

**San Jose State University, Department of Economics**  
**Econ 138, Business and Economic Forecasting**  
**Spring 2023**

**Professor:** Dr. Ruxandra Boul, [ruxandra.boul@sjsu.edu](mailto:ruxandra.boul@sjsu.edu)

**Classroom:** DMH 165

**Office Location:** DMH 144

**Day/Time:** Thursday 6-8:45 pm

**Office Hours:** In person, Thursday 3:30 pm to 5:30 pm, or virtual, by appointment, via Zoom.

**Course Description**

This course introduces students to the econometric analysis of time series data. We focus on the use of time series models to forecast economic and financial variables. Students will learn how to classify and represent a time series, how to estimate various times series models and how to test a variety of hypotheses involving time series data. We discuss different methods of forecasting and how they can be evaluated. The goal of this course is that, at the end, you can independently create quality forecasts of time series. It emphasizes hands-on experience and all students will acquire knowledge of the programming language R in the context of time series models and forecasting.

**Pre-requisites**

ECON 1A, ECON 1B and a semester of statistics.

**Required Materials:**

- *Forecasting: principles and practice* by Hyndman and Athanasopoulos, available free online at [Forecasting: Principles and Practice \(3rd ed\) \(otexts.com\)](https://otexts.com/)
- *R for Data Science* by Wickham and Grolemund, available free online at [R for Data Science \(2e\) \(hadley.nz\)](https://hadley.nz/)
- R and Rstudio (freely available statistical software)
- Other materials as journal articles, etc. will be posted online, in the weekly module.

**Lecture Notes**

Copies of the lecture outlines, codes and additional materials will be posted weekly on Canvas.

**Course Format**

Each class session will include a lecture followed by hands-on laboratory work. During lectures, I will cover time series econometrics and forecasting concepts and provide demonstrations to facilitate understanding of these concepts. Students will then participate in laboratory exercises to gain hands-on experience of concepts covered in lecture. As such, regular attendance and active participation in lab activities is essential for learning and succeeding in the course.

Given that the format and content of this course is quite different than that of typical economics courses, it is especially important that you stay on top of your homework and regularly practice your new skills. Unlike many of your other courses, this is not a course in which you can cram at the last minute! Should you miss a class, it is extremely important to find out what you missed—preferably by contacting one of your fellow students—and to practice lab activities on your own. Being proactive about seeking help is similarly important in achieving a successful outcome. Please ask questions when you do not understand the lecture, laboratory activities, or readings -- asking questions and offering ideas is welcomed and encouraged!

### **Software Requirements**

You will have to download and install R, available at <https://cran.r-project.org/> and Rstudio, available at <https://posit.co/downloads/> (the free Rstudio Desktop version). See also the appendix of the book [Appendix: Using R | Forecasting: Principles and Practice \(3rd ed\) \(otexts.com\)](https://otexts.com/).

### **Grades**

Grades will be based on class participation, ten homework assignments and a project, which will be presented in the last week, during class, and submitted in the end of the semester.

20% Class participation/Short Exercises

40% Assignments

20% Midterm

20% Project (including presentation in the last week of classes)

**Class Participation:** You are expected to attend all scheduled classes. Please send me an email message beforehand if you will miss a class. To earn a good participation grade, you need to be prepared and engaged in class. Your participation grade will be calculated based on class work: you will be completing a short exercise based on the work that we just did in class, using the code that we worked on. You will submit the output, comments/answers (if needed) and code via Canvas, before the beginning of the following class. I will be dropping the two lowest scores.

**Homeworks:** There will be **ten assignments** during the semester. Assignments will largely consist of data manipulation and applying the methods learned in class to real world data using R. The homework should include the R code that you used to generate the output. Students are allowed to work together on problem sets; however, all write-ups must be done individually. Homework assignments will be checked for plagiarism, and assignments that demonstrate plagiarism will receive a score of zero. The homeworks will be submitted online, via Canvas, on the due dates. No late assignments are accepted. I will be dropping the two lowest scores.

**Exam:** There will be one midterm exam. Make-up exams will not be given except for a medical or other serious reason, in which case the student must be able to obtain a letter including a signature and telephone number (or other proof in case of an accident, etc.).

**Project:** An applied project will be presented during the last week of class and the final paper will be submitted in the final exams' week. You can work in a **group of 1-2 students and submit one project**. This assignment will be discussed in greater detail later in the semester.

**Important advice to be successful in this course:**

- This course is likely to be more technical than many of your other classes. It generally requires more practice, and you must strive for a solid understanding of the material.
  - The course is, by nature, comprehensive, and poor performance early on will lead to poor performance throughout the semester.
  - It is a good idea to study in pairs or groups. Make new friends and exchange phone numbers and names early in the semester.
  - If there are things you don't understand in class, you should first look to the lecture notes and the textbook for clarification. If you have questions, please write them down and make an appointment with me on Zoom.
  - You can email me questions that require answers that are not longer than one or two sentences. It is much better to arrange a Zoom meeting to discuss your more complex questions.
- Please allow 24 hours for both email replies and appointment requests.**

**COURSE OUTLINE\***

Date:	Topic	Assignments
January 26	Syllabus and Introduction Considerations for a successful forecast	
February 2	Introduction to R	<b>Homework 1 due</b>
February 9	Exponential Smoothing	<b>Homework 2 due</b>
February 16	Time Series Decomposition	<b>Homework 3 due</b>
February 23	Regression and Forecasting	<b>Homework 4 due</b>
March 2	ARIMA	<b>Homework 5 due</b>
March 9	ARIMA	<b>Homework 6 due</b>
March 16	Discuss Project and Review	<b>Homework 7 due</b>
March 23	<b>Midterm</b> Structural Change	
March 30	<b>No class-Spring Break!</b>	
April 6	Vector Autoregression Model	<b>Project – First Report Due</b>
April 13	Advanced Topics	<b>Homework 8 due</b>
April 20	Advanced Topics	<b>Homework 9 due</b>
April 27	Case Studies	<b>Homework 10 due</b>
May 4	Project Presentations	
May 11	Project Presentations	
May 19		<b>Project - Final Report Due</b>

\* Subject to adjustments

**University Policies**

Per University Policy S16-9, relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page at <https://www.sjsu.edu/curriculum/courses/syllabus-info.php> Make sure to visit this page to review and be aware of these university policies and resources.