# Econometrics 1

| Course title – Intitulé du cours | Econometrics 1 |
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| Level / Semester – Niveau /semestre | M2 ETE S1 |
| School – Composante | Ecole d'Economie de Toulouse |
| Teacher – Enseignant responsable | Pascal Lavergne and Stéphane Grégoir |
| Other teacher(s) – Autre(s) enseignant(s) | Wenxuan Wang and Young Kim |
| Other teacher(s) – Autre(s) enseignant(s) | |
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| Other teacher(s) – Autre(s) enseignant(s) | |
| Lecture Hours – Volume Horaire CM | 36 |
| TA Hours – Volume horaire TD | 15 |
| TP Hours – Volume horaire TP | |
| Course Language – Langue du cours | English |
| TA and/or TP Language – Langue des TD et/ou TP | English |

**Teaching staff contacts – Coordonnées de l'équipe pédagogique :**

Part 1 : Pascal Lavergne : pascal.lavergne@ut-capitole.fr    office T506

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**Course Objectives – Objectifs du cours :**

**Part 1** Econometric models and methods
The course will cover core methods for estimation and inference in microeconometric models. We shall explore some leading models and methods, in particular: linear regression, instrumental variables estimation, generalized method of moments, maximum likelihood.

**Part 2:** Introduction to time series modelling.

After an introduction to the univariate time series analysis framework and the conditions allowing inference, the linear modelling of stationary processes is studied. It leads to the use of ARMA models and the three-step approach to their estimation. The Kalman Filter procedure is presented for the exact calculation of the likelihood of a normally distributed ARMA time series. A general framework for estimating dynamic models in a stationary setting

is introduced. Finally, the course deals with the study of integrated time series and the nature of the transformations to be performed to recover the stationary framework.

**Prerequisites – Pré requis :**

Intermediate econometrics, possibly introduction to time series.

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

**Grading system – Modalités d'évaluation :**

4 Homeworks (40%), midterm exam (30%) and final exam (30%)

**Bibliography/references – Bibliographie/références :**

**Part 1**
Cameron, A.C., and Trivedi, P.K. (2005) Microeconometrics, Cambridge University Press.

Greene, W. (2005) Econometric Analysis, Pearson.
Gourieroux, C. and Monfort, A. (1999) Statistics and Econometric Models, Cambridge University Press.
Hansen, B. (2022) Econometrics, Princeton University Press
Hayashi, F. (2000) Econometrics, Princeton University Press
Ruud, P. (2000) An introduction to Classical Econometric Theory, Oxford University Press

**Part 2**
Brockwell, P. and R. Davis: Time Series: Theory and Methods, Springer.
Diebold, F.: Elements of Forecasting, Thomson, South-Western.
Hamilton, J. D.: Time Series Analysis, Princeton University Press.
Kilian, L. and H. Lutkepohl: Structural Vector Autoregressive Analysis, Cambridge University Press.
Pesaran, H.: Time Series and Panel Data Econometrics, Oxford University Press.
Stock, J. and M. Watson: Introduction to Econometrics, Addison Wesley.

**Session planning – Planification des séances**

**Part 1 (Weeks 1 to 6)** To be announced

**Part 2 (Weeks 7 to 12)**

7) Strict stationarity, ergodicity and mixing

8) Linear modeling of time series I

9) CLT and inference for time series

10) Kalman filter and estimation and inference for AR, MA and ARMA models

11) Estimation of dynamic models (M-estimator and Z-estimator (GMM))

12) Nonstationary time series : unit root process, unit root test

**Distance learning** *:*

*Distance learning can be provided when necessary by implementing:*

- *Interactive virtual classrooms*
- *Recorded lectures (videos)*
- *MCQ tests and other online exercises / assignments*
- *Remote (online) tutorials (classes)*
- *Chatrooms*