

STS 532: Mathematical Statistics II

University of Maine
Department of Mathematics and Statistics

Spring 2024

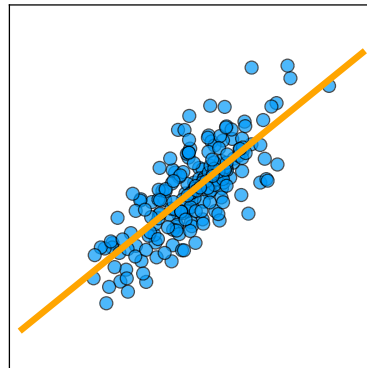
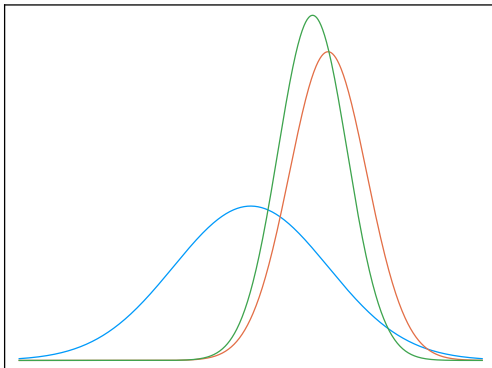
Instructor: Aden Forrow (aden.forrow@maine.edu)

Course Description:

How do we learn from observations of the world around us? How confident should we be in claims made from data? Statistics, the quantitative study of uncertainty, gives a language and set of tools for precisely understanding both our knowledge and our ignorance.

This course will build on the foundations introduced in STS 531, emphasizing newer tools and practical considerations. Our topics will include:

- Modeling and regression (especially linear, generalized linear, and hierarchical models)
- Causal inference
- High dimensional statistics
- Computational approaches in statistics (convex optimization and Markov chain Monte Carlo)
- Selected machine learning approaches, especially for unsupervised learning



Class Time: MWF 2-2:50pm

Textbooks:

No text is required. Each of the books below covers some of the course topics and may be a useful reference.

- *Statistical Inference*, Casella and Berger (2002).
- *Bayesian Data Analysis*, Gelman, Carlin, Stern, Dunson, Vehtari, and Rubin (2020). Available free online.

- *Causality*, Pearl (2009).
- *Convex Optimization*, Boyd and Vandenberghe (2009).
Available free online.
- *Pattern Recognition and Machine Learning*, Bishop (2006).
Available free online.

Prerequisites: A grade of C or better in STS 531.