# Statistics 674: Time Series (2 units)

**Spring 2023**

**Prof. Suess, Department of Statistics and Biostatistics, CSU East Bay**

**Lecture:**

- Section 1: MW 4:00 to 5:40 and on Zoom

**Intructor:** Prof. Eric A. Suess **Office:** NSc 319 **Phone:** 510-885-3879 **e-mail:** eric.suess@csueastbay.edu

**Office Hours:** MW 2 to 3pm, or by appointment

**Class Website:** http://cox.csueastbay.edu/~esuess/statistics674/

**Required Text:**

- Hyndman and Athanasopoulos, Forecasting: Principles and Practice (3rd ed), 2021.

**Reference Texts:**

- Shumway and Stoffer, Time Series: A Data Analysis Approach Using R, CRC Press, 2019.
- Shumway and Stoffer, Time Series Analysis and Its Applications, Fourth Edition, Springer-Verlag, 2016.
- Box, Jenkins, Reinsel, Ljung, Time Series Analysis, Forecasting and Control, Fifth Edition, Wiley, 2015.
- Brockwell and Davis, Introduction to Time Series and Forecasting, Second Edition, Springer-Verlag, 2002.
- Chatfield, The Analysis of Time Series, An Introduction, Sixth Edition, Chapman-Hall, 2003.
- Diggle, Time Series, A Biostatistical Introduction, Oxford Science Publications, 1990.

**Further References:**

- Whickham, Grolemund, r4ds

- Ismay, Kim, ModernDive
- Phillips, Yarrr
- Kross, Unix Workbench

**Material To Be Covered:**

In this course we will cover the fundamentals of Statistical Time Series analysis, the study of correlated random variables over time. Descriptive methods will be introduced to describe trends, seasonal patterns, and autocorrelation in time series data. Time Domain Methods of analysis such as Autoregression and ARIMA modeling will be presented. Frequency Domain Methods will also be briefly introduced. The class will be roughly split between the discussion of theory and computer applications applied to real data. Examples will come from such fields as Economics, Biology, Medicine, Seismology, and Engineering

**Homework:** A list will also be on the website. Homework will be assigned weekly. Homework will be "due" on Mondays, which means you should complete the homework and come to class prepared to ask questions. Homework will be "collected" though Canvas and needs to be submitted by Friday of the week the homework is due.

**Quizzes and Exams:** Two short quizzes, one midterm will be given and the final.

**Grading:**

- Project 30%
- Homework 15%
- Quizzes 5%
- Midterm 25%
- Final 25%

**Policy on Make-up Exams:** You are expected to take the quizzes and exams at the scheduled times. In case of genuine emergency, illness or hardship, for which you can present written documentation I may agree to arrange for a make-up exam. Make-up exams must always be arranged BEFORE the regular exam is given and always take place AFTER the regular exam. Quizzes may not be made up!

**Statistics 674 SLOs**

**Student Learning Outcomes (SLO's):**

Upon successful completion of this course students will be able to:

1. Graphically display and numerically describe time-dependent data.
2. Derive and understand the theory of point and interval estimation for forecasting.
3. Formulate and model practical problems for solutions using these statistical methodologies.
4. Produce relevant computer output using standard statistical software and interpret results appropriately.

5. Communicate statistical concepts and analytical results clearly and appropriately to others.