

COURSE OUTLINE

Course Code / Title	:	HE4403 Econometric & Business Forecasting
Pre-requisites	:	HE3003 Econometrics III
No. of AUs.	:	4
Contact Hours	:	52

Course Aims

This course will introduce you to a wide range of methods and models used in forecasting in business and economics. You will be familiar with the processes of forecasting, quantitative forecasting methods, data analysis and selection of the appropriate forecasting models and implementation of forecasting. You will also know how to use and apply R-statistical packages to implement the models using real data. No prior knowledge of R software is required for the course.

Intended Learning Outcomes (ILO)

Upon the successful completion of this course, students would be able to:

1. Show good knowledge of the qualitative and quantitative forecasting processes
2. Identify patterns in time series data
3. Estimate and interpret regression models for forecasting
4. Decompose and forecast different components of time series data
5. Apply a variety of smoothing methods
6. Identify and interpret univariate models
7. Apply the forecasting methods and processes to real-world data from business and economics
8. Use the appropriate R-statistical packages to implement the forecasting models
9. Work, manage time and negotiate content or solutions in a team

Course Content

1. Forecasting toolboxes-time series graphics
2. Forecaster's toolboxes
3. Forecast using judgement, linear regression and multiple regression
4. Time series decomposition
5. Exponential Smoothing
6. ARIMA models
7. Dynamic regression models

Course Assessment (To be specific)

Class Participation : 10%

Assignments : 10%

Project (group/individual) : 30%

Final Examination : 50%

Total -----
100%

Reading and References

Main Text (HA) Hyndman, R., and Athanasopoulos, Forecasting: Principles and Practice (second edition) at <http://otexts.org/fpp2/index.htm1>.

References (To be updated during the semester) Introduction to R

Try R Code School (<http://tryr.codeschool.com/>)

DataCamp Introduction to R (<https://www.datacamp.com/courses/free-introduction-to-r>)

R tutorial (Clarkson University) (<http://www.cyclismo.org/tutorial/R/>)

Coursera R Programming (<https://www.coursera.org/learn/r-programming>) Reference for R

Kickstarting R (<https://cran.r-project.org/doc/contrib/Lemon-kickstart/index.html>) Time series analysis in R

Using R for Time Series Analysis (<http://a-little-book-of-r-for-timeseries.readthedocs.io/en/latest/src/timeseries.html>)

Course Instructor

Instructor	Office Location	Email
TBA	-	TBA

Planned Weekly Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	1.1 Introduction to R 1.2 Introduction to Forecasting (Getting Started)	1,8	HA 'Using R' & Ch 1 (2 nd edition)	In-person	NA
2	2. Time series graphics 2.1 Times series patterns 2.2 Seasonal plots 2.3 Scatter plots 2.4 Lag plots 2.5 Autocorrelation 2.6 White noise	1,2,8	HA Chapter 2 (2 nd edition)	In-person	NA
3	3. Forecaster's toolboxes 3.1 Simple forecasting methods 3.2 Transformation and adjustments 3.3 Evaluating forecast accuracy 3.4 Residual diagnostics 3.5 Prediction intervals 3.6 Forecast package in R	1,2,6,7	HA Chapter 3 (2 nd Edition)	In-person	NA
4	4. Forecasting using regression 4.1 Review of linear regression 4.2 Evaluating the regression model 4.3 Forecasting with regression 4.4 Review of multiple regression 4.5 Some useful predictors 4.6 Selecting predictors 4.7 Residual diagnostics	1,2,3,5,7,8	HA Chapter 5 (2 nd edition)	In-person	NA

	4.8 Non-linear regression 4.9 Correlation, causation and forecasting				
5	4. Forecasting using regression 4.1 Review of linear regression 4.2 Evaluating the regression model 4.3 Forecasting with regression 4.4 Review of multiple regression 4.5 Some useful predictors 4.6 Selecting predictors 4.7 Residual diagnostics 4.8 Non-linear regression 4.9 Correlation, causation and forecasting	1,2,3,5,7,8	HA Chapter 5 (2 nd edition)	In-person	NA
6	5. Time series decomposition 5.1 Time series components 5.2 Moving averages 5.3 Classical decomposition 5.4 X-11 decomposition 5.5 SEATS decomposition 5.6 STL decomposition 5.7 Forecasting with decomposition	1,2,4,7,8	HA Chapter 6 (2 nd edition)	In-person	NA
7	6 Exponential Smoothing 6.1 Simple exponential smoothing 6.2 Trend methods 6.3 Holt-Winters' Seasonal method 6.4 Taxonomy of exponential smoothing 6.5 Innovations of state space model	1,2,4,5,6,7,8	HA Chapter 7 (2 nd edition)	In-person	NA

	6.6 Forecasting with ETS models				
8	6 Exponential Smoothing 6.1 Simple exponential smoothing 6.2 Trend methods 6.3 Holt-Winters' Seasonal method 6.4 Taxonomy of exponential smoothing 6.5 Innovations of state space model 6.6 Forecasting with ETS models	1,2,4,5,6,7,8	HA Chapter 7 (2nd edition)	In-person	NA
9	7 ARIMA models 7.1 Stationarity and differencing 7.2 Backshift notation 7.3 Autoregressive models 7.4 Moving average models 7.5 Non-seasonal ARIMA models 7.6 Estimation and order selection 7.7 ARIMA modelling in R 7.8 Forecasting 7.9 Seasonal ARIMA models 7.10 ARIMA vs ETS 7.11 Forecast Combinations	1,2,6,7,8	HA Chapter 8 (2 nd edition) Section 12.4 (2 nd edition)	In-person	NA
10	7 ARIMA models 7.1 Stationarity and differencing 7.2 Backshift notation 7.3 Autoregressive models 7.4 Moving average models	1,2,6,7,8	HA Chapter 8 (2nd edition) Section 12.4 (2nd edition)	In-person	NA

	7.5 Non-seasonal ARIMA models 7.6 Estimation and order selection 7.7 ARIMA modelling in R 7.8 Forecasting 7.9 Seasonal ARIMA models 7.10 ARIMA vs ETS 7.11 Forecast Combinations				
11	8 Dynamic regression 8.1 Estimation 8.2 Regression with ARIMA errors in R 8.3 Forecasting 8.4 Stochastic and deterministic trends 8.5 Dynamic harmonic regressions 8.6 Lagged predictors	1,2,3,7,8	HA Chapter 9 (2 nd edition)	In-person	NA
12	Student presentations of their projects (Project reports are due Monday of this week. Students to provide slides of their presentations)	1-8, 9	Slides will be provided	In-person	Presentation
13	Student presentations of their projects (Project reports are due Monday of this week. Students to provide slides of their presentations)	1-8, 9	Slides will be provided	In-person	Presentation