AAEC 4484 - Applied Economic Forecasting
Virginia Polytechnic Institute and State University
Dr. Shamar L. Stewart
Spring 2025

E-mail: stewartls@vt.edu   **Course Website:** github.com/shamar-stewart/forecasting-S25
Class Hours: MW 2:30 − 3:45 PM   **Class Room:** MCB 218
Office: 202-B Hutcheson Hall
Office Hours: W 1:00 − 2:00 PM **OR** *by Appointment - please feel free to email*

TA: Mr. Isaac Albores   **TA Office:** HUTCH 319B
TA E-mail: isaacg@vt.edu   **Office Hours:** T 12:30 − 1:30 PM

Course Description

This course offers some of the essential tools for time series modeling and analysis of agricultural, economic, and financial data. We will focus on the application of forecasting models to data such as commodity prices and agricultural yields, weather and climate, food consumption, exchange rates, and regional economic indicators.

Our emphasis will be on examining and preparing data before forecasting and forecast evaluation. Alternative forecasting techniques will be introduced to improve the quality of predictions. We will cover some of the traditional forecasting models and techniques such as (dynamic) linear regressions, Autoregressive Integrated Moving Averages (ARIMA) models, modeling seasonality, Vector Autoregressions (VAR), etc.

Towards the latter portion, and time allowing, we will cover a few nonlinear techniques. In particular, we will use ARCH and GARCH model techniques to forecast future expected volatility in commodities and financial markets.

Course Objectives

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

- collect, interpret, and analyze time series data.

- formulate and specify basic econometric forecasting models, including univariate and multivariate time series models.

- apply fundamental statistical and probability concepts used in forecasting.

- code econometric forecasting models in R.

- graphically examine Time Series Data: trend, seasonal, cyclical, and irregular components.

- evaluate the forecasting accuracy of competing forecasting methods.

- form efficient "combination" forecasts.

Textbooks

You are not required to purchase a text for this course, as I believe my notes will be sufficient. If you were to require additional references and background sources, however, I would recommend the following texts:

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

  - This book is available for free at http://otexts.com/fpp3/. All the examples are written in R. For the earlier topics, we will follow this book somewhat closely. As much as possible, we will utilize the fpp3 package that accompanies the book.

Prerequisites

AAEC1005/1006 or ECON 2005/2006, and STAT 3005 or STAT 3604 or STAT 3615 or BIT 2405.

Software & Datacamp

R & R Studio: Econometric analyses will be done in the `R` language. This statistical software may be downloaded for free by going to https://posit.co/download/rstudio-desktop/.

You will need to download the latest version of `R` and `RStudio` for your operating system. `RStudio` is a great code editor that interfaces with `R` and provides a more interactive experience, especially for new users.

Datacamp: Datacamp is a learning platform that offers instruction on various programming languages. Through videos and hands-on-the-keyboard exercises, you will be able to improve your proficiency in `R` and other programming languages.

I have requested six months of premium access to Datacamp (https://www.datacamp.com/) for all students enrolled in this course. Please feel free to use this resource to improve your coding skills or even learn a new language. I may also assign some exercises to help you practice the concepts covered in class.

Grading Policy

This section of the syllabus details multiple policies that will be implemented in this class throughout the semester. Continued enrollment in this class constitutes acceptance of the terms outlined in this document.

Grading Components

Your assessments for this course are as follows:

Assessments	Weights
Weekly Assignments	**30%**
Exam I	**35%**
Exam II	**35%**
Total	**100%**

Your letter grades will be assigned as follows:

A >= 93	A- 90-92	B+ 87-89	B 83-86	B- 80-82	C+ 77-79
C 73-76	C- 70-72	D+ 67-69	D 63-66	D- 60-62	F <60

I will **ROUND UP** your final grades but please do not anticipate any further grade adjustments!

Assignments

Assignments will be given throughout the semester. The assignments are mostly empirical and practical for solving problems. The assignments are given on CANVAS and you are required to submit your answers electronically there as well. The due date of each assignment will be given at the time the assignment is announced. A late assignment is **NOT ACCEPTABLE**, and will receive a grade of 0.

Group study and discussion for assignments are strongly encouraged. However, each student must independently write his/her own solutions for turning in. The honor code is fully enforced and all students who resort to submitting "copycat" assignments will receive a zero for the assignment.

Lastly, all assignments must be submitted as a `pdf` compiled using `RMarkdown`. In our *Introduction*

to R session, I will discuss how to use this aspect of `R`. Additional resources such as `Tutorials`, and `Cheatsheets` can be found using the *Learn R Markdown* website at https://rmarkdown.rstudio.com/docs/articles/rmarkdown.html.

Exams

Your exams are designed to evaluate not only your grasp of the material discussed in class and assigned on homework, but also your ability to apply the concepts to more complex and/or new problems. Given the nature of this course, your exams are take home assignments. These will typically be open for 24 hours and you will be required to upload ahead of the deadline. It is therefore in the best interest of all students to take their exams on time. **Again, no late exams will be accepted.**

Make-Up Exam Policy

There are **NO** make-ups for missed exams.

Regrades

If you feel that you were unfairly graded on any assessment, you have until the subsequent class period after the assignment is returned to submit a re-grade request. Requesting a re-grade in no way assures you will receive additional points.

Lastly, if you have questions about the material being covered, your performance in the course or related concerns, please meet with me, **as soon as possible**, during office hours, or arrange an appointment by email. For help with course content, you can also contact the TA, Mr. Albores.

Attendance and Participation Policy

I do not have a mandatory attendance requirement for this class. You are responsible for your own success, and failure, in this course. In my experience, and studies would prove, there is a high correlation between students' attending classes regularly and performing well in university courses.

Students need to be active participants in this course. This involves attending classes regularly, asking and answering questions, and participating in class discussions. It is your responsibility to obtain any handouts, assignments or information given during a missed class period. Any student who is unable to attend class regularly, regardless of the reason or circumstance, should withdraw from the class before poor attendance interferes with his/her ability to achieve the course objectives.

Students are strongly advised to set up office hours appointments (with the TA and/or me) the moment they sense that they are falling behind and need help understanding the material. Do not wait until the end of the semester to do so if such problems arise. I am unable to help you then!

Cellphone/Computer Usages

If you need to speak or correspond via email or text please excuse yourself quietly and conduct your business outside. Otherwise, be respectful of other students: **turn your cellphones to vibrate during the class and do not text in class.**

I would normally ban the use of laptops in class but the nature of this class requires that students follow along with scripts and lectures on their laptops. For these purposes, I will allow their use in class. If any such device is seen being used for any other purpose, you will lose this privilege and will not be permitted to use them during subsequent classes.

Wellness Principles

By participating in this class, all students agree to abide by the Virginia Wellness principles. If you are exhibiting signs of illness, notify me by email and stay home. You agree to also follow the instructions posted at https://www.vt.edu/public-health.html. **Please take the necessary precautions to protect yourself and others around you.**

ADA Policy

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. If you believe you have a disability requiring an accommodation, please contact the Services for Students with Disabilities (SSD) at (540) 231-3788 (30 Old Turner St) or visit https://ssd.vt.edu. After the initial arrangements are made with that office, please contact the instructor.

Academic Dishonesty Policy

Please note that the Virginia Tech honor code applies to all graded assessments in this course. Moreover, the Department of Agricultural & Applied Economics has a zero tolerance policy towards acts of academic misconduct. Violations of the Honor Code will result in a grade of F in the course. For more information, please visit http://www.honorsystem.vt.edu

Tentative Course Outline

The instructor reserves the right to change the dates and topics as seen fit. Prior notification will be provided if any detail below were to change.

Lecture	Topic
1	Introduction to Forecasting, R & R Markdown
2	Exploring & Visualizing Time Series
	Univariate Models
3	Basic Forecasting Models
4	Linear & Dynamic Time Series Regressions
5	Time Series Decompositions
	Exam 1 – March 5, 2025
	SPRING BREAK: March 8 – 16, 2025
7	ARIMA & Seasonal ARIMA Models
	Multivariate Models
8	VAR & SVAR Models
9	Volatility Models
10	Forecast Evaluation & Combination
	EXAM 2 - May 7, 2025