STAT 303, Fall 2025: Experimental Design

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Trexler Hall 270G

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Office Hours

Mondays, Wednesdays, Fridays: 2:20-3:20 PM in Trexler 263

Course Information Tuesday and Thursday in Trexler 270G or on Zoom. You can also schedule an appointment by email.

Intended Learning Outcomes The objective of this course is to investigate techniques for designing effective and informative experiments. We will discuss statistical methods for analyzing data from various types of designs and determine in which circumstances each design is appropriate. In our discussion, we will encounter simple comparative designs, the analysis of variance, completely randomized designs, randomized block designs, factorial designs, fractional factorial designs, and Latin-square designs.

By the end of this course, successful students will be able to:

- use statistical software to organize, describe, and screen data.
- understand how to select an appropriate experimental design for a given set of constraints and goals.
- articulate the importance and limitations of using data and statistical methods in decision-making.
- advise scientists on how to interpret their findings using statistical methods.
- express themselves clearly and effectively in writing the concepts and language of statistics.

Required Materials

Textbook: Design and Analysis of Experiments; Douglas C. Montgomery; Wiley, 8th Edition Technology: You will also need to have R and RStudio on your personal computer.

Course Grades

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

Assignments and Quizzes	40%
Tests	40%
Final Exam	20%

A grade scale will be determined after final grades are computed but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

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

Participation

We will strive to have an active, rather than passive, classroom environment. This means that questions are welcome in class, and the instructor will ask for your help in completing problems presented in class. Depending on your learning style, you may prefer to see a topic in class, and then read the textbook, or perhaps read the textbook before class and then see it explained further in class; either way, you prefer, reading the textbook and paying close attention will be key in your success. Since a central goal of this subject is to help you become independent and critical thinkers, you are discouraged from the extensive use of generative AI tools to create code or text as part of your work. If you do use AI-generated content in your assignments, you must clearly indicate what work is yours and what part is generated by the AI.

Assignments and Quizzes

There will be regular homework in this class, though it may not be given, or due, daily. A detailed list of homework that is assigned for this class will always be available on Inquire, but it will be announced and discussed in class as well. Unless otherwise specified, you are highly encouraged to work with your classmates on homework problems; discussing mathematics and statistics with each other is a highly valued skill by future employers! What you turn in to me, though, should be written on your own and not with others around.

There may also 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. Staying current with the material and being active in class is a great way to avoid surprise quizzes!

Tests and Final

There will be three tests in this class along with a final exam. While the tests themselves are not designed to be cumulative, because of the cumulative nature of mathematics and its progression of material, mastery of previous material will be beneficial to success on future tests. Please take time to learn from your homework feedback and previous test feedback throughout this class. The instructor is always more than happy to discuss feedback in more detail.

Each test given will have an in-class component and may include a take-home component. Unless otherwise specified, the take-home component will be due at the time of the in-class portion of the test. More information about each test will be given as the date for those tests approaches. Unless possibly modified by weather closings and/or delays, the three in-class test days will be Friday, September 26, Friday, October 24, and Wednesday, December 3. Any deviation from this schedule will be announced in class, distributed through email, and corrected on a revised syllabus on Inquire.

The final exam is scheduled, per the Roanoke College Academic Calendar for block 6 classes, on December 9 from 2:00 PM to 5:00 PM.

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. 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. Late homework will be accepted within 48 hours of the due time and will be subject to a 50% penalty. Afterward, late homework will be accepted for the purpose of providing you feedback only; credit will not be given for late homework beyond 48 hours. Assignments and take-home portion of tests will have their own penalties for late work.

Study Room

The MCSP Study Room, Trexler 271, can be used by you and your friends to meet up so that you can work on homework together or prepare for tests. It is open virtually 24 hours a day, 7 days a week (very occasionally there are meetings in that room). Your student ID card should grant you access to Trexler Hall

any time of day if the doors happen to be locked (use the card access point located by the first-floor entrance facing the parking lot). Take advantage of this area and time, especially during weekdays when I am around (which is generally a lot)!

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 can be used during any class or testing period (this includes cell phones; please silence or turn them off before class). Note that looking at or using your cell phone during a quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so.

Workload

At a bare minimum, this course expects you to spend at least 12 hours of work each week inside Course and outside of class.