



## **Econometrics & Programming 2024/2025**

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### **Course objectives**

This course aims to familiarize students with modern econometric techniques for analyzing financial time series. Specifically, it provides a broad foundation in econometric methods, issues, and recent advances. Students will learn both standard estimation and inference techniques as well as more advanced methodologies recently applied in economics and finance. Throughout the course, students will apply their knowledge using computational software (Matlab) to conduct econometric analyses on both simulated and real data.

### **Outline of the course**

Linear Regression Model: what is the relationship between economic variables? The method of Ordinary Least Squares (OLS). Model fit and model errors. Forecasting Returns using Matlab.

Statistical Inference: confidence intervals and hypothesis test. Probability distribution of the estimators and hypothesis testing. Testing normality. Generating (normal) random numbers, stock prices simulation, and hypothesis testing in Matlab.

Interpretation OLS regressions, pitfalls and diagnostic. The method of Generalized Least Squares (GLS) and the feasible GLS (FGLS). Main issues with OLS. Endogeneity. Measurement error and reverse causality. Autocorrelation and heteroskedasticity.

Structural Estimation: Identification. Statistical and economic models. Maximum Likelihood (ML) estimation. Properties and advantages of ML. Equivalence between ML and OLS. Discrete choice models, theory and practice. Applications of MLE in economics and finance.

Instrumental Variables (IV) approach. Method of moments and the Generalized Method of Moments (GMM). Applications in asset pricing. Estimating asset pricing models using GMM in Matlab.

### **Readings**

A detailed list of readings for each lesson will be provided within the slide deck.

### **Textbooks**

*Econometric Analysis, William Green*

*Asset Pricing, John H. Cochrane*

### **Prerequisites**

Basic knowledge of mathematics and linear algebra

Basic knowledge of Matlab

### **Software needed**

Matlab

### **Exam type**

In a final test, the students will be required to conduct an econometric analysis on real data using the software and provide economic interpretation to their results