

# Introduction to Theoretical Statistics I (STA 6326)

## Time and Location

M W F Period 2, 104 Leigh Hall

## Instructor Office Hours

M W F 9:30 am – 10:30 am, 208 Griffin-Floyd Hall

## TA Office Hours

Tuesday 12:30 pm – 2:30 pm, 218 Griffin-Floyd Hall

## Text

Your primary study material should be your lecture notes. As a reference, we will use the 2nd edition of *Statistical Inference* by Casella and Berger. We will cover selected topics from Chapter 1 to Chapter 5, along with additional material not in the book. A list of topics covered in class will be maintained on the course web page.

## Homework

Homework is worth 10% of the final grade. No late homework will be accepted.

## Exams

Three exams will each count for 30% of the final grade. The schedule for the exams will be announced in class.

## Grading Scale

The usual 10 point scale (90% for an A, 80% for a B, ...) is tentatively adopted, but will most likely be loosened.

## Attendance and Late Policy

Students are responsible for all material covered in class. If you are absent, make arrangements with a classmate to borrow the notes and any handouts from them. Handouts will be distributed once and only once.

## List of topics covered in class

Wednesday, August 21: Overview of probability and statistics

Friday, August 23: Mathematical definition of probability, Properties of probability

Monday, August 26: Properties of probability (continued), Assigning probabilities for countable sample spaces

Wednesday, August 28: Counting rules, choosing  $r$  objects from  $n$  objects

Friday, August 30: Birthday problem, Inclusion-Exclusion principle

Friday, September 6: Secretary problem

Monday, September 9: Conditional probability, Prisoner's dilemma

Wednesday, September 11: Random variables, probability mass functions

Friday, September 13: Cumulative distribution functions and their properties

Monday, September 16: Discrete, continuous and mixed random variables

Wednesday, September 18: Expected Values, definition and existence

Friday, September 20: Variance and standard deviation

Monday, September 23: Indicator random variables, Markov's inequality, Chebyshev's inequality

Wednesday, September 25: Transformations of random variables, Definition of moment generating functions

Friday, September 27: Exchanging derivatives/sums and expectations, application to moment generating functions

Monday, September 30: Bernoulli random variable, Binomial random variable

Wednesday, October 2: Binomial random variable, Poisson random variable

Monday, October 7: Geometric random variable, Memoryless property

Wednesday, October 9: Negative Binomial random variable

Friday, October 11: Hypergeometric random variable

Monday, October 14: Uniform random variable, Exponential random variable

Wednesday, October 16: Memoryless property of exponential, Gamma random variable

Friday, October 18: Normal random variable

Monday, October 21: Beta random variable, Cauchy random variable

Wednesday, October 23: Computing probabilities and expectations using joint mass/density functions

Monday, October 28: Conditional mass/density functions and independence

Wednesday, October 30: Tower property

Friday, November 2: Bivariate transformations

Monday, November 5: Convergence in distribution, central limit theorem