

STAT4101 (Theory of Statistics I) Schedule, Fall 2007

I do not expect any changes to the following schedule, but it should still be viewed as tentative. Perhaps class will be cancelled for snow, or a given topic will prove more difficult than anticipated. Any changes will be announced in class, by email (to your university email address) and posted on the website.

Homework for a given week is due by the end of class of Wednesday of the following week. For instance the homework for Week 1 (Sept. 5–7) is due on September 12.

Week 1: Sept. 5–7

What is Statistics (Chapter 1, and 2.1–2.2)

You should be able to ...

- explain how statistical conclusions are made, and why probability models are necessary tools for making those conclusions.
- interpret relative frequency histograms and distributions.
- create and interpret sample means and standard deviations.

Week 2–3: Sept. 10–21

Probability (Chapter 2)

You should be able to ...

- use set notation to describe an actual experiment and calculate sizes of various subsets.
- use the axioms of probability to calculate the probability of sets of events.
- use the multiplication rule, permutations, and combinations to count events and calculate probabilities.
- calculate conditional probabilities
- determine if events are independent or not
- calculate probabilities of intersections and unions of sets of events
- construct random variables from a set of events

Week 4–5: Sept. 24–Oct. 5

Discrete Random Variables (Chapter 3 – not 3.10)

You should be able to ...

- compute expected values for a given probability distribution
- use the rules of expectation to compute expected values and variances of linear combinations.
- identify variables that are Binomial, Geometric, Negative Binomial, Hypergeometric, and Poisson, and compute probabilities and expected values for them.
- compute moment-generating function for a given probability distribution and use it to find the mean and variance.
- use moment-generating functions to find the probability distribution for a given variable.
- use Tchebysheff's theorem to find a bound on a desired probability.

Week 6a: Oct. 8–10

Exam (through Chapter 3)

- Monday will be a review; Wednesday is the exam.

Week 6b–8: Oct. 12–26

Continuous Random Variables (Chapter 4)

You should be able to . . .

- compute probabilities from both distribution functions and density functions.
- convert between distribution functions and density functions.
- compute expected values for a given probability distribution function.
- identify variables that are Uniform, Normal, Gamma, and Beta, and compute probabilities and expected values for them.
- compute moment-generating function for a given probability distribution and use it to find the mean and variance.
- use moment-generating functions to find the probability distribution for a given variable.
- use Tchebysheff's theorem to find a bound on a desired probability.

Week 9–11: Oct. 29–Nov. 16

Multivariate Distributions (Chapter 5 – not 5.9 or 5.10)

You should be able to . . .

- compute probabilities and expected values from joint probability distribution and density functions.
- convert between marginal, joint, and conditional distributions.
- identify whether or not two variables are independent from their joint distribution function.
- understand the relationship between uncorrelated and independent.
- use the rules of expectation to find means and variances of linear combinations of several variables, and of products of independent variables.
- find conditional expectations, both directly and by the rule of iterated expectations.

Week 12: Nov. 19–20

Midterm Exam (through Chapter 5)

- Monday will be a review; Tuesday is the exam.
- There will be no class on Wednesday, Nov. 21.

Week 13–15: Nov. 26–Dec. 12

Functions of Random Variables and the Central Limit Theorem (Chapters 6 & 7 – not 6.6)

You should be able to . . .

- find the probability distribution of a function of random variables by using distribution functions, transformations, and moment-generating functions.
- be familiar with order statistics and able to perform basic operations using them.
- know how the χ^2 , T , and F distributions are formed and be able to use their properties to find expected values and variances.

Week Final: December 17, 10:30–12:30 am

Final Exam (cumulative)