

CEMFI, 2025-2026  
Enrique Sentana

## TIME SERIES ECONOMETRICS

### Contents

This course studies econometric models for describing and predicting economic and financial time series, and analysing the interrelations suggested by economic theory.

#### **Part A**

##### **1. Univariate time series:**

Stochastic processes. Stationarity and serial correlation. Prediction theory and the Wold decomposition. The frequency domain. ARMA models. Temporal aggregation.

##### **2. Multivariate time series:**

Serial correlation structure in the time and frequency domains. VARMA models. Contemporaneous aggregation, marginalisation and causality. Impulse-response analysis. Dynamic models with latent variables and the Wiener-Kolmogorov and Kalman filters.

##### **3. Integration and non-linear models:**

Integrated processes. Cointegration. Non-linear models. Volatility models. Compound autoregressive processes. Markov chains, dynamic regime-switching models and the Hamilton filter.

#### **Part B**

##### **4. Inference with dependent observations:**

Identification. Asymptotic properties of pseudo-maximum likelihood estimators in the time and frequency domains. Specification tests: Lagrange multiplier, Hausman and information matrix tests.

##### **5. Estimation of time series regression models:**

Autoregressive models. Unit roots and cointegration. Dynamic regression models. Heteroskedasticity and autocorrelation. Predictive densities.

## References

The main references are:

Hamilton, J.D.: *Time Series Analysis*, Princeton University Press, Princeton, 1994.

Martin, V., Hurn, S. and Harris, D.: *Econometric Modelling with Time Series: Specification, Estimation and Testing*, Cambridge University Press, Cambridge, 2013

## Course assessment

Participation in lectures, presentations and classes is compulsory. The students' performance in presentations will contribute 10% of the final grade. In turn, the homework is worth 20% while the remaining 70% will be determined by the grade of the exam questions on the material covered in the lectures.