

MODULE SPECIFICATION • ELECTIVE

Advanced Time Series Econometrics

This course shows how time series can be modelled and analysed. The aim is to provide understanding and insight into the methods used, as well as explaining the technical details. Statistical time series modelling is demonstrated using the STAMP computer package and participants are given the opportunity to use STAMP in class, including the Kalman filter, smoothing methods, maximum likelihood estimation, treatment of missing values, forecasting and simulation. There is a wide range of applications, ranging from assessing the impact of the UK seat belt law to modelling volatility in financial time series and long term forecasting of climate variables.

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

COURSE CONVENOR

NAME Prof Siem Jan Koopman

OFFICE By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 7905 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
01	Local Level Methods	- Basic concepts of stationary and non-stationary time series - Unobserved components and signal extraction - Local level model and the Kalman filter - ARIMA models
02	Trends, seasonals and cycles	- Structural time series models - Explanatory variables and intervention analysis - STAMP package
03	State space methods	- State space model and the Kalman filter - Maximum likelihood estimation - Diagnostic checking - Missing values - Forecasting - Simulation
04	Multivariate analysis	- Multivariate structural time series models - Common trends and cointegration - Equation by equation filtering - Collapsed Kalman filtering and smoothing - Dynamic factor models

KEY SKILLS

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

- State space models and the Kalman filter
- Practical time series modelling using the STAMP package
- The modelling of univariate and multivariate time series

DESIRED OUTCOMES

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

- Understand the nature of time series models, the use of state space methods, and the way they are applied in practice
- Present, interpret and analyse information and results from software packages such as STAMP

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

The course is based on extracts from two different books; the monograph of Durbin and Koopman (2012) discusses the details of the state space methods. Copies of the lecture slides are made available on the course web pages, together with additional material and course announcements. Work is screened using plagiarism-detection software.

- Commandeur, J. J. F. and Koopman, S. J. (2007). An Introduction to State Space Time Series Analysis. Oxford University Press
- Durbin, J. and Koopman, S. J. (2012). Time Series Analysis by State Space Methods, 2nd edition. Oxford University Press