

STP 598: Statistical Inference for Functional Data

Instructor: John Fricks

Spring 2025 TTh 4:30-5:45

Functional Data Analysis (FDA) is the area of statistics concerned with data consisting of continuous, smooth functions. In this course, we will study statistical inference techniques for such data, such as functional linear regression, functional ANOVA, functional PCA, and functional time series. In addition, we will learn to fit ordinary differential equation models to data using the framework of FDA—an area also known as Dynamic Data Analysis. The approach will be both theoretical and computational with extensive use of real data sets. This course should be accessible for graduate students in Statistics or Applied Mathematics who have had at least an undergraduate probability course.

Relevant sources:

- J. O. Ramsay and B.W. Silverman. *Functional Data Analysis*. Springer, 2013.
- Piotr Kokoszka and Matthew Reimherr. *Introduction to functional data analysis*. CRC Press, 2017.
- Ramsay, J. O., G. Hooker, and S. Graves. *Functional data analysis with R and MATLAB*. Springer, 2009.
- Giles Hooker and James O. Ramsay. *Dynamic Data Analysis: Modeling Data with Differential Equations*. Springer, 2017.
- Tailen Hsing and Randall Eubank. *Theoretical Foundations of Functional Data Analysis with an Introduction to Linear Operators*. Wiley, 2015.