Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ECON418	Time Series Analysis	8	3	0	0	3	6

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Elective
Course Level	Bachelor Degree
Objective	This course aims to equip students with the fundamental theoretical and applied tools needed to understand, model, and forecast the statistical properties of data observed over time (time series). By introducing key concepts such as stationarity, autocorrelation, and ARIMA models, the course provides students with an analytical foundation for analyzing economic, financial, and other social science data.
Content	The course covers the fundamental components of time series (trend, seasonality, cyclicality) and the concept of stationarity, followed by the model identification process using autocorrelation and partial autocorrelation functions. It addresses the construction, estimation, and diagnostic checking of autoregressive (AR), moving average (MA), ARMA, and ARIMA models within the Box-Jenkins methodology. SARIMA models for seasonal series, forecasting methods, and the evaluation of forecast performance are also covered. In its later parts, the course provides an introductory treatment of conditional heteroskedasticity (ARCH/GARCH models) as well as cointegration and error correction models (VECM). All topics are supported by hands-on applications using statistical software (EViews, R, or Python).
References	Box, G. E. P., Jenkins, G. M., Reinsel, G. C. — Time Series Analysis: Forecasting and Control, Wiley Hamilton, J. D. — Time Series Analysis, Princeton University Press Enders, W. — Applied Econometric Time Series, Wiley Brockwell, P. J., Davis, R. A. — Introduction to Time Series and Forecasting, Springer Wooldridge, J. M. — Introductory Econometrics: A Modern Approach (time series chapters), Cengage

Theory Topics

Week	Weekly Contents
1	Introduction to time series: basic concepts, components (trend, seasonality, cycle, random component)
2	The concept of stationarity; weak and strong stationarity
3	Autocorrelation function (ACF) and partial autocorrelation function (PACF)
4	Unit root tests: Dickey-Fuller and Augmented Dickey-Fuller tests
5	Autoregressive (AR) models
6	Moving average (MA) models
7	ARMA models
8	ARIMA models and the Box-Jenkins methodology
9	Midterm exam and model diagnostics (residual analysis, Ljung-Box test)
10	Seasonal ARIMA (SARIMA) models
11	Forecasting methods and evaluation of forecast performance
12	Conditional heteroskedasticity: introduction to ARCH and GARCH models
13	Introduction to cointegration and error correction models (VECM)
14	Applied case studies