Instructor:
Dr. Chris Lee
Trexler 270D
clee@roanoke.edu

Office Hours:
Office hours are available Monday – Thursday and are by appointment. To make an appointment, please use the link:

https://drchrislee.youcanbook.me

Overarching Philosophy: Your ability to do Mathematics is not measured by a number stamped on your forehead at birth. Ability is a direct result of effort, and everything in this course is designed to encourage and reward maximum effort. No matter what your ability or grade is at any given moment, it can be changed through focused effort.

Course Description: Does gun control save lives? Such a politically charged question can be approached from many directions. In this course students will learn the methodologies of modern statistics and use them to address the issue of measuring the effectiveness of gun control. Special attention will be given to the importance of being able to set aside politics, emotions, and pre-conceived notions in order to analyze a difficult question from a statistical point of view.

Learning Outcomes:

1. Students will be able to use the methodologies of statistics to
    a. Investigate a topic of interest and make decisions based on the results.
    b. Design and carry out a simple statistical experiment.
    c. Critique news stories and journal articles that include statistical information. In the critique students will recognize variability and its consequences, identify potential sources of bias and both proper and improper cause and effect inference.
2. Students will be able to articulate the importance and limitations of using data and statistical methods in decision making.
3. Students will be able to write about course topics clearly and effectively.
4. Students will be able to interpret quantitative information related to the course topic.

Required Text: *Statistic: Concepts and Controversies, 9th edition.* Moore& Notz.

Attendance: 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. If you accumulate 3 unexcused absences you will be dropped from the class with a grade of DF recorded. When absent, you are responsible for all material covered in class. Missing class has no effect on assignment due dates.

Late Work: Unless specific permission is given in advance of the due date, no late work will be accepted.

Cell Phones: This is very simple - no cells phones are allowed to be used or even visible in our classroom. This includes before, during, and after class. If a cell phone is seen, the student may be asked to leave the classroom and the day will be counted as an unexcused absence.

Reading and Participation: The key to learning a topic in mathematics is participation. We will strive to have an active, rather than passive, classroom environment. The last page of the syllabus is a day-by-day outline of the sections that will be discussed in class. You are fully expected to have read the upcoming section before the class meeting! This does not mean you need to understand everything, but rather you should be familiar with the definitions and concepts from the sections; having read the section will allow you to ask better questions and follow along better in class.

Co-Curricular Engagement: The MCSP Department offers a series of talks (MCSP Conversation Series) that appeal to a broad range of interests related to your fields of study. You are invited to be involved with all these meetings. After attending, submit a one-page paper reflecting on the discussion through Inquire. These reflection papers earn **extra credit**, with .5% add to your course average for each attended, up to 2% total. In addition, individually you may request that other appropriate events count. These events may be related to either statistics or the topic of our course: "Does gun control save lives".

Academic Integrity: Students are expected to follow the integrity policy detailed in the handbook *Academic Integrity at Roanoke College*. Additionally, if you are ever uncertain as to how the College's policy pertains to any assignment or exam in this course, please ask me for clarification. The bottom line is that all work that a student submits for a grade must be ***solely*** the work of that student unless the instructor has given explicit permission for students to work together. You will have the opportunity on some quizzes and our main project to collaborate with another as you work in pairs. It is critical that you understand that collaboration means both parties are contributing equally and meaningfully to the assignment. Adding your name to the work of another, as well as using a divide-and-conquer approach, are both examples of seeking credit for work that is not your own.

Grading Components

Testing: As described in more detail on the next page, we will be making use of mastery-based testing.

Problems of the Day: At the end of each class period during which content is discussed, practice problems will be assigned. It is expected that students work all these problems. To keep you from procrastinating and to measure understanding, an overwhelming majority of class days will begin with a "problem of the day". When you enter the classroom there will be a problem displayed for you to work and turn in. This problem will be due 5 minutes after the start of our class time regardless of when you enter the classroom.

Writing: While knowing statistics is important, it is useless if you cannot communicate the ideas and concepts you have learned. Work for this course includes three writing assignments and a project.

Grading: Components of a student's grade will be weighted as follows:

Tests: 80% Short Writing: 5% Project: 10% Problem of the Day: 5%

A scale will for final grades will be not be lower than the scale given below.

0	*60*	*63*	*67*	*70*	*73*	*77*	*80*	*83*	*87*	*90*	*93*
F	*D-*	*D*	*D+*	*C-*	*C*	*C+*	*B-*	*B*	*B+*	*A-*	*A*

Testing: We will be making use of **mastery-based testing** rather than a points-based system. Mastery-based testing is very different from what you are used to – do not hesitate to ask me questions.

Description: You only receive credit for answers that demonstrate you completely understand (have mastered) a topic. But you get many chances to display mastery throughout the semester with no penalty whatsoever for earlier attempts.

- The course has been boiled down to 24 essential types of questions, or "topics". Each corresponds to a chapter of our text.
- Each problem submitted is graded as either "Mastery" or "Not Mastered". A grade of Mastery indicates that you have demonstrated full understanding of the concept being tested and further work on the topic is not necessary.
- Once you have mastered a problem you need not ever attempt it again.
- There is no penalty whatsoever for multiple attempts taken to achieve mastery.
- Mastery does not mean perfect; it means you understand and can demonstrate all fundamentals of the topic and are proficient at the level desired for the course – you do not need to study the topic further.

Mastery Opportunities: You will have the opportunity to work mastery problems roughly every other Friday. On a given mastery day, new topics are REQUIRED – you must make a good faith effort at the new topics to have any mastery problems graded that day.

Grading: Your overall test grade is then determined by the number of topics you have mastered.

# mastered	Points Equiv.
24	100
23	96.6
22	93.3
21	90
20	86.6
19	83.3
18	80
17	76.6
16	73.3
15	70
14	66.6
13	63.3
12	60
11	56.6
10	53.3
9	50
0 - 8	0

Notes on Master-Based Testing

- Clear content objectives, students continually know exactly what they need to work on to improve.
- Credit only for eventual mastery. No partial credit. Multiple attempts with complete forgiveness.
- A points-based system sets arbitrary deadlines by which time perfection must be attained.
- Perseverance: Points – try a problem once, maybe twice, hope for the best.
  Mastery – Keep trying until you succeed (and I know you can)
- Use of feedback: Points – do I agree with the instructors grading
  Mastery – what can I do to demonstrate that I understand
- Reduced Test Anxiety: Points – every test has the potential to damage your GPA.
  Mastery – no one test can harm your grade.
- Intelligent Test Preparation: You may choose to skip problems on a test. Better to achieve mastery on some than to demonstrate mediocrity on all.
- No longer will any of us have to wonder just what exactly a 7/10 means on a problem compared to an 8/10…
- A "broad and superficial" strategy may earn a C or D in a points-based system, in mastery you will fail.

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

		Topic/Chapter		
Wed	Aug 28		Intro	Writing #1 Assigned
Fri		1	*Where Do Data Come From?*	Writing #1 Due
Mon	Sept 2	2	*Samples, Good and Bad*	
Wed		3	*What Do Samples Tell Us?*	
Fri		4	*Sample Surveys in the Real World*	
Mon	Sept 9	5	*Experiments, Good and Bad*	
Wed		6	*Experiments in the Real World*	
Fri		**Mastery Day**		
Mon	Sept 16	7	*Data Ethics*	
Wed		8	*Measuring*	
Fri		9	*Do the Numbers Make Sense*	
Mon	Sept 23	10	*Graphs, Good and Bad*	
Wed		11	*Displaying Distributions with Graphs*	Writing #2 Assigned
Fri		**Mastery Day**		
Mon	Sept 30	12	*Describing Distributions with Numbers*	
Wed		12	*Describing Distributions with Numbers*	
Fri		13	*Normal Distributions*	
Mon	Oct 7	13	*Normal Distributions*	
Wed		14	Scatterplots and Correlation	Writing #2 Due
Fri		**Mastery Day**		
Fall Break				
Mon	Oct 21	15	Regression, Prediction, and Causation	
Wed		16	*The Consumer Price Index / Govt Statistics*	Project Assignment
Fri		17	*Thinking about Chance*	
Mon	Oct 28	18	*Probability Models*	
Wed		Group work on Project		
Fri		**Mastery Day**		
Mon	Nov 4	19	*Simulation*	
Wed		20	*The House Edge: Expected Values*	
Fri		21	*What is a Confidence Interval?*	
Mon	Nov 11	22	*What is a Test of Significance?*	
Wed		22	*What is a Test of Significance?*	
Fri		**Mastery Day**		
Mon	Nov 19	23	*Use and Abuse of Statistical Inference*	Project Due
Wed		23	*Use and Abuse of Statistical Inference*	
Fri		24	*Two-Way Tables and the Chi-Square Test*	Writing #3 Assigned
Mon	Nov 25	24	*Two-Way Tables and the Chi-Square Test*	
Mon	Dec 2	Review		
Wed		**Mastery Day**		
Fri		Course Wrap Up		Writing #3 Due
Wed	Dec 11	**Mastery Day** (Final Exam Block)		