded, but implementing computational algorithms yourself is the only way to really learn them. So I highly encourage you to complete the homeworks and submit them to get feedback.

Tentative Course Outline.

1. Neoclassical growth model
    - discretization, value function iteration
    - Howard's improvement algorithm
    - interpolation: linear, cubic spline, shape-preserving spline, Chebyshev polynomials
2. RBC model
    - transition between steady states
    - uncertainty, discretizing AR(1)
3. Perturbation methods
    - log-linearization
    - solving and estimating DSGEs in Dynare
4. Heterogeneous agents
    - Aiyagari: finding the stationary distribution
5. High-performance programming

- good coding practices
- parallelization
- BlueHive: using university's cluster
- exposition of advanced computational techniques

References. This is a list of some resources that you might find useful in this course and beyond, when solving models for your classes or research projects.

- Kenneth L. Judd. 1998. *Numerical Methods in Economics*, MIT Press.
- Ramon Marimon and Andrew Scott ed. 2001. *Computational Methods for the Study of Dynamic Economies*, Oxford University Press.
- Mario Miranda and Paul Fackler. 2002. *Applied Computational Economics and Finance*, MIT Press.
- Burkhard Heer and Alfred Maußner. 2009. *Dynamic General Equilibrium Modelling: Computational Methods and Applications*. Springer.
- Fernández-Villaverde and Valencia. 2018. "A Practical Guide to Parallelization in Economics." Working paper.
- lectures.quantecon.org