Objective of the course: The central objective of the course is to provide theoretical and quantitative foundations of econometrics with special focus on identification and disentangling of causal mechanism. To achieve this objective, as well as provide a comprehensive overview of econometrics, the course is divided into three parts:

1. General Econometrics,
2. Micro-econometrics,
3. Macro-econometrics.

The first part will establish fundamental concepts, tools and methods in econometrics. Students will learn about causal inference, asymptotic properties of different estimators, linear and nonlinear estimators, and instrumental variables. The second part will focus on econometric issues and applications associated with widely available micro-datasets. Specifically, students will learn about structure of micro-datasets and its implication for estimation and inference, and application of nonlinear estimators. The third part of the course focuses on time series data and the problem of causality and forecasting associated with this type of data. Students will learn about the issue of stationarity/non-stationarity, dynamic causal effects, and vector auto-regressions.

Learning outcomes: After successful completion of the course students will have a broad overview about various econometrics concepts and methods. They will develop the skills to disentangle correlation from causality, frame proper research questions, and implement different econometric methods using programming language R.

Course outline:

a. General Econometrics (8 hours)
   
   ii. Lecture 2: OLS and Gauss-Markov Theorem. Large sample properties of OLS. Maximum Likelihood (ML), Fisher Information. Relationship between OLS and MLE.
   
   iii. Lecture 3: Causality and Regression. OLS and Program Evaluation.
iv. **Lecture 4:** Causality and Regression. OLS and Instrumental Variables.

    b. **Micro-econometrics** (8 hours)
       i. **Lecture 1:** Structure of micro-economic datasets, inference in these datasets; finite populations, super-populations, sampling variance of the mean, sampling weights, stratification and clustering.
       ii. **Lecture 2:** How survey designs affect regressions, how to deal with clustered samples and different types of weights, heteroscedasticity and simple quantile regressions, and estimation of censored regression variables.
       iii. **Lecture 3:** Generalized method of moment (GMM) estimation.
    
iv. **Lecture 4:** Maximum likelihood (ML) estimation.

    c. **Macro-econometrics** (8 hours)
       i. **Lecture 1:** Introduction to time series data, autoregressive models, and Granger causality.
       ii. **Lecture 2:** Forecasting, forecast criteria, trends and non-stationarity.
       iii. **Lecture 3:** Dynamic causal effects in single dependent variable models, interpretation of causal effects.
       iv. **Lecture 4:** Vector auto-regression, and methods for estimation of dynamic causal effects.

**Evaluation (exam and grading):**
The evaluation is divided into two parts: one exam accounting for 40 percent, and one take home assignment accounting for 60 percent. The weights associated with each sub-module in exam are as follows:

- General econometrics: 30 percent i.e. 12 percent overall.
- Micro-econometrics: 35 percent i.e. 14 percent overall.
- Macro-econometrics: 35 percent i.e. 14 percent overall.

The assignment can be done in a group of two students. The rules of assignment are as follows: lecturers will propose some empirical papers conditional on the size of the class. The assignment is to replicate the results of that empirical paper. Each group will submit their preference for the paper. Based on the preferences, papers will be assigned. The instructors are supposed to guide students in replication of the paper. However, independent initiative from the student's side will be rewarded. In the end, students will have to submit the replication code, and properly written results in LaTeX.

**Pre-requisite:** It is absolutely necessary that you have a basic understanding of linear algebra (especially matrix manipulations) and probability theory. Further, you should have taken a basic course in econometrics. Further, if you don’t know R, then you should start learning. It will be needed in assignment/exam. There are many online resources for learning. It is recommended that you download RStudio and then go through RBootCamp by Jared Knowles [Link].
### a. General econometrics

**Text books:**

**Articles:**

### b. Micro-econometrics

**Text books:**

**Articles:**
- Will be recommended conditional on the progress of the class.

### c. Macro-econometrics

**Text book:**

**Articles:**
- Will be recommended conditional on the progress of the class.

### Konsultuojančiųjų dėstytojų dėstytojų vardas, pavardė | Mokslo laipsnis | Svarbiausieji darbai mokslo kryptyje (šakoje) paskelbti per pastaruosius 5 metus
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Policy under Sectoral Interconnections, Netherlands Economic Review (De Economist).

Doktorantūros komiteto teikimu patvirtinta fakulteto/instituto taryboje 20__ m.__ mēn.__ d. , protokolo Nr.

Tarybos pirmininkas

Pastaba: jei doktorantūros teisė bus suteikta kartu su kita institucija, tvirtinama ne fakulteto taryboje , o jungtinėje komisijoje.