

STAT 202, Spring 2019: Probability and Statistics

Instructor	Maggie Rahmoeller <i>Email:</i> rahmoeller@roanoke.edu (preferred method of contact)	<i>Phone:</i> (540) 375-2505 <i>Office:</i> Trexler 270J
Class Meetings	M/W/F Noon - 1PM in Trex 263	
Office Hours	Mon, Wed, Thurs, Fri: 2:00PM - 4:30PM By appointment only through https://drmaggie.youcanbook.me/ NOTE: You can book up to 3 days in advance but have to book at least 2 hours before the time slot. Email me if none of those times work.	
Course Objectives	The objective of this course is to apply calculus to the subject of probability in order to form a strong foundation for statistical methods. We will begin the course by discussing set theory and its application to discrete and continuous random variables. Armed with the tools of probability theory we will explore the relationship between probability theory and statistics.	
Intended Learning Outcomes	By the end of this course, successful students will be able to: <ul style="list-style-type: none">• understand and interpret a probability distribution.• distinguish the difference between continuous and discrete random variables and understand how to use them to describe random processes.• understand the role of randomness in decision-making processes.• distinguish among different statistical tests, and know which to use in a given situation.• distinguish among different distributions, and know which to use in a given situation.• use integration and sums as appropriate to determine probabilities.	
Required Materials	Textbook: <i>Mathematical Statistics with Applications</i> , by Wackerly, Mendenhall, and Scheaffer, 7th edition Technology: scientific calculator, Minitab, and Mathematica Mathematica Free Download: see https://webapps.roanoke.edu/www/it/mathematica/	
Course Content	We will cover most of the first 4 chapters of the textbook and an introduction to statistical inference. Included in these topics is: <ul style="list-style-type: none">• An Introduction to Descriptive Statistics• Probability• Discrete Random Variables and Their Distributions• Continuous Random Variables and Their Distributions• Confidence Intervals• Hypothesis Testing• Correlation and Regression	

Course Grades The following table lists the weights for the various forms of assessment for this class.

Tests	50%
Assignments/Quizzes	30%
Final Exam	20%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below:

	B+	87-89	C+	77-79	D+	67-69		
A	93-100	B	83-86	C	73-76	D	63-66	F 0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62	

Homework Homework will be assigned regularly in this class (virtually every class period) and may take several forms. Typically, it will be due at the start of the class period immediately following the assigning of the homework. Homework will be graded partly on effort and partly on correctness. Late homework is not accepted. If you miss class, get a friend to turn in your homework for you.

Quizzes There may be written quizzes in this class. They may either be in-class quizzes or take-home quizzes. I may occasionally warn you about an upcoming quiz but you should be prepared to take a quiz on any given day, including lab days.

Tests Four tests will be given in this course. They are scheduled for the following dates:

- Friday, Feb 8
- Wednesday, Feb 27
- Friday, Mar 22
- Monday, Apr 15

Each test will focus on the material learned since the last test, but as with most mathematics/statistics classes, the exam will necessarily require you to understand and remember things from the past. Note that weather and other changes in the course schedule may affect the material covered on tests, but unless a test day is canceled due to weather, the tests will happen as scheduled.

Final Exam The final exam will be comprehensive and given during the scheduled time for **the final exam for Block 4, i.e. Wednesday, April 24 from 8:30-11:30AM**. The best way to review for the final is to review your performance on the four tests: focus on material that you did not master the first time around, and review the topics that you did master.

Attendance & Make-Up Work Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. Unexcused absences may result in the lowering of the final grade (for example, a B to a B-). When absent, excused or unexcused, you are responsible for all material covered in class. **You will not be allowed to make up any work missed due to an unexcused absence.**

**MCSP
Conversation
Series**

The Department of Mathematics, Computer Science and Physics offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our discipline. Members of this class are invited to be involved with all of these meetings; however participation in **at least two** of these sessions is mandatory. After attending, students will submit a one page paper reflecting on the discussion **within one week of the lecture**. This should **not** simply be a regurgitation of the content, but rather a personal contemplation of the experience. This reaction paper will be counted as a quiz and should be uploaded to Inquire using the appropriate link. If you are caught leaving the talk early or being disruptive, you will receive a 0 on the assignment.

**Accessible
Education
Services**

Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment.

**Academic
Integrity**

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No electronic devices other than calculators can be taken out during any class or testing period (this includes cell phones) unless written consent is given by the professor (e.g. Mathematica may be allowed for some tests). Note that looking at or using your cell phone during a test or quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so.

Subject Tutoring Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm - 9 pm, Sunday - Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are highly trained Roanoke College students who offer one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences. Tutoring sessions are available in 15, 30, or 45-minute appointments. Feel free to drop by for a quick question or make an appointment at https://libguides.roanoke.edu/subject_tutoring for a longer one-on-one appointment. For questions or concerns, please contact us at 540-375-2590 or subject_tutoring@roanoke.edu.

Tentative
Course
Schedule

Mon	Jan 14		Intro
Wed	Jan 16		<i>No class - cancelled!</i>
Fri	Jan 18		<i>No class - cancelled!</i>
Mon	Jan 21	2.4 - 2.5	Discrete Probability Models
Wed	Jan 23	2.6	Counting Sample Points
Fri	Jan 25	2.6 - 2.7	Counting Sample Points & Conditional Probability
Mon	Jan 28	2.7	Conditional Probability & Independence
Wed	Jan 30	2.8	Laws of Probability
Fri	Feb 1	2.9	Event Composition
Mon	Feb 4	2.10	Laws of Total Probability & Bayes' Rule
Wed	Feb 6	3.1 - 3.2	Discrete Random Variables
Fri	Feb 8		Test 1
Mon	Feb 11	3.3	Expected Value
Wed	Feb 13	3.4	Binomial Probability Distribution
Fri	Feb 15	3.5	Geometric Probability Distribution
Mon	Feb 18	3.7	Hypergeometric Probability Distribution
Wed	Feb 20	3.8	Poisson Probability Distribution
Fri	Feb 22		Discrete Distributions Worksheet
Mon	Feb 25	4.1 - 4.2	Continuous Random Variables
Wed	Feb 27		Test 2
Fri	Mar 1	4.3 - 4.4	Expected Values & Uniform Probability Distribution
Spring Break			
Mon	Mar 11	4.5	Normal Probability Distribution
Wed	Mar 13	4.6	Gamma Probability Distribution
Fri	Mar 15		<i>No class - cancelled!</i>
Mon	Mar 18	4.7	Beta Probability Distribution
Wed	Mar 20	5.1 - 5.2	Multivariate Probability Distributions
Fri	Mar 22		Test 3
Mon	Mar 25	5.4	Independent Random Variables
Wed	Mar 27	5.7	Covariance of 2 Random Variables
Fri	Mar 29	10.2 & 10.6	Hypothesis Testing: z-test for mean
Mon	Apr 1		Sampling Distribution & Central Limit Theorem
Wed	Apr 3		Hypothesis Testing: t-test for mean
Fri	Apr 5		Hypothesis Testing: 2-sample t-test for means
Mon	Apr 8		Hypothesis Testing: ANOVA
Wed	Apr 10		Confidence Intervals
Fri	Apr 12		Regression
Mon	Apr 15		Test 4
Wed	Apr 17		Regression
Fri	Apr 19		<i>No class - Good Friday</i>
Mon	Apr 22		Review
Wed	Apr 24		Final Exam: 8:30 - 11:30AM

Commitment
Hours

This course expects you to spend at least 12 hours of work each week inside and outside of class.