THE OHIO STATE UNIVERSITY

STAT 3201
Introduction to Probability for Data Analytics (24995)
Autumn 2026

Syllabus - Instructor Information

Jillian Morrison

Professional Qualifications
Ph.D., Statistical Science, Washington State University

Master's, Computational Finance, Washington State University

Bachelor's, Mathematics, University of Belize

Associate, Mathematics and Physics, St. John's College

Syllabus - Required or Recommended Readings

Required Textbook:

Mathematical Statistics with Applications (7th edition) by Wackerly, Mendenhall and Sheaffer.

The textbook for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through Carmen/Canvas, saving them up to 80% per title. The fee for this material is included as part of tuition and is listed as CarmenBooks fee on your Statement of

Account. In addition to cost-savings, materials provided through CarmenBooks are available immediately on or before the first day of class. There is no need to wait for financial aid or scholarship money to purchase your textbook.

Unless you choose to opt out of the program, you do NOT need to purchase any materials for this course at the bookstore. For more information on the program or information on how to opt out, please visit the CarmenBooks website.

Access this eBook through the CARMENBOOKS reader link in the course navigation of your Carmen course for this class.

Supplemental Textbook:

Course material will be supplemented with the freely available textbook - **Introduction to Probability and Statistics using R** by Kerns; available online at https://www.atmos.albany.edu/facstaff/timm/ATM315spring14/R/IPSUR.pdf

Syllabus - Course Schedule

Week	Topic to be covered
1	Course introduction, Introduction to R
2	Characterizing data using numerical and graphical summaries
3	Introduction to probability and counting methods
	Labor day - September 7
4	Introduction to probability and counting methods
5	Conditional probability and independence, probability laws, Bayes' Theorem
6	Introduction to simulation and Monte Carlo (MC) estimation

7	Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson
8	Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson
	Autumn Break - October 15-16
9	Continuous random variables and their probability distributions
10	Uniform, Normal, Gamma, Exponential, and Beta
11	Functions of random variables
12	Sampling distributions, Central Limit Theorem
	Veterans Day - November 11
13	Bivariate probability distributions
14	Marginal and conditional distributions, independent random variables
	Thanksgiving Break - November 25-27
15	Conditional expected values
	Covariance and correlation
16	Bivariate Normal distribution

Course Details - Instructor Contact Details

Email address: morrison.1043@osu.edu

Email: Please begin subject with “STAT 3201”; use my OSU email morrison.1043@osu.edu and avoid using the Carmen email tool. In order to protect your privacy, all course email correspondence must be conducted using your valid OSU name.# email account: any email from a non-OSU account will not be answered. I will attempt to answer emails within 48 hours, however, due to the large volume of emails this may not always be possible.

Course Details - Office Hours

Zoom Office Hours: Tue 11am -12pm, or by appointment

Office Hours are conducted in one large Zoom room, but you can email me if you need to speak with me privately.

Course Details - Class Meeting Details

Class Meeting Details: TBA - Online -

Course Details - Course Description

An introduction to probability and its role in statistical methods for data analytics. Equal emphasis is placed on analytical and simulation-based methods for quantifying uncertainty. Approaches to assessing the accuracy of simulation methods are discussed. Applications of probability and sampling to big-data settings are discussed. Prereq: Math 1152, 1161.xx, 1172, 1181, or equiv; or permission of instructor. Not open to students with credit for 4201 or Math 4530.
Prerequisite(s) / Corequisites: Prereq: Math 1152, 1161.xx, 1172, 1181, or equiv; or permission of instructor. Not open to students with credit for 4201 or Math 4530.

Course Details - More About This Course

Statistics 3201 is a 4-unit course that offers an introduction to probability and its role in statistical methods for data analytics. Equal emphasis is placed on analytical and simulation-based methods for quantifying uncertainty. Approaches to assessing the accuracy of simulation methods are discussed. Students should have some prior knowledge of basic programming. Applications of probability and sampling to big-data settings are also discussed.

Prerequisites: Math 1152 or 1161.xx or 1172 or 1181 or equivalent

Course Details - Course Learning Outcomes

Course Learning Outcomes

By the end of this course, students should successfully be able to:

1. Quantify uncertainty about events using mathematical descriptions of probability.
2. Quantify uncertainty about events using simulation methods.
3. Assess the quality and accuracy of simulation-based descriptions of uncertainty.
4. Update a description of uncertainty based on new information.
5. Identify appropriate probability models for experiments/data and summarize expected outcomes from such models.
6. Use correlation and conditional expectation to describe the relationship between two random variables.
7. Quantify uncertainty about summary statistics for large data sets.

This course satisfies the General Education foundation requirement in Mathematical and Quantitative Reasoning or Data Analysis which has the following goals and expected learning outcomes:

Goals: Successful students will be able to apply quantitative or logical reasoning and/or mathematical/statistical methods to understand and solve problems and will be able to communicate their results.

Expected Learning Outcomes (ELOs):

Successful students are able to:

1. Use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
2. Use diverse logical, mathematical and/or statistical approaches, technologies and tools to communicate about data symbolically, visually, numerically and verbally.
3. Draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
4. Make and evaluate important assumptions in estimation, modeling, logical argumentation and/or data analysis.
5. Evaluate social and ethical implications in mathematical and quantitative reasoning.

This course also satisfies the Legacy General Education requirement in Data Analysis which has the following goals and expected learning outcomes:

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

Expected Learning Outcomes:

1. Students understand basic concepts of statistics and probability.
2. Students comprehend methods needed to analyze and critically evaluate statistical arguments.
3. Students recognize the importance of statistical ideas.

Course Details - Course Supplies

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at https://ocio.osu.edu/help/hours, and support for urgent issues is available 24x7.

- Self-Service and Chat support: http://ocio.osu.edu/selfservice
- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- TDD: 614-688-8743

Necessary software

- This class requires you to use the statistical software package called R (The R Project for Statistical Computing; http://www.r-project.org/) to illustrate certain aspects. Here is the information for obtaining R.
    1. You can download R for Windows, Mac, and Linux, from the CRAN archive at https://cran.r-project.org.
    2. An in-depth introduction to R is available at http://cran.r-project.org/doc/manuals/R-intro.pdf
    3. Hands-on tutorials are available in the Swirl system, which you can learn about at http://swirlstats.com/ . In particular, “R Programming: The basics of programming in R” is an appropriate first tutorial for students who have never used R.
- An easier-to-use interface to R is available in the software package RStudio. This package is available for Windows, Mac, and Linux and can be downloaded for free from https://posit.co. Note that RStudio requires R to be installed.
- It may be helpful to become familiar with the (free) R Markdown authoring framework as you take this class; its use is required in future courses in this sequence. An online guide with overview information can be found at https://rmarkdown.rstudio.com.

- Microsoft Office 365 ProPlus All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
    1. Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
    2. Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found https://ocio.osu.edu/kb04733.
- Course Website: Important announcements, course materials, homework problems, computing references, and other information about the class are posted on Carmen (carmen.osu.edu, login with your web ID)

Baseline technical skills

- Basic computer and web-browsing skills
- Navigating Carmen and Carmen Zoom

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 10+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Course Details - Detailed Course Schedule

#	Day	Week	Topic to be covered	Textbook reading

1	August 25-28	1	Course introduction, Introduction to R	1.1
2	August 31- Sept 4	2	Characterizing data using numerical and graphical summaries	1.2-1.3
3	September 7-11	3	Introduction to probability and counting methods	2.1-2.6
4			Labor day - September 7	
5	September 14-18	4	Introduction to probability and counting methods	2.1-2.6
6	September 21-25	5	Conditional probability and independence, probability laws, Bayes' Theorem	2.7-2.10
7	September 28-2	6	Introduction to simulation and Monte Carlo (MC) estimation	
8	October 5-9	7	Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson	3.4-3.8
9			**Exam 1 - October 5 @ 4:10-5:20pm in Cockins Hall 0312**	
10	October 12-16	8	Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson	3.4-3.8
11			Autumn Break - October 15-16	
12	October 19-23	9	Continuous random variables and their probability distributions	4.1-4.3
13	October 26-30	10	Uniform, Normal, Gamma, Exponential, and Beta	4.4-4.7
14	November 2-6	11	Functions of random variables	6.1-6.3
15			**Exam 2 - November 2 @ 4:10-5:20pm in Cockins Hall 0312**	
16	November 9-13	12	Sampling distributions, Central Limit Theorem	7.1-7.3
17			Veterans Day - November 11	
18	November 16-20	13	Bivariate probability distributions	5.1-5.2
19	November 23-27	14	Marginal and conditional distributions, independent random variables	5.3-5.4
20			Thanksgiving Break - November 25-27	

21	November 30 - December 4	15	Conditional expected values	5.11
22			Covariance and correlation	5.7
23	December 7-9	16	Bivariate Normal distribution	5.1
24	Date TBD		**Final Exam (in person) - Location and time TBD**	

Course Details - Grading Policy

Assignment or category	Percentage
Homework and Labs	35
Midterm 1	20
Midterm 2	20
Final Exam	25
Total	100

Course Details - Grading Scale

Letter Grade	Percentage Range
A	100% to 93%
A-	< 93% to 90%
B+	< 90% to 87%
B	< 87% to 83%
B-	< 83% to 80%
C+	< 80% to 77%
C	< 77% to 73%
C-	< 73% to 70%
D+	< 70% to 67%
D	< 67% to 60%
E	< 60% to 0%

Course Details - Instructor Policies

Assignment information

Homework: The goal of homework assignments is to help you learn the material. There will be homework assignments posted on the course website, and they will be typically due once per week, with dates and times provided. They will consist of mostly textbook-style problems and problems motivated by data analytics applications. Homework may be typed or handwritten and scanned; if handwritten, the student is responsible for verifying that the writing is clear and legible and the scanned version is of good quality (e.g., not blurry). Scans should be compiled into a single pdf and submitted. Any R code and output must be typed. Please be sure that the questions are clearly labeled, all supporting work (including computer code) can be easily identified, and that all figures/tables are referenced and interpreted in the text.

Lab Assignments: The goal of lab assignments is to help you learn how to program in R and to use programming to solidify concepts from class. I will include sample code in my notes and post sample code to Carmen, but the best way to learn to code in R is to practice. Working with other students while learning to code is helpful, because when errors arise it's nice to have other people help inspect your code! R code and output must be typed. Please be sure that the questions are clearly labeled, all supporting work (including computer code) can be easily identified, and that all figures/tables are referenced and interpreted in the text. Submissions should be your own individual work..

Academic Integrity and Collaboration for Homework and Labs: You are encouraged to work with other STAT3201 students on homework and labs, and you may consult references both internal and external to the course material. Each student must produce their own assignments to be handed in. Do not copy any part of another student's homework or lab. You must list at the top of your

homework or lab your collaborators and any references (texts or other online materials) that you consulted. Use of homework solutions distributed in previous offerings of the course or available on the web constitutes academic misconduct and will be handled according to university rules.

Exams: The goal of the exams is both to help you solidify your understanding of the material and to evaluate you on your knowledge. There will be two midterm exams and one final exam. Statistical tables will be provided as needed. Calculators may be used. You will not be expected to do R coding during the exam, but if appropriate some R code and output may be displayed for interpretation.

Exams 1 and 2 will be delivered in-person in CH0312 on the scheduled date and time.

Location for Final Exam will be announced and posted on Carmen

A**cademic Integrity and Collaboration for Exams:** All exams are closed book/ closed notes and there are no make-up exams. You may not consult the course text, lecture materials, other students in Stat 3201 OR materials, people, or online forums outside of Stat 3201. Exams should be completed without any external help or communication.

Late assignments

Generally late assignments are **not** accepted. If you are unable to complete an assignment on time, please get in touch with me as soon as possible so we can discuss your situation.

Course Details - Course Policies

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call 614-688-HELP at any time if you have a technical problem.)

Grading and feedback

For assignments and labs, you can generally expect feedback within 7-10 days.

E-mail

I will typically reply to e-mails within 48 hours on school days. If you do not get a response within that timeframe, feel free to email again.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- Tone and civility: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- Citing your sources: When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)

Course Details - AI Use Policy

GenAI can fabricate information (for example, creating citations to sources that do not exist) or omit key information. You are ultimately responsible for the accuracy and integrity of your submitted work. Unless explicitly permitted below, representing AI-generated content as your own work is a violation of the Code of Student Conduct. Please check with your instructor if you have questions.

These levels may apply to the entire course or specific assignments, as indicated by the instructor:

- Permitted: You may use GenAI as a virtual tutor to explain concepts, quiz you on course topics, or summarize content you have personally authored (e.g., your own class notes).
- Prohibited: The materials in this course may be subject to copyright protection. Do not input or allow AI to access external or instructor-created course materials (e.g., assigned readings, slides) without explicit instructor permission. Do not use GenAI to outline, draft, translate, or write any part of an assignment.

Syllabus - University Policies

Office of Undergraduate Education - Standard Syllabus Statements

- Academic Misconduct
- Religious Accommodations
- Accommodations for Disability and Illness
- Intellectual Diversity
- Grievances and Solving Problems
- Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct
- Copyrights
- Content Warnings
- Mental Health Support

- Resources for Military-Connected Students
- Campus-wide Class Cancellations