Economic Forecasting & Big Data

Fall 2022

Instructor:	Edmond Berisha	**Time:**	TTH 17:40 – 19:00
Email:	edmond.berisha@rutgers.edu	**Place:**	FH-A5

Office Hours: Immediately after class or by appointment.

Main References: This Upper Level Elective course is designed to introduce majors in economics to the elements of forecasting processes that are useful in establishing a successful forecasting system. It is imperative that forecasting is regarded as a process that involves selection of certain key components. This selection, in turn, depends on the type of data that are available. Major topics of focus in this course include time series regression models, Logistic Regression, Time series decomposition, ARIMA models, Dynamic Regression Models, Vector Autoregression, and Forecasting with many Predictors using Lasso & Ridge Regressions, Regression Trees, and Principle Components. The overall goal of the course is to prepare students to identify forecasting methods that would be good candidates to forecast various types of series.

Prerequisites: 01:220:320, 01:220:321, and 01:220:322

Objectives:

1. Explain processes for developing forecasts.

2. Build a simple linear regression and multiple regression model for forecasting.

3. Understand the application of Logistic Models

4. Differentiate between parametric and non-parametric models(K-Nearest Neighbors)

5. Distinguish between trend, seasonal, and cyclical data patterns.

6. Define and estimate ARIMA models.

7. Estimate forecasts using Dynamic Regression Model.

8. Develop a vector autoregression model (VAR) for making one period and multi-period forecasts.

9. Understand methods for forecasting with large data sets.

Course Materials

Required Materials:

- Forecasting: Principles and Practice by Rob J Hyndman and George Athanasopoulos

- An Introduction to Statistical Learning with Applications in R by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani.

- Varian, Hal R. "Big data: New tricks for econometrics." Journal of Economic Perspectives 28.2 (2014): 3-28.

Other Recommended Textbooks/Readings:

- Introduction to Econometrics by James H. Stock and Mark W. Watson (4th edition)

- Time Series Analysis with Applications in R by Jonathan D. Cryer and Kung-Sik Chan.

- Introductory Econometrics for Finance by Chris Brooks

- Data Analysis for Business, Economics, and Policy by Gabor Bekes & Gabor Kezdi

Technology Requirements for this Course:

- Statistical Package: R-studio

- All Quizzes will be posted on Canvas.

Grading and Assignments:

Quizzes/Homework	50
Projects	100
Exams (I & II)	200

In class quizzes consist of multiple-choice questions, explaining concepts, and solving problems. Quizzes will be assigned during the class time. Take home quizzes consists of problem solving exercises that might require the use of Microsoft Excel and R Studio.

Course Policy:

- Mastery of the concepts presented in this Forecasting & Big Data course is best accomplished by means of active interaction between student and instructor. This is why class attendance is so important.

- Quizzes are unannounced. There might be cases where take-home quizzes will be offered.

Academic Integrity: Please be aware that Rutgers has set up tough penalties on breaches of academic integrity. All the students in this class must abide by the Rutgers academic integrity policy: `http://academicintegrity.rutgers.edu/academic-integrity-policy`.

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Student-Wellness Services: Mental Health Services: `health.rutgers.edu/medical-counseling-services/counseling`. Violence Prevention and Victim Assistance: vpva.rutgers.edu. Scarlet Listeners: `rutgers.campuslabs.com/engage/organization/scarletlisteners`.

Course Topics	
Activities	Topics
Chapter 2	Time Series Graphics
Chapter 3, Chapter 2 ISL	The forecaster's toolbox
Chapter 6	Time Series decomposition
Chapter 7	Exponential Smoothing
Chapter5, Chapter 3 ISL	Time Series Regression Models
Chapter 4 ISL	Logistic Regression
Exam 1	October 27
Chapter 8	ARIMA Models
Chapter 9	Dynamic Regression Models
11.CB	Vector Autoregression
14 SW	Prediction with Many Regressors and Big Data
17.6 SW	Forecasting with Many Predictors Using Dynamic Factor Models and Principle Components
15/16 GG	Regression Trees, Random Forest and Boosting
Exam 2	Final Exam Week