**Моделирование и прогнозирование моделей сезонных временных рядов с использованием R (курс на английском языке)**

**Лектор: д.э.н. Деан Фантаццини**

**Modelling and Forecasting Seasonal Time Series models using R**

Instructor: D.Sc. *Dean FANTAZZINI*

**Course Objectives**: The goal of this course is to discuss a selection of seasonal time series models for economic and financial forecasting with R. The first part starts by introducing seasonal and periodic time series models for macroeconomic variables, and then progresses to more advanced seasonal models like Generalized Additive Models (GAM), Trigonometric seasonality, Box-Cox transformation, ARMA errors, Trend and Seasonal components (TBATS) models, and the Monash Electricity Forecasting Model (MEFM), which are useful for dealing with electricity/gasoline/temperature data. Some of these models can be used for applications in artificial intelligence.

**Course Outline:**

# Introduction to Time Series Analysis with R [4 hours]

1.1 Introduction

1.2 Basic forecasting models

1.3 Basic models for seasonal data

# Benchmark models for seasonal data [8 hours]

2.1 Decomposition methods for seasonal time series

2.2 Exponential smoothing

2.3 Seasonal-ARIMA (SARIMA)

2.4 Seasonal Regression

# 3. Advanced models (part 1) [6 hours]

3.1 Periodic Auto-Regressive Models

3.2 Generalised Addittive Models (GAMs) for Seasonal Data

# 4. Advanced Seasonal (part 2) [6 hours]

4.1 Dynamic harmonic regression and STL with multiple seasonal periods

4.2 TBATS models

4.3 Forecasting electricity consumption: a comparison of models

4.4 Long-term probabilistic forecasting of electricity demand: the Monash Electricity Forecasting Model (MEFM)

**Textbooks**:

* + Franses, P. and Paap, R. (2004), *Periodic Time Series Models*, Oxford University Press
  + Hyndman, R., and Athanasopoulos, G. (2018). *Forecasting: principles and practice*. OTexts.
  + Wood, S. N. (2017). *Generalized Additive Models: An Introduction with R* (2nd ed). Chapman Hall/CRC.

**Exam**: the written exam consists of four questions: two theoretical questions and two applied questions.