

Time series

Course title - Intitulé du cours	Time series
Level / Semester - Niveau /semestre	M1 / S2
School - Composante	Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	STEPHANE GREGOIR
Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
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Other teacher(s) - Autre(s) enseignant(s)	
Other teacher(s) - Autre(s) enseignant(s)	
Lecture Hours - Volume Horaire CM	30
TA Hours - Volume horaire TD	
TP Hours - Volume horaire TP	0
Course Language - Langue du cours	Anglais
TA and/or TP Language - Langue des TD et/ou TP	Anglais

Teaching staff contacts - Coordonnées de l'équipe pédagogique :

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Office: MA001

Office hours: Monday 5.00-6.00 PM and by appointment
prior appointment

Course's Objectives - Objectifs du cours :

The objectives of this course are to introduce the linear framework to deal with univariate time series from a theoretical and practical point of view and get the students able to carry out simple empirical analyses of univariate time series and to compute forecasts. The course combines lectures and tutorials. Definitions and concepts are introduced and illustrated with examples. Various estimation techniques relying on Least Squares or Maximum Likelihood approaches are explained and analyzed (Yule-Walker, conditional least squares, conditional and unconditional maximum likelihood...). Technical exercises as well as empirical analyses of software outputs should help the students understand the analytical framework and get a practical intuition.

By the end of the course, the students should be able to estimate a simple linear model of a univariate time series (select the best specification and estimate it) and compute forecasts at various horizons.

Prerequisites - Pré requis :

Intermediate econometrics (Least square estimators, maximum likelihood estimator, method of moments, test theory and practice)

Basic complex number calculus (computation of roots of second order equations with real coefficients)

Practical information about the sessions - Modalités pratiques de gestion du cours :

Laptops or tablets are accepted in class.

Grading system - Modalités d'évaluation :

Grading policy: 30% mid-term; 70% final exam

Online MCQs are provided for self assessment and not taken into account in the final grade

Bibliography/references - Bibliographie/références :

P.J. Brockwell and R.A. Davis "Introduction to time series and forecasting", Springer Verlag (chap. 1 to 5, 9)

J. D. Hamilton "Time series analysis ", Princeton university (chap. 1 to 6, 8, 13)

Session planning - Planification des séances :

1. Introduction : examples and motivation ; probabilistic framework of time series
2. Stationarity and sampling scheme.
3. Descriptive statistics for time series: mean, autocovariance function, autocorrelation function, partial autocorrelation,...
4. Spectral density and its interpretation
5. AR(p) and MA(q) models: Definition, properties and characterization
6. ARMA(p,q) models: Definition, properties and characterization
7. Statistical approach: Estimation of AR and MA time series
8. Estimation of ARMA models or introduction to Unit root time series