SPRING 2024

Instructor: Nick Lucas

Phone: 974-5862

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

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Course Description

    Math 1350 course discusses the fundamentals of descriptive and inferential statistics. Students will gain knowledge in 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.**

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 CANVAS. 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.

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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). The homework assignments can be found by following the *Assignments* link on the left side of the Home page. *Homework assignments must be received 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. The review exercises can be found by following the *Assignments* link on the left side of the Home page.

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 as well as answering another student's questions regarding the material.

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*. This includes waiting at least two days *after* posting your original thread before replying to three other students' posts. This requirement is intended to increase interaction with the class site and conversations with other students. 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 can be found by following the *Discussions* link on the left side of the Home page.

Exams

There will be a total four exams. The first three exams are worth 100 points each and will be completed in CANVAS by following the Quizzes link on the left side of the Home page. 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 are required to use Microsoft Excel during exams and will need to attach all work completed in Excel to receive any credit.

The fourth exam, or final exam, will be a cumulative exam and will cover material from all chapters covered over 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.

IMPORTANT: Students may only make-up missed exams if they have contacted the instructor within 24 hours of 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	20 - 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').

Academic Integrity

Having academic integrity is paramount to your success in any class. Plagiarism or cheating is not tolerated. Any instance of this will result in a grade of zero for that assignment. Here is the link to the UNM Academic Dishonesty Policy:

https://policy.unm.edu/regents-policies/section-4/4-8.html.

The policy states:

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or who otherwise fails to meet the expected standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.

Academic Dishonesty is defined as:

"Academic dishonesty" includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

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. The registered student for the course must be the author of any work submitted. 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.

Accessibility Support

UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center at arcsrvs@unm.edu or by phone at 505-277-3506. The UNM-Valencia Equal Access Services (Sarah Clawson, Coordinator), at (505) 925-8840 or by email at sjclawson@unm.edu.

Student Academic Support

Resources to support study skill and time management are available through

UNM-Valencia Learning Commons (Tutoring)

Tutoring is available to you in math, science, writing, and other subjects through the Learning Commons: Learning and STEM Centers and Writing Center. In person tutoring is in these centers in the LRC (the building that also has the library). Tutoring in Zoom and, for writing, through email, is also available.

Making use of tutoring is a fantastic way to use your resources and set yourself up to learn deeply and well in your courses.

To schedule an appointment, please go to: Learning Commons Bookings

If you are making an email appointment with the Writing Center, email your draft to tutor@unm.edu after you fill out the form above.

If you have difficulty with the scheduling link above, would like an appointment in a subject not listed at that link, or have a question, email tutor@unm.edu. You'll get answers during business hours Monday through Friday.

The webpage, with more details about available hours, is here: Learning Commons: Tutoring Services webpage.

Center for Academic Program Support (CAPS). Many students have found that time management workshops can help them meet their goals (consult (CAPS) website under "services").

Credit-hour statement

This is a three credit-hour course delivered in an entirely Online modality over 16 weeks during the Fall semester. Please plan for a minimum of 9 hours per week to learn course materials and complete assignments.

Title IX

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees." 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 (oeo.unm.edu). For more information on the campus policy regarding sexual misconduct, see: https://policy.unm.edu/university-policies/2000/2740.html.

Citizenship and/or Immigration Status

All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor, as noted in the attendance guidelines above. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: http://undocumented.unm.edu/.

Respectful and Responsible Learning

We all have shared responsibility for ensuring that learning occurs safely, honestly, and equitably. Submitting material as your own work that has been generated on a website, in a publication, by an artificial intelligence algorithm, by another person, or by breaking the rules of an assignment constitutes academic dishonesty. It is a student code of conduct violation that can lead to a disciplinary procedure. *Please ask me for help in finding the resources you need to be successful in this course. I can help you use study resources responsibly and effectively.* Off-campus paper writing services, problem-checkers and services, websites, and AIs can be incorrect or misleading. Learning the course material depends on completing and submitting your own work. UNM preserves and protects the integrity of the academic community through multiple policies including policies on student grievances (Faculty Handbook D175 and D176), academic dishonesty (FH D100), and respectful campus (FH CO9). These are in the *Student Pathfinder* (https://pathfinder.unm.edu) and the *Faculty Handbook* (https://handbook.unm.edu).
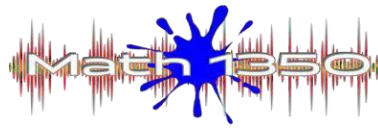
CLASS SCHEDULE

Week	Chapter	Material Covered
1/16	1	Introduction; Why statistics? What is data? Scales of measurement; Populations versus samples
1/22	1 & 2	Types of variables; Research Designs; Sampling methods; Describing Data: Pie Charts & Bar Graphs
1/26		**Last day to drop a class with a complete refund**
1/29	2 & 3	Describing Data with Histograms; Describing Data: Measures of Central Tendency
2/5	3	Describing Data: Measures of Central Tendency and Variability
2/11		**EXAM 1: Must be completed in Learn by 11:59p.m., Sunday, 2/11. Covers Chapters 1, 2, & 3; HWs 1 - 2; Rev Exercises 1 & 2**
2/12	4	Examining relationships between variables: Correlation between two variables
2/19	4 & 5	Testing the correlation between two variables; Bivariate regression
2/26	5	Plotting the regression line; Understanding regression error (residuals)
3/3		**EXAM 2: Must be completed in Learn by 11:59p.m., Sunday, 3/3. Chapters 4 & 5; HWs 3 & 4; Rev Exercises 3 & 4**
3/4	6	What are z-scores? Finding the area under the normal curve.
3/11		**SPRING BREAK – NO CLASS**
3/18	6 & 7	Estimating the standard error of the mean; Confidence intervals
3/25	7	Using Student's t – distribution; How does sample size affect estimating population values?
3/31		**EXAM3: Must be completed in Learn by 11:59p.m., Sunday, 3/31. Covers Chapters 6 & 7; HWs 5 & 6; Rev Exercises 5 & 6**
4/1	8	Hypothesis testing; Statistical errors; Statistical Power
4/8	8	Significance tests comparing population means; How are confidence intervals and significance tests linked?
4/15	9	The matched-pairs t – test; Obtaining the confidence interval for the mean difference
4/22	9	The independent-groups t – test; Obtaining the confidence interval for the difference between two sample means
4/29	10	Nonparametric Tests: The One-Way Chi-square test;
5/5	10	Nonparametric Tests: The Two-Way Chi-square test; The final exam will be emailed to your UNM Lobo account on Thursday, December 7, 2023.
5/8		**EXAM 4: Must be emailed to the instructor no later than 11:59 p.m. on Wednesday, May 8, 2024. The final exam covers all chapters, homeworks, and review exercises. Exams received after the deadline will NOT be accepted. No exceptions.**