Professor Dr. Robert Jung

Universität Hohenheim
Institute of Economics
Department of Econometrics and Statistics

Winter 2025/26

Applied Time Series Analysis and Forecasting Techniques (5211-220 - Bachelor's program)

Course description:

The course overviews model-based forecasting techniques frequently used in business, economics and finance. The focus is correctly applying time series models to real-world data for forecasting purposes. Technical details and mathematical concepts will be covered on a fundamental level that is accessible to students with a background in statistics and econometrics on the level of an introductory econometrics course (like e.g. *Einführung in die Ökonometrie*).

Upon the end of the course, the students will be able to:

- understand important concepts of forecasting in the areas of business, economics and finance,
- understand different approaches for modelling empirically relevant data features like trend, seasonality and persistence,
- use the analytical tools that are employed to analyse time series data;
- tailor-make models for their applications and use them to produce forecasts in `R`.

Practical class:

The lecture is accompanied by practical class taught by Marius Puke. The aim of the class is to repeat important concepts discussed in the lecture and demonstrate their practical application using real world data sets and the software packages `R`.

Meeting times and location:

Wednesday, 16:15 - 18:30, in presence only (S 07), starting Oct. 15, 2025

Instructors:

Prof. Dr. Robert Jung
e–mail: `econometrics@uni-hohenheim.de`
Office hour: by appointment in person or via zoom

Marius Puke
e–mail: `marius.puke@uni-hohenheim.de`
Office hour: by appointment in person or via zoom

Grading:

Evaluation will be based on a midterm computer based practical exam (17.12.2025) and a final computer based practical exam (28.1.2026). Students can earn up to 20 points for the final grade participation in a forecast competition. Details will be provided in class.

Literature:

The main textbook for the course is the online-textbook

> Diebold, F.X. (2024), *Forecasting*, Department of Economics, University of Pennsylvania, `https://www.sas.upenn.edu/~fdiebold/Teaching221/Forecasting.pdf`

Additional textbooks:

- Hyndman, R.J. and Athanasopoulos, G. *Forecasting: Principles and Practice*. Third Edition. O-Text available under `https://www.otexts.org/fpp3`

Additional reading, in particular references to journal articles, will be announced during the course.

Course materials:

Lecture slides, data sets, assignments and additional material will be available via ILIAS `https://ilias.uni-hohenheim.de/goto.php/crs/1755033`. Access information via ILIAS.

Course outline:

- Introduction
- Universal Considerations
- Predictive Regression
- Forecast Model Building and Use
- Time Series Modelling and Forecasting: A Component Perspective
  - Trend and Seasonality
  - Cycles I: Autoregressions
  - Cycles II: Wold Representation
  - Noise
  - Assembling the Components in a use case
- Forecast Evaluation
- Additional Topics