

# STAT 801: Mathematical Statistics

## Course outline:

- Distribution Theory.
  - Basic concepts of probability.
  - Distributions
  - Expectation and moments
  - Transforms (such as characteristic functions, moment generating functions)
  - Distribution of transformations
- Point estimation
  - Maximum likelihood estimation.
  - Method of moments.
  - Optimality Theory.

- Bias, mean squared error.
- Sufficiency.
- Uniform Minimum Variance (UMV) Unbiased Estimators.
  
- Hypothesis Testing
  - Neyman Pearson optimality theory.
  - Most Powerful, Uniformly Most Powerful, Unbiased tests.
  
- Confidence sets
  - Pivots
  - Associated Hypothesis Tests
  - Inversion of hypothesis tests to get confidence sets.
  
- Decision Theory.