

MODULE SPECIFICATION • ELECTIVE

Econometrics of Energy Markets

This course shows how energy returns can be modelled, analysed and forecasted. The aim is to provide understanding and insight into the methods used, as well as explaining the technical details. Econometric modelling and forecasting is demonstrated using EViews and Python, and participants are given the opportunity to learn this software in class. The course discusses univariate and multivariate GARCH models for energy returns and the Value at Risk and Global Minimum Variance portfolio used by policy makers, traders and academics to identify the best econometric model of energy returns. There are no prerequisite modules required.

10	15h	85h	100h
CREDITS	CONTACT HOURS	PRIVATE STUDY	TOTAL STUDY

COURSE CONVENOR

NAME Dr Malvina Marchese

OFFICE By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 7911 is a 10-credit course and students are expected to input approximately 100 hours of study. The total number of contact hours is 15 hours, leaving 85 hours for private study. Delivery is by lectures — 15 hours across the first three weeks of term, comprising 10 hours of lectures and 5 hours of tutorials. Optional clinics run on the last day of the course.

During private study, balance the course material (the primary source) against the recommended textbooks: think critically about how these fit into the body of knowledge, perform the exercises, complete coursework and revise. You can expect to perform well only by working consistently through the year.

MODULE PROGRAMME

LECT.	TOPIC	SESSION CONTENT
02	Univariate Linear Time Series models of energy returns	- ARIMA models - Structural time series models - Estimating ARIMA models in EViews and Python
03	Univariate GARCH models	- Short memory GARCH: estimation and testing - Long memory GARCH: estimation and testing - Forecasting energy returns with GARCH models
04	Multivariate GARCH models	- CCC, DCC, BEKK models - Estimation of MGARCH models in Python
05	Modelling the Value at Risk	- Historical approach - Parametric approach - Back testing the V@R

KEY SKILLS

By the end of this course, students should have some knowledge and understanding of:

- The modelling of univariate and multivariate time series of energy returns
- Practical time series modelling using EViews and Python
- Nonlinear time series models, including volatility modelling and the score-driven approach
- Forecasting energy price volatilities and correlation
- Forecasting Value at Risk for energy markets

DESIRED OUTCOMES

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

- Understand the nature of time series models and the way they are applied in practice
- Present, interpret and analyse information and results from EViews and Python

ASSESSMENT

WEIGHTING	100% coursework
ISSUED	End of week 6
DUE	End of week 10 — four weeks for completion
SUBMISSION	Electronically via the Moodle site for this course
FEEDBACK	Returned within 4 weeks of the deadline, as marker's notes appended to the PDF of your coursework

Marking criteria and penalties are set out in the Economics Undergraduate Handbook and the general course information paper, available via the Current Student page of the university website under Academic Regulations.

COURSE TEXT & RECOMMENDED READING

Copies of the lecture slides are made available on the course web pages, together with additional material and course announcements.



- Tsay, R. S. (2014). Financial Time Series. Wiley
- Harvey, A. C. (2013). Dynamic Models for Volatility and Heavy Tails. Cambridge University Press
- Harvey, A. C. (1993). Time Series Models (TSM), 2nd edition. Harvester Wheatsheaf
- Harvey, A. C. (2020). Score-driven time series models
- Martin, V., Hurn, S. and Harris, D. (2013). Econometric Modelling with Time Series