

Math 227, Statistics

West Los Angeles College www.wlac.edu

9000 Overland Ave., Culver City, CA 90230

Section 4496, Fall 2015

Transfer: UC:CSU; Units: 4

Class meets Tuesday and Thursday from 7:30 p.m.–9:35 p.m. in GC 350

Instructor Prof. Nancy Foreman

E-mail foremann@wla.edu

Office hour Tuesday 3:30-4:20 p.m. in MSB 214 and Tuesday/Thursday after class

Prerequisite Mathematics 125 or equivalent, with a grade of 'C' or better, or appropriate placement level demonstrated through math assessment process.

Textbook *Statistics: Informed Decisions Using Data* (3rd ed.), by Michael Sullivan

Calculator A graphing calculator is a necessary aid for the course and is required. Use of calculators for statistics will be discussed in class. Supported models include all TI-83, TI-84, all Casio FX9750 and Casio FX9860; other models, provide your own manual. No cell phones, computers, or other communication or internet devices are permitted on exams.

Course description This course is an introduction to measures of central tendency and dispersion, probability, discrete and continuous probability distributions, descriptive and inferential statistics, sampling distributions, estimation, hypothesis testing, linear correlation and regression analysis, and analysis of variance. Using technology in the form of a statistical software package, online resources, or a statistical/graphing calculator (such as a TI-84) is a required component of the course.

Important First class meeting: Sept. 1

dates Last day to drop without a “W”: Sept. 11

 Last day to drop with a “W”: Nov. 20

Final Examination: Thursday, Dec. 17, 2015 from 7:30-9:35 p.m.

Evaluation	5 Exams, 100 points each	500 pts.
is based on	In Class Work*	total 200 pts.
	Final Examination	<u>200 pts.</u>
	Total	900 pts.

*In Class Work will consist of classroom-based activities which may include, but are not limited to, worksheets, quizzes, and group work.

Grading scale	90%-100%	A
	80%-89%	B
	70%-97%	C
	60%-69%	D
	less than 59%	F

Special circumstances Students with disabilities or those who need accommodation for any reason must communicate with the instructor in a timely manner to ensure their needs are met. Any paperwork needed must be completed in advance. Contact Disabled Students Programs and Services located in SSB 320 (phone 310-287-4450).

Attendance & participation policy Enrolled students must attend the first week of class, or risk being dropped. Attendance will be taken during each class; if roll call is missed, the student is marked absent. Students are expected to participate in all class activities, which may include worksheets, group work, or other activities. To avoid being dropped from class, students should contact the instructor (email foremann@wlaac.edu) when they must be absent for emergency reasons. If a student is absent more hours than the number of hours the class meets per week, and there are no mitigating circumstances which may justify the absences, the student may be excluded from the class. Students are encouraged to advise their instructor by email of anticipated absences. Note: if a student decides they cannot complete the class, it is the student's responsibility to drop (withdraw) on or before Nov. 11, 2015.

Makeups, Late Work, Extra Help Makeups are discouraged as students generally do less well. Any makeup exams must be given during instructor's office hour only. No more than one makeup exam will be administered. The final exam score may substitute for one missed exam. In class work cannot be made up. Any late work must be submitted by Dec. 17 (Final Exam) for partial credit (up to one-half the original point score). Plan to attend every class session. If you must miss a class, email foremann@wlaac.edu in advance. For extra help, you can look for an instructional video at www.khanacademy.com or on YouTube. If you can't figure it out on your own, consult a tutor or use the instructor's office hour to get help.

Etiquette & Discipline Please respect your classmates and the instructor, and refrain from disruptive behaviors such as coming late, leaving early, wandering in and out of class, eating or drinking during class, side conversations, instant messaging, websurfing, etc. Turn cell phone ringer off and do not use your cell phone during class. If you are in doubt, consider if your behavior is distracting or disruptive to others, or to yourself. If so, please stop. Let us maintain a civil atmosphere conducive to learning and thought. All college rules and regulations will be enforced; see the West Los Angeles College Catalog for more information. Student discipline rules are found at <https://www.laccd.edu/Board/Documents/BoardRules/Ch.IX-ArticleXI.pdf>

Extra Credit: Up to 20 points extra credit may be awarded for student work such as bad graph documentation, essays, or other projects.

Academic dishonesty Cheating will not be tolerated. Maintain the highest standards of academic honesty. You may not give or receive help on tests or quizzes, and you may not turn in someone else's work as your own. If academic dishonesty is detected, a score of zero will be assigned, and the student(s) involved may be reported to the administration.

How to pass. Attend class, complete all homework and worksheets, stay on top of things and don't fall behind. Practice until you have mastered each new technique. We're not kidding about the 8 hours study time per week (or more, in some cases). No special talent is required, just time, thought, and attention to detail.

Homework Homework and reading are assigned for each covered section. Reading is assigned for each covered section of the text. Before each class, skim over the sections that will be covered that day. Begin to familiarize yourself with the vocabulary and subject matter before class begins. After the material has been covered in class, re-read as necessary for understanding. Homework is not collected. Students who wish to pass will complete all homework in a timely fashion. The homework and reading list below is given as a guide. Assignments may be modified as circumstances dictate. The day's schedule and any important information will be posted on the board.

Homework Set 1 Complete by Sept. 17

Section 1.1: Read pp. 3–11, Work Exercises 1–47 odd, 55, 57, 61

Section 1.2: Read pp. 15–20, Work Exercises 1–8, 9–21 odd

Section 1.3: Read pp. 22–27, Work Exercises 1–5, 7–13 odd

Section 1.4: Read pp. 30–36, Work Exercises 6–10, 11–21 odd, 25, 29, 31, 37

Section 1.5: Read pp. 38–42, Work Exercises 4, 6, 8–12, 13–17 odd, 21, 23, 28

Section 1.6: Read pp. 45–53, Work Exercises 1, 3, 7–9, 13, 21, 34

Section 2.1: Read pp. 67–73, Work Exercises 3–6, 8, 13, 17, 23

Section 2.2: Read pp. 82–93, Work Exercises 1–4, 9–13 odd, 19, 23, 25, 31, 35

Section 2.3: Read pp. 102–105, Work Exercises 2–4, 7, 9
Section 2.4: Read pp. 110–115, Work Exercises 1–5, 7(a), 9(ab), 11–13

Section 3.1: Read pp. 129–137, Work Exercises 1–5, 7–13 odd, 25, 31, 37, 41

Section 3.2: Read pp. 143–153, Work Exercises 1, 2, 4–7, 10, 11–17 odd, 21, 31

Section 3.3: Read pp. 160–164, Work Exercises 3, 5, 11

Section 3.4: Read pp. 167–172, Work Exercises 2, 3, 15, 15, 21, 25

Section 3.5: Read pp. 176–180, Work Exercises 3–9 odd

Homework Set 2 Complete by Oct. 6

Section 5.1: Read pp. 258–268, Work Exercises 1–6, 11–39 odd, 47–55 odd

Section 5.2: Read pp. 274–281, Work Exercises 1–4, 5–39 odd, 45

Section 5.3: Read pp. 286–289, Work Exercises 4–6, 7–27 odd

Section 5.4: Read pp. 292–298, Work Exercises 3–17 odd, 23–33 odd

Section 5.5: Read pp. 301–311, Work Exercises 1–25 odd, 31, 41, 43

Section 6.1: Read pp. 331–339, Work Exercises 2–4, 7–27 odd

Section 6.2: Read pp. 343–354, Work Exercises 1–27 odd, 35, 37, 43–47 odd

Section 6.3: Read pp. 358–362, Work Exercises 1–15 odd, 21

Homework Set 3 Complete by Oct. 20

Section 7.1: Read pp. 373–380, Work Exercises 1–33 odd

Section 7.2: Read pp. 385–394, Work Exercises 2, 5–43 odd

Section 7.3: Read pp. 397–401, Work Exercises 3–23 odd

Section 7.4: Read pp. 405–409, Work Exercises 1–7 odd, 11, 13

Section 8.1: Read pp. 427–438, Work Exercises 1–23, 27

Section 8.2: Read pp. 442–448, Work Exercises 1–17 odd

Homework Set 4 Complete by Nov. 5

Section 9.1: Read pp. 457–467, Work Exercises 1–21 odd, 25, 27, 33, 43, 45

Section 9.2: Read pp. 475–482, Work Exercises 1–19 odd

Section 9.3: Read pp. 488–493, Work Exercises 1–4, 5, 7, 11, 13, 15, 23, 27, 29, 31

Section 10.1: Read pp. 515–521, Work Exercises 1–8, 9–37 odd

Section 10.2: Read pp. 523–535, Work Exercises 1–8, 11–25 odd

Section 10.3: Read pp. 541–547, Work Exercises 5–23 odd

Section 10.4: Read pp. 552–558, Work Exercises 1–19 odd

Homework Set 5 Complete by Nov. 24

Section 4.1: Read pp. 193–201, Work Exercises 2–4, 7, 8, 9–15 odd, 23–27 odd, 37, 39

Section 4.2: Read pp. 209–217, Work Exercises 2–4, 6, 8, 9, 11, 17–23 odd

Section 4.3: Read pp. 223–232, Work Exercises 1–29 odd

Section 4.4: Read pp. 238–244, Work Exercises 2–4, 5–11 odd

Section 14.1: Read pp. 737–748, Work Exercises 1, 5, 7, 13

Section 11.1: Read pp. 583–590, Work Exercises 1, 2, 5–13 odd, 17

Homework Set 6 Complete by December 17

Section 11.2: Read pp. 595–602, Work Exercises 1–11 odd, 15

Section 11.3: Read pp. 608–614, Work Exercise 5–19 odd

Section 12.1: Read pp. 645–651 Work Exercises 1–11 odd, 15

Section 12.2: Read pp. 656–664, Work Exercises 1, 7, 11, 13

Section 13.1: Read pp. 679–688, Work Exercises 1, 3, 5, 7, 11

Section 13.2: Read pp. 694–699

Proposed Schedule (Subject to change)

Week	Tuesday	Thursday
I	Sept. 1 Chapter 1: Data Collection	Sept. 3 Chapter 2: Organizing Data
II	Sept. 8 Sec. 3.1, 3.2: Mean & St. Deviation	Sept. 10 Sec. 3.3, 3.4: Grouped Data, Position
III	Sept. 15 Sec. 3.5: Boxplots, Review	Sept. 17 Exam 1 (covers Chapters 1, 2 and 3)
IV	Sept. 22 Sec. 5.1, 5.2: Basic Probability	Sept. 24 Sec. 5.3, 5.4, 5.5: Conditional Probability, Counting

V	Sept. 29 Sec. 6.1, 6.2: Random Variables, Binomial Distribution	Oct. 1 Sec. 6.2, 6.3: Binomial Distribution, Poisson Distribution
VI	Oct. 6 Exam 2 (covers Chapters 5 and 6)	Oct. 8 Sec. 7.1, 7.2: Normal Distribution
VII	Oct. 13 Sec. 7.3, 7.4: Normal Distribution con't	Oct. 15 8.1, 8.2: Sampling Distributions and Central Limit Theorem
VIII	Oct. 20 Exam 3 (covers Chapter 7 and 8)	Oct. 22 Sec. 9.1, 9.2: Confidence Intervals
IX	Oct. 27 Sec. 9.3: Confidence Intervals for Proportions	Oct. 29 Sec. 10.1, 10.2: Hypothesis Testing
X	Nov. 3 Sec. 10.3, 10.4: More on Hypothesis Testing	Nov. 5 Exam 4 (covers Chapters 9 and 10)
XI	Nov. 10 Sec. 4.1, 4.2: Linear regression	Nov. 12 Sec. 4.3, 4.4: Diagnostics, Association
XII	Nov. 17 Sec. 14.1, 14.2 Inference on the least squares line	Nov. 19 Sec. 11.1: Inference on two means (dependent)
XIII	Nov. 24 Exam 5 (covers Chapters 4, 14, and Sec. 11.1)	Nov. 26 No Class
XIV	Dec. 1 Sec. 11.2, 11.3: Inference on two means (independent), Inference on two proportions	Dec. 3 Sec. 12.1, 12.2: Chi-square testing
XV	Dec. 8 Sec. 13.1, 13.2: One-way ANOVA, Tukey's test	Dec. 10 Review for Final Exam
	Dec. 15 (Not a regular class day) More Review for Final Exam (optional)	Dec. 17 FINAL EXAM

Course Student Learning Outcomes

1. Given a set of sample data, students shall perform a hypothesis test including gathering the data using appropriate sampling techniques, designing the hypothesis, finding the p-value and stating the conclusion.
2. From a real-life situation, students will be able to successfully perform all vital aspects of simple linear regression analysis, from the gathering of the sample bivariate data set input into a graphing calculator or using software, create the sample linear regression equation, interpret (such as slope or the correlation coefficient), and justify its usefulness via a model utility hypothesis test.
3. The student will be able to apply their knowledge of probability to assist them in understanding the notions of discrete and continuous random variables, sampling distributions and confidence intervals. The students will be able to summarize the probability of a particular event symbolically in terms of a random variable, and find this probability comfortably.

Course Objectives

- 1a. Comfortably Use Statistical Terminology and Symbols.
- b. Prepare a Report of Categorical Data Summarized by Bar Graphs, Pie Graphs, or Time-Series Graphs.
- c. Demonstrate Numerical Data with Histograms or Stem-and-Leaf Displays.
- d. Use a Random Number Table for Simulation.
- e. Study of data collection, in particular understanding the difference between observational studies and controlled experiments and the role of confounding factors.
- 2a. Explain and Calculate the Various Measures of Central tendency. Recite Formulas for Each.
- b. Demonstrate the Measures of Variation and their Usefulness. Recite Formulas for Each. Apply Chebyshev's Rule or the Empirical Rule where appropriate.
- c. Use Technology (TI-84) to Quickly Calculate Above for Large Data Sets.
- 3a. Comfortably Use Basic Probability Terminology and Symbols.
- b. Understand Probability Both Computationally and Conceptually.
- c. Compute Probabilities of Compound Events.
- d. Utilize Combinatorics and Various Counting Strategies.
- e. Sketch a Probability Tree Diagram.
- f. Recognize Basic Structural Probability Scenarios, Introduce the Hyper-Geometric Distribution.
- g. Use Technology (such as TI-84) to Simulate Experiments.
- 4a. Define a Random Variable, Understand its Role in Statistical Inference.
- b. Distinguish Between a Discrete and Continuous Random Variable.
- c. Understand a Binomial Random Variable, Binomial Probabilities, and the Binomial Distribution.
- d. Understand the Poisson and Geometric (optional) Probability Distributions.
- e. Compare and Contrast Binomial, Geometric, and Poisson Scenarios.
- f. Use Technology (such as TI-84) to Quickly Calculate Probabilities Concerning the Above Three Discrete Probability Distributions, Interpret Results.
- 5a. Relate Probabilities as Areas Under Curves, Demonstrated Easily by the Uniform Distribution (optional).
- b. Calculate Probabilities Concerning the Standard Normal z Distribution, by Interpreting the Standard Normal Distribution Chart.
- c. Calculate Probabilities Concerning Any Normal Distribution, by Translating into Standard Normal.
- d. Use Technology (such as TI-84) to Quickly Calculate Probabilities Concerning Normal Probability Distributions. Interpret Results.
- e. Approximate a Binomial Distribution with a Normal Distribution, When Appropriate (optional).
- f. Assess Normality of a Given Data Set, via a Probability Plot or Other Standard Assessment Tools (optional).
- g. Use Technology (such as TI-84) to Quickly Calculate Probabilities Concerning the Continuous Probability Density Functions, Interpret Results.
- 6a. Explain Clearly How a Sampling Distribution is Constructed.
- b. Express Clearly how to Determine the Mean and the Standard Deviation of the Sampling Distribution of the sample mean.
- c. Apply the Central Limit Theorem.
- d. Explain the Concept of an Unbiased Estimator.
- e. Examine Other Sampling Distributions, such as for Proportions.
- 7a. List the Sample Statistic Point Estimators for Several Population Parameters. Question the Reliability of Point Estimators, Motivating the Necessity for Interval Estimators.
- b. Construct Confidence Intervals for the Population Mean, Understand When the Student t Distribution is Needed.
- c. Construct Confidence Intervals for the Population Proportion.
- d. Design an Experiment by Determining the Sample Size Necessary to Achieve a Specified Level of Confidence.
- e. Use Technology (such as TI-84) to construct confidence intervals.

- f. Interpret Confidence Intervals, Margin of Error Correctly Citing Real Life Examples.
- 8a. Comfortably Use Hypothesis Testing (HT) Terminology and Symbols. Explain Type I and Type II Errors. Use and Explain Significance Levels and p-values.
- b. Perform Hypothesis Tests on various Population Parameters, such as the Population Mean, Proportion, Duel Population Paired Difference (Dependent Samples) or Difference of Means/Proportions (Independent Samples) Regardless of Sample Size/Knowledge of Population Standard Deviation.
- c. Defend the Choice of the Alternative Hypothesis Over the Null Hypothesis. Draw Conclusions from Hypothesis Tests both Orally and in Writing, in the Context of the Problem. Formulate and defend theses, such as the significance of Type I and Type II errors in Particular Problem Situations.
- d. Use Technology (such TI-84) to Quickly Calculate Results of a Given Hypothesis Test, Especially when given the Actual Sample Data. Interpret the result in the context of the problem.
- e. Find any HT, find the corresponding p-value (using technology OK) and interpret this p-value in the context of the problem.
- f. Perform a real-life Hypothesis Test on something pertaining to their own lives.
- 9a. Comfortably Use Regression Terminology and Symbols. Interpret symbols, both in general, and in the context of the problem.
- b. Graph Bivariate Data in Scatter Plots.
- c. Measure Linear Correlation, and Distinguish Correlation from Causation.
- d. Determine and Assess the Fit of Least-Squares for Bivariate Data.
- e. Perform Hypothesis Tests on various Population Parameters of Linear Regression, such as the Correlation Coefficient and the Slope of the Regression Line (Model Test of Utility). Construct Corresponding Confidence Intervals.
- f. Question the Practicality of Simple Linear Regression, understand that a response is usually contingent on several predictor (explanatory) variables, thus motivating Multiple Regression Analysis. (optional)
- g. Interpret the regression coefficients both in general, and in the context of the problem.
- h. Estimate a response value given specific values of the predictor variables. Interpret this estimation in the context of the problem.
- i. Use Technology (such as TI-84) to Quickly Perform Regression Analysis.
- 10a. Use Chi-Square Analysis to Test Independence and Goodness-of-Fit in Categorical Data.
- b. Perform Hypothesis Tests on Population Parameters of Variation. Construct Corresponding Confidence Intervals.
- c. Use Technology (such as TI-84) to Quickly Perform Chi-Square Analysis.
- 11a. Perform Hypothesis Tests on Duel Population Parameters of Variation utilizing the F distribution.
- b. Perform One-Way Analysis of variance. Understand variation within versus variation between samples.
- 12a. Use technology (graphing calculators such as TI-84, statistical software packages, or online resources) appropriately to analyze real data, especially large data sets. See how technology is used in each of the above (last part)

Professor Foreman's education and experience:

A.A. Liberal Studies w/Honors, Santa Monica College 1987. B.S. Mathematics, U.C.L.A. 1990. M.S. Mathematics, Northern Arizona University 1993, Thesis: *Graceful Trees and Graph Numberings*.

Teaching Experience: Northern Arizona University, 1991-1993. Los Angeles Mission College, 1994-1998. West Los Angeles College, 1998–present. Santa Monica College, 2008–present.