Course description

Dynamic macroeconomic models

1. **Course name, ECTS, quarter/semester, contact hours**

   Dynamic macroeconomic models, 3 ECTS, 4th quarter, 36 contact hours

2. **Author of the course**

   Sergey Slobodyan, PhD, Department of Economics

3. **Outline**

   This course aims to introduce the students to the language of a modern macroeconomic theory – discrete time dynamic programming, using a set of highly stylized models such as consumption/saving problem of Robinson Crusoe, real business cycles model, basic search model, and a simple optimal monetary policy model. We will discuss foundations of the dynamic programming, basic algorithms using it – value function and policy function iterations, as well as two methods of computing approximate solutions to the Dynamic Programming problems: Log-Linearization and Linear-Quadratic approach. An extensive discussion of foundations of Rational Expectations hypothesis and methods of solving economic models with Rational Expectations will be provided. It is intended that a significant share of seminars in this class will take the form of computer exercises, where students would use programming languages such as MATLAB to solve basic dynamic programming problems. If time permits, the students will be introduced to DYNARE package for solving, simulating, and estimating RE models.

4. **Structure and content**

   a) Foundations of Dynamic Programming with Finite Horizon.
   b) Dynamic Programming with Infinite Horizon. Value Function Iteration and Policy Function Iteration Methods. Curse of Dimensionality.
   c) Dynamic Programming in Economics: Consumption/Savings and Basic Search Models.
   d) Approximate Solutions: Log-Linearization. Real Business Cycles and Search Models. Rational Expectations. Blanchard-Kahn Method.
   e) Approximate Solutions: Linear-Quadratic Dynamic Programming Problem. Optimal Monetary Policy.

5. **Prerequisites**

   Mathematics for Economists, undergraduate-level Macroeconomics.

6. **Assessment**

   60% - final exam, 20% - midterm exam, 20% - homework and class participation.