LECON2703 – Big Data in Macroeconomics and Finance

Oct - Nov 2026

Course Description	This course will focus on methods in time series econometrics designed to handle "big data." We will talk about univariate predictive regressions with many regressors, discussing various dense and sparse regularization techniques, such as principal components, ridge, lasso and others. We will discuss Bayesian inference in the context of these regressions and explore the connection between Bayesian shrinkage and regularization. The course will then cover some of the most popular multivariate econometric models for big data, specifically Bayesian VARs, detailing in particular how they can be used to deal with mixed-frequency and irregularly sampled data. We will also cover some machine learning for macroeconomic forecasting. We will discuss applications of these models and methods to nowcasting and forecasting in macroeconomics and finance.
	
	More detail:
	• Big data in macroeconomics and finance
	  ○ A history
	  ○ The curse of dimensionality: what are the issues and how has the profession approached it
	  ○ Principal components, regularisation techniques (ridge, lasso , elastic net and others)
	• An introduction to Bayesian Inference
	  ○ Priors and their connection with regularisation techniques
	  ○ Selection of regularization parameter/prior tightness: Model comparison and model choice.
	  ○ Sparse vs dense modelling: Spoke and slab (Giannone, Lenza, Primiceri, Ecta)
	• Bayesian multivariate models
	  ○ Large Bayesian VARS
	  ○ Bayesian Factor Model-> Antolin-Diaz, Drechsel, Petrella (2021)
	• Overview of Machine Learning for Macroeconomics
	  ○ Tree-based methods (Random Forest, Gradient Boosting)
	  ○ Neural Networks

Economics School of Louvain

Timing and location	**Jeudi 8/10/2026** **14h30** **17h00** **Jeudi 15/10/2026** **14h30** **17h00** **Jeudi 29/10/2026** **14h30** **17h00** **Jeudi 12/11/2026** **14h30** **17h00** **Jeudi 19/11/2026** **14h30** **17h00** **Jeudi 26/11/2026** **14h30** **17h00**
Professor	Francesca Monti francesca.monti@uclouvain.be Center for Operations Research and Econometrics (CORE) B234, Voie du Roman Pays, 34 - L1.03.01 1348 Louvain-la-Neuve
Grades and evaluation	Presentation and discussion of a paper in class
Reading list	Antolin-Diaz, J., T. Drechsel and I. Petrella (2021) « Advances in Nowcasting Economic Activity : Secular Trends, Large Shocks and New Data » http://econweb.umd.edu/~drechsel/papers/advances.pdf Cimadomo, Jacopo and Giannone, Domenico and Lenza, Michele and Monti, Francesca and Sokol, Andrej, Nowcasting with Large Bayesian Vector Autoregressions (February 1, 2021). CEPR Discussion Paper No. DP15854, Available at SSRN: https://ssrn.com/abstract=3795250 Giannone, D., M. Lenza and G.Primiceri "Economic Predictions with Big Data: The Illusion of Sparsity, " January 2021, forthcoming, Econometrica. https://faculty.wcas.northwestern.edu/~gep575/illusion5-1-colors.pdf Gelman, A., J. B. Carlin, H. S. Stern, and D. B. Rubin (2004): Bayesian Data Analysis, London: Chapman and Hall. Geweke, J. F. (2005): Contemporary Bayesian Econometrics and Statistics, New York: Wiley. Leamer, E. E. (1973): "Multicollinearity: A Bayesian Interpretation," The Review of Economics and Statistics, 55, 371–380.

	Trevor Hastie, Robert Tibshirani, Jerome Friedman (2001). The Elements of Statistical Learning, Available at http://www-stat.stanford.edu/~tibs/ElemStatLearn/. Schorfheide, Frank and Dongho Song, "Real-Time Forecasting with a Mixed-Frequency VAR, " Journal of Business and Economic Statistics, Volume 33, Issue 3, p.366-380, (2015) Stock, James H., and Mark W. Watson (2002). "Forecasting Using Principal Components from a Large Number of Predictors." *Journal of the American Statistical Association* 97, no. 460 (2002): 1167-179. Accessed August 27, 2021. http://www.jstor.org/stable/3085839. Stock, J. H. and M. W. Watson (2002b): "Macroeconomic Forecasting Using Diffusion Indexes," Journal of Business and Economics Statistics, 20, 147–162. Tibshirani, R. (1996): "Regression shrinkage and selection via the lasso," Journal of the Royal Statistical Society. Series B (Methodological), 267–288. James, G., Witten, D., Hastie, T., Tibshirani, R., & Taylor, J. (2023). An Introduction to Statistical Learning with Applications in Python Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press. The definitive textbook on neural networks (Chapters 6–7 for foundations)