

Statistics 601 – Statistical Analysis

Class Information

Fall 2009, Sections 600, 700, 720

- Time and Place:* MWF 11:30am–12:20pm and Tu 11:10am–12:25pm, Blocker 150. *Distance students will be able to view lectures online the following day. (See below.)*
- Instructor:* Prof. Daren Cline, Blocker 459D, 845-1443.
e-mail: dcline@stat.tamu.edu
- Office Hours:* M–F 10:00am–11:00am, or by appointment.
- Course Web Page:* <http://stat.tamu.edu/~dcline/601.html>
- Grader:* TBA.
Office hours: TBA.
e-mail: tba@stat.tamu.edu
- Textbook:* D.C. Montgomery and G.C. Runger, *Applied Statistics and Probability for Engineers*, 4th ed., John Wiley & Sons.
Please see the course outline below to correlate the textbook with the lectures.
- References:* J.S. Milton and J.C. Arnold, *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences*, 3rd ed., McGraw-Hill.
A.C. Tamhane and D.D. Dunlop, *Statistics and Data Analysis: from Elementary to Intermediate*, Prentice-Hall.
- Handouts:* You are also expected to download the lecture notes and the booklet of handouts and examples that are available on the course web page, and to bring these to class.
- Computing:* We will use JMP software for examples and you may wish to use it for homework. This requires access to a computer with JMP. There are microcomputers in the Open Access Labs (such as the one in Blocker) with JMP and you will be able to get JMP free (for *your own* desktop) from the Statistics Department at the beginning of the semester.
- Prerequisite:* Two semesters of calculus. Multiple integration and elementary linear algebra are helpful.
- Disabilities Help:* The Americans with Disabilities Act ensures that students with disabilities have reasonable accommodation in their learning environment. If you have a disability and need help, please contact me and Disability Services in B118 Cain Hall, 845-1637.
- Academic Integrity:* You are expected to maintain the highest integrity in your work for this class. This includes not passing off anyone else's work as your own, even with their permission. Please see the homework and exam policies below for specifics.
- Copyright:* All the resources I provide for this course are copyrighted and may not be copied or distributed without my express, written permission.

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- Homework:* Homework will be assigned on the course web page and collected regularly and is worth 20% of the total term score. *Please see the homework policy below.*
- Exams:* Two midterm quizzes worth 22.5% each and a final worth 35%. *Please see the exam policy below.*
- Exam Dates:* Exam I: TBA.
Exam II: TBA.
Final Exam: TBA.
- Grading Scale:* A 85% – 100%.
B 70% – 84%.
C 60% – 69%.
- Distance Students:* Only *off-campus* students may register for the distance learning sections (700 for Texas residents, 720 for everyone else). Please see the Statistics Department Online Learning Program at <http://www.stat.tamu.edu/dist/index.php>. Further information concerning recorded lectures, submission of homework and exams, and other distance related issues will be provided close to the beginning of the fall semester.
- Homework Policy:* Your homework solutions must be your own work, not from outside sources, consistent with the university rules on academic integrity. I expect you to follow this policy scrupulously. Your performance on the exams is much more likely to be better if you do.
- You may use:
- Your textbook and notes from class.
 - Your notes, homework, etc., from a related class that you took or are taking.
 - References listed on the syllabus.
 - Discussion with the instructor or grader.
 - Voluntary, mutual and cooperative discussion with other students currently taking the class.
- You may *not* use:
- Solutions manuals (printed or electronic) and copies of pages from solutions manuals.
 - Solutions from previous classes.
 - Solutions, notes, homework, etc., from classes taught elsewhere or at another time.
 - Solutions, notes, homework, etc., from students who took the class previously.
 - Copying from students in this class, including expecting them to reveal their solutions in "discussion".
- Exam Policy:* Your exam solutions must be your own work, using only resources I explicitly allow, consistent with the university rules on academic integrity.
- Each exam will be comprehensive, cumulative and closed book. Acceptable resources are:

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- A calculator for numerical calculations only.
- Statistical tables. (Make your own copies. I have versions available on the class web page.)
- One page (8½×11, both sides) of notes for the first exam, two pages for the second exam and four pages for the final exam. These *must* be of your own construction, not copied from somewhere else.

No other resources are acceptable.

Copies of my old exams will be available on the course web page. The exams will be a mix of computations, interpreting output, concept questions and mathematical derivations.

Answers should be complete, but not lengthy, with the solution clearly marked. Most questions are designed to be answerable with just a few sentences.

Missed Work and Incompletes:

This is based on university policy.

- If you must miss an exam due to illness or circumstances beyond your control, notify me or the Statistics Department, in writing or by email (before, if feasible, otherwise within two working days after you return). See me as soon as possible to schedule a make-up exam.
- An Incomplete grade will be given only in the event that circumstances beyond your control cause prolonged absence from class and the work cannot be made up.

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Course Outline for Statistics 601

Topic	Section
<i>I. Modeling Data</i>	
A. Data and Model, Randomness and Inference	1.1–1.4
B. Types of Data	3.1, 4.1
C. Displaying Data: crosstabulation, histogram, scatterplot	6.2, 6.3, 6.5, 11.1
D. Describing Data: mean, standard deviation, quantiles, boxplot	6.1, 6.3, 6.4
E. Basic Probability: interpretations, rules	2.1–2.3
F. Probability Models: density, mean, variance	2.8, 3.1–3.4, 4.1–4.4
G. Special Distributions: normal, gamma, Weibull, lognormal	4.5, 4.6, 4.8–4.11
H. Density Estimates and Quantile Plots	6.3, 6.6
I. Random Sampling and Simulation	
<i>II. Statistical Inference</i>	
A. Estimation of Parameters: mean, standard deviation	7.1, 7.4
B. Sampling Behavior: bias, standard error, normal approximation	7.2, 7.3, 8.3
C. Confidence Intervals: interval for a mean, confidence	8.1–8.3
D. Hypothesis Testing: t-test, hypotheses, p -value, Type I and II errors	9.1–9.3, 9.6
E. Designing a Sample: sample size determination	8.2, 9.2, 9.3
F. Inference for Other Parameters: two-sample t-test	8.4, 9.4, 10.1–10.5, 10.7
<i>III. Correlation and Regression</i>	
A. Joint Distributions: correlation and independence	5.1–5.6, 11.8
B. Conditional Expectation and Regression	5.1, 5.2, 11.1
C. Estimating Correlation	11.8
D. Straight Line Regression: least squares fit, inference	11.1–11.6, 11.9
E. Residuals Diagnostics	11.7
F. Multiple Linear Regression: estimation, prediction	12.1–12.4
G. Outliers and Influential Values: Studentized residuals, Cook's D	12.5, 12.6
H. Model Fitting and Selection: hypothesis tests, model selection	12.2, 12.6
<i>IV. Design and Analysis of Experiments</i>	
A. Comparing Group Means: analysis of variance, Tukey's test	13.1, 3.2
B. Handling Assumptions: Brown-Forsythe test, Kruskal-Wallis test	13.2, 15.4, 15.5
C. Contrasts	
D. Random Effects Model	13.3
E. Factorial Models: interaction	14.1–14.5
F. Randomized Block Design	13.4
G. General Linear Models: covariate analysis	
<i>V. Analysis of Categorical and Count Data</i>	
A. Distributions for Counts: binomial, Poisson and multinomial	3.1–3.9, 4.7, 5.1
B. Inference for Proportions	8.5, 9.5, 10.6
C. Categorical Data Analysis: goodness of fit and contingency tests	9.7, 9.8
D. Inference for Percentiles	15.2