

## Statistics 601 – Statistical Analysis

Class Information  
Fall 2010, 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, if not sooner. (See [instructions](#) below.)*
- Instructor:* [Prof. Daren Cline](#), Blocker 459D, 979-845-1443.  
e-mail: [dcline@stat.tamu.edu](mailto:dcline@stat.tamu.edu)
- Office Hours:* MWF 10:00am–11:00am, or by appointment. ([my schedule](#))
- Course Web Page:* <http://stat.tamu.edu/~dcline/601.html>
- DoStat Web Page:* <http://dostat.tamu.edu/dostat> (*This is a new link.*)  
Course materials including recorded lectures, lecture notes and homework assignments will be available to *all students* at this site. (See [details](#) below.)
- WebAssign Web Page:* <https://www.webassign.net/login.html>  
Distance students will obtain their exams and return them via this site. Homework will also be turned in here. (See [details](#) below.)
- Grader:* Lianfu Chen. Blocker 405B, 979-845-5482.  
Office hours: Wed 3:00pm–5:00pm and Fri 11:00am–1:00pm in the [Blocker Open Access Lab](#).  
e-mail: [lianfuch@stat.tamu.edu](mailto:lianfuch@stat.tamu.edu)
- Textbook:* D.C. Montgomery and G.C. Runger, *Applied Statistics and Probability for Engineers*, 5<sup>th</sup> ed., John Wiley & Sons. *This is a new edition as of 2010. ([supplemental material](#))*  
*Please see the [course outline](#) below to correlate the textbook with the lectures.*
- References:* ([on reserve in Evans Library](#))  
J.S. Milton and J.C. Arnold, *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences*, 4<sup>th</sup> ed., McGraw-Hill.  
A.C. Tamhane and D.D. Dunlop, *Statistics and Data Analysis: from Elementary to Intermediate*, Prentice-Hall.  
F.L. Ramsey and D.W. Shafer, *The Statistical Sleuth: A Course in Methods of Data Analysis*, 2nd ed.
- Handouts:* You are expected to download the lecture notes and the booklet of handouts and examples as they become available on the [DoStat](#) web site, and to bring these to class.
- Discussion Board:* A discussion board, monitored by the grader and myself, is available at the [DoStat](#) web site. I will originate topics as I see fit or by request. Its purpose is to allow you to converse freely with the class about issues/problems, especially for homework. I only ask that you give each other help in the form of hints and suggestions, but not complete solutions. Courtesy and discretion are of course required.

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*The discussion board will be off-limits on exam days.*

- Computing:** I will use JMP software for examples and you may wish to use it for homework. This requires access to a computer with JMP. You will be able to get JMP free (for *your own* computer) from the Statistics Department at the beginning of the semester and there are computers in the [Open Access Labs](#) (such as the one in Blocker) with JMP.
- 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 follow the [Aggie Honor Code](#) and 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, sold or distributed without my express, written permission.
- Homework:** Homework will be assigned on the [DoStat](#) web site 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: Tuesday, 5 October.  
Exam II: Tuesday, 16 November.  
Final Exam: Friday, 10 December.
- 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](#). Recorded lectures and other course materials will be found at the [DoStat](#) web site.  
  
Distance students must also register at the WebAssign web site. *Specific information regarding this will be posted on DoStat.* Homework assignments *and* completed exam papers are to be turned in at this site (*not* at DoStat). Exams will be retrieved at this site as well.
- DoStat Instructions:** *All* students will have access to the recorded lectures, lecture notes and handouts, homework assignments and other instructional materials at the [DoStat web site](#). (*This is a new link.*) You must register as indicated below, using the course reference and registration code I will provide to you near the start of the semester.

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1. Go to <http://dostat.tamu.edu/dostat> and click on REGISTER HERE if you have not previously registered. (If you have previously registered, continue with step 3. Please note that *the server link has changed* but you should still be registered.)
2. Fill in the information requested and click on SUBMIT . Please enter your *preferred email address* as this will be the one I use to contact you. You should get an email confirming your registration.
3. Log into <http://dostat.tamu.edu/dostat> using the information entered in step 2.
4. Click on the Add Course link to the left.
5. Fill in the Course Reference and the Registration Code and press Register .
6. Click on the course name to access the materials.
7. Click My Account and edit your information as desired. Again, please indicate your *preferred email address*.

### 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 from similar 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:

- A calculator for numerical calculations only.
- Statistical tables. (Obtain your own copies. I will have versions available on the [DoStat](#) web site.)
- One page (8½×11, both sides) of notes for the first exam, two pages for the second exam and four pages for the final

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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 [DoStat](#) web site. 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

Topic	Textbook 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, 2.6
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, 4.8–4.12
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, 8.2
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	8.1, 9.2, 9.3
F. Inference for Other Parameters: two-sample t-test	8.3, 9.4, 10.1–10.5, 10.7
<i>III. Correlation and Regression</i>	
A. Joint Distributions: correlation and independence	5.1–5.5, 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: model selection criteria, multicollinearity	12.2, 12.6
I. Nonlinear Regression: an example	
<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	10.3, 13.2
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	8.4, 9.5, 10.6
C. Categorical Data Analysis: goodness of fit and contingency tests	9.7, 9.8
D. Inference for Percentiles	9.9