

Introduction to Time Series: Fall 2024

Stat 153

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Course website: <https://stat153.berkeley.edu/fall-2024/>

(See course website for lecture times, room, office hours, etc.)

In *Introduction to Time Series*, we will cover the basics of time series analysis and prediction. This class will be mostly focused on computational and practical aspects, with a limited emphasis on theory—for the most part, the theory we cover will be intended to help develop a better root understanding of the nature of the topic at hand, say, the behavior or performance of a method under idealized conditions. A stronger focus will be on developing a working “scientific intuition” for time series problems and methods. Topics to be covered will most likely include: characteristics of time series, regression, smoothing, forecasting, scoring, calibration, ensembling.

Prerequisites

Probability at the level of Stat 134 or Data 140 is required. Statistics at the level of Stat 133 and 135 is recommended and may be taken concurrently. We will also assume a basic level of fluency with programming in R. Examples and homework assignments will use the R programming language. (Counterpart examples in Python may also be available, if we are able to pull it off.)

Topics

In slightly more detail, the topics that we will cover will likely include:

- Measures of dependence
- Stationarity
- Regression
- Smoothing
- Spectral analysis
- ARIMA models
- ETS models
- Advanced forecasters
- Scoring and calibration
- Ensembling

Evaluation

Evaluation will be based on be five homeworks, one midterm exam, and one final exam. The grading breakdown is as follows (each homework assignment is worth an equal amount):

- Homeworks: 50%
- Midterm: 20%
- Final: 30%

Details on the dates for the homework and exams will be provided on the course website. More details on the exams will be forthcoming, later in the semester.

Homework

The homeworks are structured to give you experience in written mathematical exercises and programming exercises. As we may reuse problems from other, similar courses that have been taught in the past, you **must not to copy, refer to, or look at** previous solutions in preparing your answers.

Also, while it is completely acceptable for you to collaborate with other students in order to solve the homework problems, we assume that you will be taking **full responsibility in terms of writing up your own solutions and implementing your own code**. You must indicate on each homework the students with whom you collaborated.

You will get a total of 5 late days that you can use for the homework assignments that you can allocate in any way you choose across the semester. (For example, you can use 5 days towards Homework 1; you can use 3 days towards Homework 1 and 2 days towards Homework 4; and so on.) Beyond that, late homework will not be accepted, except in the case of a true emergency (sudden sickness, family problems, etc.). Just reach out to us (Instructor and GSI) in the latter case, and we will figure something out.

Take care of yourself

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking some time to relax. This will probably help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus. You can find these linked from the Academic Accommodations Hub <https://evcp.berkeley.edu/programs-resources/academic-accommodations-hub>.