

Fall 2021

Instructor: Nick Lucas

Phone: 974-5862

Virtual Office Hours: Thursdays 6:00 – 7:00pm

Email: nlucas@unm.edu

Course Description

Math 1350 course discusses the fundamentals of descriptive and inferential statistics. Students will gain introductions to topics such as descriptive statistics, probability and basic probability models used in statistics, sampling and statistical inference, and techniques for the visual presentation of numerical data. These concepts will be illustrated by examples from a variety of fields. Although introductory statistics courses are often thought of as just another math class, this course focuses on the understanding and application of statistics rather than the underlying theoretical and computational aspects which often leave the student with a mindful of formulae but little understanding of their application and interpretation.

There is no assigned textbook for this class. However, additional online resources will be made available. All material for the class shall be presented in downloadable lecture notes and instructional videos. All homework assignments and any extra credit assignments can only be obtained through the class portal. Each week, students will need to watch the assigned instructional video, participate in a class discussion relevant to the topics covered in that week's lecture, and work on the assigned homework problems.

Students are encouraged to send the instructor questions as needed and participate in class discussion boards. Students are also encouraged to utilize the instructor's virtual office hours. Time management is also extremely important. If you don't plan sufficient time for studying class materials and watching instructional video, you will always find yourself behind and confused. This class requires participation, effective communication, organization, patience, and the motivation to learn. Your participation in this class is your responsibility and the consequence for non-participation is also your responsibility. **Students requiring a reasonable accommodation are asked to contact the instructor immediately.**

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Student Learning Outcomes

1. Explain the general concepts of statistics.
 - a. Explain and evaluate statistics used in the real world (from a news article, research project, etc.).
 - b. Use statistical vocabulary appropriately.
 - c. Distinguish between descriptive and inferential statistics.
 - d. Distinguish between qualitative and quantitative data.
 - e. Distinguish between populations and samples, and parameters and statistics.
 - f. Give examples of independent and dependent variables.
2. Presentation and description of data.
 - a. Present data graphically using histograms, frequency curves and other statistical graphs.
 - b. Interpret graphs of data, including histograms and shapes of distributions.
3. Summarize data using measures of central tendency and variation.
 - a. Calculate and interpret the mean, median, and mode to describe data.
 - b. Calculate and interpret range, variance, and standard deviation to describe data.
4. Present the concepts of probability.
 - a. Interpret basic probabilities.
 - b. Calculate probabilities using the standard normal distribution and relate them to areas under the curve.
 - c. Describe the relationship between the sampling distribution and the population distribution.
 - d. Use the central limit theorem to approximate the probability distribution and calculate probabilities.
5. Compute point and interval estimates.
 - a. Determine the confidence interval for a parameter.
 - b. Interpret the confidence level and margin of
 - c. Determine whether a statistical technique is appropriate under stated conditions.
6. Perform hypothesis tests.
 - a. Determine whether a statistical test is appropriate under stated conditions.
 - b. Identify null and alternative hypothesis.
 - c. Perform and interpret statistical tests (e.g. z-test, t-test, one-tailed and two-tailed, one-sample, two-sample) and determine whether data is statistically significant.
 - d. State the conclusion of a hypothesis test.
 - e. Interpret a p-value as compared to a significance level.
 - f. Explain why a test can lead us to reject a null hypothesis, not accept one.
 - g. Distinguish between Type I and Type II errors.
7. Analyze data using regression and correlation.
 - a. Explain the difference between correlation and causation.
 - b. Construct and interpret scatter plots.
 - c. Calculate and interpret the linear correlation coefficient.
 - d. Determine and use the equation of a least-squares regression line between two variables to make predictions.
 - e. Interpret the meaning of the coefficient of determination.
8. Optional topics.
 - a. Inter-quartile range, box-plots, stem-and-leaf plots.
 - b. Statistical power.
 - c. Chi-square.

Learning Objectives

1. Descriptive Statistics, Data Production and Inference: Students will be able to explain basic vocabulary, logic, and procedures for data exploration, data production, and statistical inference.

2. Data Exploration: Students will be able to explain principles of data exploration and differentiate between quantitative and categorical variables. Students will illustrate by way of graphs and the use of tables how to interpret data. They will identify the underlying principles and measures used to analyze this data.

3. Procedures for data production: Students will demonstrate that they can use tables of random numbers to perform simple random sampling to obtain samples from populations. They will show that they can distinguish differences between observational studies and experiments. Students will demonstrate techniques for the design of a controlled experiment.

4. Sampling Distributions: Students will be able to recognize and apply the terms population, sample, parameter and statistics as they pertain to sampling distributions. They will apply the concept of the Law of Large Numbers and Central Limit Theorem. They will demonstrate the ability to obtain the sampling distribution of sample means and spread of a population.

5. Making Inferences: Students will demonstrate an understanding for the procedures involved in making inferences about quantitative populations.

6. Tests for Independence of two categorical variables: Students will be able to interpret 2-way tables, stating hypothesis, calculating expected counts and using Chi Square distribution to test for independence.

How to Communicate with Your Instructor

Students are encouraged to call, email, or message me at ANY time. I will do my best to get back with you as soon as possible. Students can also message me through the class site on Blackboard. The virtual office hour listed on the first page is the best time to reach me, however, I am happy to respond to messages throughout the day when I can.

Tel: 974-5862 Email: nlucas@unm.edu

Technical Skills

NOTE: if the embedded hyperlinks provided below will not open, go to the indicated footnote for the full URL link to open

In order to participate and succeed in this class, you will need to be able to perform the following basic technical tasks:

- Use UNM Learn (help documentation located in "How to Use Learn" link on left course menu, and also at [Online Student Documentation](#)¹). Also, UNM-Valencia provides a Blackboard Learn Jumpstart self-learning module to give you practice with the most commonly used tools in UNM Learn.
- Use email – including attaching files, opening files, downloading attachments
- Copy and paste within applications including Microsoft Office and Excel
- Open a hyperlink (click on a hyperlink to access a website or online resource)
- Use Microsoft Office applications
 - Create, download, update, save and upload MS Word and Excel documents

¹ <http://online.unm.edu/help/learn/students/>

Coursework and Participation

Instructor Response Time

I routinely check the course for postings or emails during the week, but I may be a little longer in replying to questions on the weekends. Normally, I will respond within 24-hours or sooner. The quickest way to get a response is to send me a text message.

Homework

There will be 9 homework assignments. These assignments will consist of short answer problems and problems to be worked using Microsoft Excel. Each homework assignment is worth 20 to 30 points. Credit is given based on the amount of effort shown in your work and not the number of correct or incorrect answers. In order to obtain full credit, all work **must** be shown, including all work done in Excel (Refer to the Assignments Rubric for more information on grading criteria). **Homework assignments must be submitted into Learn by the assigned date and time. No late assignments shall be accepted – no exceptions.**

Review Exercises

From time to time, students will be given exercises to review the material just presented. These exercises will provide students the opportunity to earn extra credit. Although there is no specific number of exercises planned, students can expect to have the opportunity to earn no less than 50 points extra credit. Review Exercises are graded using the Assignments Rubric. **Review Exercises must be submitted into Learn by the assigned date and time. No late assignments shall be accepted – no exceptions.**

Discussion Boards and Participation

Students are required to actively participate in the weekly discussion boards. Students are required to respond initially to the discussion board question by initiating an Original Thread. The Discussion Board is where we assess your participation as if you were in a regular in-person class. You are expected to be an active and engaged member of the class. You are required to participate in all discussion posts during the semester. Discussion posts take numerous forms. They could involve responding to questions and commenting on the lecture presentations or answering another student's questions regarding the material. Please refer to the Netiquette Rules on the *About this Course* page regarding appropriate conduct when posting in discussion boards.

Each discussion board assignment is worth 10 points. In order to receive full credit for these posts, you must fulfill some basic requirements as defined in the *Discussion Board Rubric*. Active participation in the online discussions helps create a learning community and gives you opportunities to work with and get to know other students. Discussion questions and instructions are located in the Discussion Board section of the course site. **Discussion assignments must be submitted into Learn by the assigned date and time. No late assignments shall be accepted – no exceptions.**

Exams

There will be four exams. Students should use a UNM campus computer to take the exam or a computer connected to the internet using an Ethernet cord (not WiFi). The first three exams are worth 100 points each. Exams will include material from the video lecture, notes, homework assignments and review exercises. Exam questions will consist of multiple-choice and short answer items. Class materials will not be available while taking exams. Students will use Microsoft Excel during exams and will need to attach all work completed in Excel to receive any credit. The fourth or final exam will be cumulative exam covering material throughout the semester. The final exam will require students to demonstrate their knowledge and skills in applying the information learned over the semester. The final exam is worth 300 points. Students may only make-up missed exams if they have contacted the instructor at least 24 hours prior to the exam due date.

Grades

Your final course grade will be computed from the four test scores, nine homework scores, and points earned from participating in the discussion boards. The table below provides a detailed breakdown of how each component in the class contributes to your final grade.

Course Component	How Many?	Points Each	Total Points Possible	Percentage of Final Grade
Homework Assignments	9	30	250	25%
Discussion Forums	15	10	150	15%
Exams	3	100	300	30%
Final Exam	1	300	300	30%
TOTALS			1000	100%

There are a total of 1000 points possible for the course (Discussion Board Participation @ 150 points; 9 homeworks @ 250 points; three exams @ 300 points; and the final exam @ 300 points; for a total of 1000 points possible for the class). The assignment of final letter grades will be contingent on the total class performance. However, students may expect the following grading distribution to be used in lieu of the total class performance: A = > 899, B = > 799, C = > 699; 699 and below → Instructor's Withdrawal (or 'W').

Timeline for Grading Assignments and Exams

The due date for all assignments and exams will be Sunday. Students can expect assignments and exams to be graded by Wednesday of that same week. Students can review their graded assignments and exams by to the My Grades page and clicking on the assigned score.

Academic Dishonesty

Students may work with one another on assignments but each must contribute an equal share. In other words, each student must understand the concept and be able to perform the skill on his/her own. Copying or relying on another student for answers is considered cheating. If it is found that a student committed any infractions of honest academic process, he or she will lose credit for the assignment or assessment, may be dropped from the course, lose credit, and/or Fail the course. Here is the link to the UNM Academic Dishonesty Policy: <https://policy.unm.edu/regents-policies/section-4/4-8.html>

UNM Policies

Equal Opportunity and Non-Discrimination

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered “responsible employees” by the [Department of Education](#)² (see pg. 15). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the [Office of Equal Opportunity](#)³.

[Read more about UNM policy regarding sexual misconduct](#)⁴.

Copyright Issues

All materials in this course fall under copyright laws and should not be downloaded, distributed, or used by students for any purpose outside this course.

[The UNM Copyright Guide](#)⁵ has additional helpful information on this topic.

If you have a disability requiring accommodation, please contact:

- [UNM-Valencia Student Services](#)⁶ if you are a Valencia campus student. The phone number is 505-925-8560
- [UNM Accessibility Resource Center](#)⁷ in 2021 Mesa Vista Hall ***if you are a main campus student***. The phone number is 505-277-3506.

Information about your disability is confidential and your instructor cannot refer you for accommodations. Be aware that you will need to provide documentation. If you need assistance in obtaining documentation, the offices above can assist you.

Accessibility Statements

[Blackboard's Accessibility statement](#)⁸

[Microsoft's Accessibility statement](#)⁹

² <https://www2.ed.gov/about/offices/list/ocr/docs/ga-201404-title-ix.pdf>

³ <http://oeo.unm.edu/>

⁴ <https://policy.unm.edu/university-policies/2000/2740.html>

⁵ <https://copyright.unm.edu/>

⁶ <http://valencia.unm.edu/students/student-services.html>

⁷ <https://arc.unm.edu/>

⁸ <https://www.blackboard.com/blackboard-accessibility-commitment>

⁹ <https://www.microsoft.com/en-us/accessibility/>

UNM Resources

- [UNM Valencia Campus Tutoring Services¹⁰](#)
- [UNM Main Campus CAPS Tutoring Services¹¹](#)
- [UNM-Valencia Library¹²](#)
- [UNM Libraries¹³](#)
- [“Life” Resources available to UNM-Valencia Students¹⁴](#)
- [Student Health & Counseling \(SHAC\) Online Services¹⁵](#)

FOR MILITARY-CONNECTED STUDENTS

There are resources on campus designed to help you succeed. You can approach any faculty or staff for help with any issues you may encounter. Many faculty and staff have completed the GREEN ZONE training to learn about the unique challenges facing military-connected students. If you feel that you need help beyond what faculty and/or staff can give you, please reach out to the Veterans Resource Center on main campus at 505-277-3181, or by email at vrc@unm.edu. The Veterans Coordinator at UNM-Valencia is in the Student Services Office, at 505-925-8560.

Accessibility Support

Students requiring accessibility support need to notify the instructor as soon as possible. Students requesting support services from UNM Accessibility Resource Center are required to submit documentation of a disability to verify eligibility under the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act of 1973, and the University of New Mexico Policy 2310. ADA defines a disability as a substantial limitation of a major life function. Submission of documentation is not the same as the request for services. Request for services and/or reasonable accommodations must be initiated by the student once he/she is admitted to the University of New Mexico (UNM). The student must schedule an intake appointment with UNM Accessibility Resource Center so that support services and reasonable accommodations may be discussed.

UNM Accessibility Resource Center
302 Cornell Dr. NE Room 2021
Albuquerque, NM. 87131
Phone: 505-277-3506
Email: arcsrvs@unm.edu

¹⁰ <http://valencia.unm.edu/campus-resources/the-learning-center/learning-center.html>

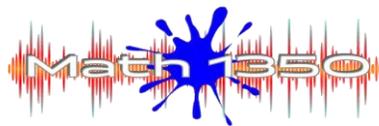
¹¹ <http://caps.unm.edu/services/online-tutoring/olc.php>

¹² <http://valencia.unm.edu/library/index.html>

¹³ <https://library.unm.edu/>

¹⁴ <http://valencia.unm.edu/students/student-resources.html>

¹⁵ <https://shac.unm.edu/>



CLASS SCHEDULE

Week	Chapter	Material Covered
8/23	1	Introduction; Why statistics? What is data? Scales of measurement; Populations versus samples
8/30	1 & 2	Types of variables; Research Designs; Sampling methods; Describing Data: Pie Charts & Bar Graphs
9/3		Last day to drop a class with a complete refund
9/6	2 & 3	Describing Data with Histograms; Describing Data: Measures of Central Tendency
9/13	3	Describing Data: Measures of Central Tendency and Variability
9/19		EXAM 1: Must be completed in Learn by 11:59p.m., Sunday, 9/19. Covers Chapters 1, 2, & 3; HWs 1 - 2; Rev Exercises 1 & 2
9/20	4	Examining relationships between variables: Correlation between two variables
9/27	4 & 5	Testing the correlation between two variables; Bivariate regression
10/4	5	Plotting the regression line; Understanding regression error (residuals)
10/10		EXAM 2: Must be completed in Learn by 11:59p.m., Sunday, 10/10. Chapters 4 & 5; HWs 3 & 4; Rev Exercises 3 & 4
10/11	6	What are z-scores? Finding the area under the normal curve.
10/18	6 & 7	Estimating the standard error of the mean; Confidence intervals
10/25	7	Using Student's t – distribution; How does sample size affect estimating population values?
10/31		EXAM3: Must be completed in Learn by 11:59p.m., Sunday, 10/31. Covers Chapters 6 & 7; HWs 5 & 6; Rev Exercises 5 & 6
11/1	8	Hypothesis testing; Statistical errors; Statistical Power
11/8	8	Significance tests comparing population means; How are confidence intervals and significance tests linked?
11/15	9	The matched-pairs t – test; Obtaining the confidence interval for the mean difference
11/22	9	The independent-groups t – test; Obtaining the confidence interval for the difference between two sample means
11/29	10	Nonparametric Tests: The One-Way Chi-square test;
12/6	10	Nonparametric Tests: The Two-Way Chi-square test; The final exam will be emailed to your UNM Lobo account on Wednesday, December 8, 2021.
12/15		EXAM 4: Must be emailed to the instructor no later than 11:59 p.m. on Wednesday, December 15, 2021. Covers all chapters, homeworks, and review exercises. Exams received after the deadline will NOT be accepted. No exceptions.