

Math 328 Probability Syllabus
Agnes Scott College, Fall 2022
Jim Wiseman, wiseman@agnesscott.edu, Buttrick 331

Monday, Wednesday, Friday, 9:45-10:35

Office hours: Mon 3:00-4:00, Tues 2:00-3:00, and by appointment.

Textbook: Tijms, Understanding Probability, Cambridge University Press, 3rd Edition, ISBN 978-1107658561.

Plan: We'll cover most of chapters 1-11. Topics include foundations of probability theory, conditional probability, discrete and continuous random variables, the law of large numbers and the central limit theorem, important distributions, and applications. There's a more detailed schedule below, but it's subject to change.

Homework: By now you've probably figured out that working problems is mostly how you learn math. There will be homework assigned nearly every week, due at midnight on Wednesdays. I strongly encourage you to work in groups, but you must make sure that you understand the problem completely yourself before submitting your answer. You will turn in the assignments on Canvas. This is a 4-credit course. In addition to in-class time, you will be spending time outside of class on various activities. The first and most important activity is to regularly read the text and to work through and understand the examples in each section. You should try to spend time on this every day.

Projects: There will be no exams (midterm or final). Instead, you will complete 4 group (2-3 people) projects. Each project will consist of a paper and a recorded video presentation. You'll turn in a draft of the paper in advance and I'll give you feedback to be incorporated into your paper and presentation. There will be information about each project on Canvas.

Honor code and group work: All students are expected to follow the honor code throughout the semester. I strongly encourage you to work on the homework in groups. I suggest that you work on the problems by yourself first, making a note of anything giving you trouble; then meet with your group and work through the remaining problems together; and finally submit the solutions by yourself. Every group member must submit their own homework solutions independently; just copying the group's answers is plagiarism and is unacceptable.

Getting help: Chances are that sooner or later you'll get stuck on something, so don't get frustrated. Think hard, and if you're still stuck, do something else for a while. (It's amazing how often that works.)

My office hours are above - these are times when I'm guaranteed to be in my office waiting to talk to someone. If you want to see me at other times, please let me know and we'll find a time. Finally, I can't emphasize enough that your classmates are your best source of help.

Course goals:

Learn to solve basic combinatorics and probability problems

Develop the ability to describe random events using probability density functions and cumulative distribution functions, and to compute probabilities associated with these events.

Be able to work with random variables.

Be able to work with the properties and applications of the basic distribution functions.

Develop the mathematical foundation for statistical estimation and hypothesis testing.

Learn to communicate mathematics effectively, both orally and in writing.

Develop skills in problem analysis and problem solving.

Interpret real-world problems in the language of mathematics

Assessment: Homework 30%, weekly discussion participation 10%, each project 15% (3% draft, 7% paper, 5% presentation).

Late work: Late work won't be accepted.

Attendance and participation: I expect you to be at every class meeting on time, unless you've talked to me about having to be absent or late. However, tardiness or absence will have no (direct) effect on your grade, unless of course you miss a midterm.

Date	Topic
Wed 8/24	1 Introduction
Fri 8/26	2.1 (optional: 2.1.3) Law of Large Numbers, 2.2 Basic concepts
Mon 8/29	More 2.2, 2.3 Expected value
Wed 8/31	2.4 Drunkard's walk, 2.9 Simulation
Fri 9/2	Catch up, examples
Mon 9/5	Labor Day - no classes
Wed 9/7	7.1 Axioms (opt.: 7.1.2), 7.2 Compound experiments (opt.: 7.2.1)
Fri 9/9	More 7.2, 7.3 Basic rules
Mon 9/12	3.1 Birthday problem
Wed 9/14	3.2 Coupon collector problem
Fri 9/16	3.7 Draft lottery
Mon 9/19	Catch up, examples
Wed 9/21	4.1 Binomial distribution
Fri 9/23	4.2 Poisson distribution (opt.: 4.2.4)
Mon 9/26	4.3 Hypergeometric distribution
Wed 9/28	5.1 Normal distribution
Fri 9/30	5.2 (opt.: 5.2.4) Variance and standard deviation
Mon 10/3	5.3 Sums, 5.4, 5.5 Central Limit Theorem
Wed 10/5	5.6 Statistics, 5.7 Confidence intervals

Date	Topic
Fri 10/7	Fall break
Mon 10/10	Catch up, examples
Wed 10/12	6.1 Conditional probability, Monty Hall
Fri 10/14	6.2 Bayes' Rule
Mon 10/17	8.1 Conditional probability
Wed 10/19	8.2 Law of conditional probability
Fri 10/21	8.3 Bayes' Rule in odds form
Mon 10/24	9.1 Random variables, 9.2 Expected value
Wed 10/26	9.3 Sums, 9.4 Variance
Fri 10/28	9.5 Independence
Mon 10/31	9.6 Important examples
Wed 11/2	9.6 Important examples
Fri 11/4	9.6 Important examples
Mon 11/7	Catch up, examples
Wed 11/9	10.1 Probability densities
Fri 11/11	10.2 Expected value, 10.3 Variance
Mon 11/14	10.4 Important examples
Wed 11/16	10.4 Important examples
Fri 11/18	10.4 Important examples
Mon 11/21	11.1, 11.2 Joint distributions
Wed 11/23 - Fri 11/25	Thanksgiving break
Mon 11/28	11.3 Marginal distributions
Wed 11/30	11.5 Covariance, correlation, regression
Fri 12/2	Catch up, examples
Mon 12/5	Summary, review

Course evaluation: Your feedback on the course is extremely valuable to me, the math department, and the administration. In particular, I take your comments very seriously and use them to improve the course the next time I teach it. You are responsible for completing an evaluation of the course at the end of the semester.

Title IX: Agnes Scott is here to help you if you have experienced any form of sexual harassment or violence, dating or domestic violence, or stalking. Please talk to any faculty or staff member with whom you feel comfortable. Faculty and staff members want to support you and have been trained to help. They will also inform the Title IX office so that you learn about options available to you. If you do not want college administrators to know what you have experienced, you may talk to the chaplain, as well as nurses or counselors in the Wellness Center with complete confidentiality. They will not tell anyone what you share with them unless you give your express permission. You may contact the Title IX Coordinator directly at T9Coordinator@agnesscott.edu.

Inclusion: This course adheres to the principles of diversity and inclusion integral to the Agnes Scott community. We respect people from all backgrounds and affirm people's decisions about gender expression and identity. Please let me know your preferred name or gender pronoun if different from the class roster. The Gay Johnson McDougall Center for Global Diversity and Inclusion is centered and grounded in dismantling systems of oppression, including structural and systemic racism, as well as empowering each individual to take action that uplifts and builds community. Students can contact them at diversity@agnesscott.edu or 404.471.6118.

ADA: Agnes Scott College seeks to provide equal access to its programs, services and activities for people with various abilities. If you will need accommodations in this class, please contact the Office of Academic Advising and Accessible Education (404-471-6150) to complete the registration process. Once registered, please contact me so we can discuss the specific accommodations needed for this course.