

COURSE OUTLINE

Course Code / Title	:	HE4031
Pre-requisites	:	Big Data: Applications in Economic and Financial Analysis
No. of AUs.	:	4
Contact Hours	:	52 hours (2 hours lecture + 2 hours tutorial per week)

Course Aims

This course provides an introduction to the econometric methods used for analysing large and complex (i.e. 'big') data. The main emphasis will be on time series, a type of dependent data we most frequently observe in economics and finance. Having taken basic probability and statistics courses in your earlier years, you will learn some modern techniques for modelling time series of large scale in this course.

Intended Learning Outcomes (ILO)

By the end of this course, you should be able to:

1. Describe the stylized facts of typical datasets in economics and finance
2. Make use of modern econometric tools for analysing and modelling big dependent data
3. Use statistical software packages for econometric analysis

Course Content

This course will cover the following topics:

1. Big Data in Economics and Finance: An Introduction
2. Recap of Probability and Statistics
3. Univariate Time Series Analysis
4. Multivariate Time Series Analysis
5. Advanced Methods in Time Series Analysis
6. Nonparametric Methods
7. Forecasting
8. Machine Learning of Big Dependent Data

Course Assessment

CA1:	10%
CA2:	10%
Mid-term:	30%
Final Examination:	50%

Total	100%

Reading and References

Peña, Daniel and Ruey S. Tsay (2021). Statistical Learning for Big Dependent Data, Wiley (ISBN: 9781119417385)

Linton, Oliver (2017). Probability, Statistics and Econometrics, Academic Press (ISBN: 9780128104958)

Hansen, Bruce (2022). Econometrics, Princeton University Press (ISBN: 9780691235899)

Course Instructors

Instructor	Office Location	Phone	Email
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Planned Weekly Schedule

Week	Topic	ILO	Readings/ Activities
Week 1	Big Data in Economics and Finance: An Introduction	1,2	Peña and Tsay (2021), Chapter 1
Week 2	Recap of Probability and Statistics	1, 2	Linton (2017), Chapters 1-8
Week 3	Univariate Time Series Analysis I	1,2,3	Peña and Tsay (2021), Chapter 2
Week 4	Univariate Time Series Analysis II	1,2,3	Peña and Tsay (2021), Chapter 2
Week 5	Multivariate Time Series Analysis I	1,2,3	Peña and Tsay (2021), Chapter 3
Week 6	Quiz 1; Multivariate Time Series Analysis II	1,2,3	Quiz 1; Peña and Tsay (2021), Chapter 3
Week 7	Advanced Methods in Time Series Analysis	2,3	Hansen (2021), Chapters 15, 16
Week 8	Mid-Term TEST; Nonparametric Methods I	2,3	Mid-Term TEST; Hansen (2021), Chapter 19, 20
Week 9	Nonparametric Methods II	2,3	Hansen (2021), Chapter 19, 20
Week 10	Forecasting	2,3	Peña and Tsay (2021), Chapter 7
Week 11	Factor Models	2,3	Peña and Tsay (2021), Chapter 6
Week 12	Quiz 2; Machine Learning of Big Dependent Data I	2,3	Quiz 2; Peña and Tsay (2021), Chapter 5, 8
Week 13	Machine Learning of Big Dependent Data II	2,3	Peña and Tsay (2021), Chapter 5, 8

The above schedule is for illustrative purposes and is subject to the exigencies of the calendar.
NB. Mid-Term Test will be conducted at the beginning of Lecture 8.