UTD	**Course**	**STAT 3332.001 Statistics for Life Sciences**
	Professor	Bhargab Chattopadhyay
	Term	Fall 2015
	Class Sessions	Mon & Wed 10:00am-11:15am GR 4.301

Professor's Contact Information

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General Course Information

Prerequisite	**One** *of the following 2 options is required: (a) MATH 1325 (Applied Calculus),* or *(b) MATH 2312 (Precalculus)*
Course Description	In the life and health sciences, decision-making using data plays a fundamental role. *Statistical science* is needed for *proper design of the experiments* that acquire relevant data for a situation and for *interpretation of the data*. For example, by obtaining relevant data, one might try to determine the true rate of occurrence for a certain kind of mutation. Or one might try to compare the effectiveness of two or more medical procedures. Or one might fit a line to explain the relationship between two variables. Or one might test whether two variables are independent. Statistical science is a *conceptual discipline for making inferences from data*. It becomes *implemented by practical tools* of a mathematical and computational nature. In this course, *basic concepts* of statistical science are introduced, and *practical tools* are examined. *Critical statistical thinking* in the setting of applications in the life sciences is emphasized. *Key topics include design of experiments, descriptive statistics, correlation and regression, probability models, sampling, estimation and confidence intervals, and hypothesis testing. One-sample, two-sample, and multi-sample situations are covered.*
Desired Learning Outcomes	An appreciation of *critical statistical thinking*, a working knowledge of *basic statistical methods* used in the life sciences, and a readiness to conduct *statistical discussions*. Particular goals are to: 1. Critically read statistical work in published papers. 2. Understand some basics of experimental design. 3. Have familiarity with the most basic probability models. 4. Recognize which statistical method (confidence interval or hypothesis testing) is appropriate for a given typical problem. 5. Apply statistical procedures to data and interpret the results.
Required Text	Freedman, D., Pisani, R., and Purves, R. *Statistics*, 4th edition, W. W. Norton, 2007. (The international edition is also acceptable.)
Other Material: Clicker	This course will require the use of a clicker. You may purchase (and sell back) your clicker at the UTD Bookstore.

Syllabus (☺ *indicates additional topic not in text*)

	PART I. DESIGN OF EXPERIMENTS
M 8/24	Ch. **1**: *Controlled Experiments.*
W 8/26	Ch. **2**: *Observational Studies.*
	PART II. DESCRIPTIVE STATISTICS
M 8/31	Ch. **3**: *The Histogram.* Ch. **4**, § **5.4**: *The Average, the Median, the Standard Deviation,*
W 9/2	*the Percentiles, and the Interquartile Range. ☺ The Boxplot ☺*
W 9/9	Ch. **5**: *The Normal Approximation for Data.*
	PART III. CORRELATION AND REGRESSION
M 9/14	Ch. **8**, §§ **9.3**, **9.5**: *Correlation*. *Outliers. Association is Not Causation.*
W 9/16	Ch. **10**, § **11.3**: *Regression. Plotting Residuals.*
	QUIZ 1 on 8/24-9/9 Material
M 9/21	Ch. **12**: *The Regression Line (continued).*
W 9/23	**TEST 1 on 8/24-9/14 Material**
	PART IV. PROBABILITY
M 9/28	Ch. **13**, §§ **14.1**, **14.2**: *What are the Chances? Counting Outcomes. Conditional Probability*
W 9/30	*Independence. The Multiplication Rule. Listing the Ways.*
	The Addition Rule. Ch. **15**: *Permutations. Combinations. The Binomial Distribution.*
M 10/5	*The Binomial Distribution (continued).*
W 10/7	*☺ The Geometric, Poisson, and Exponential Distributions ☺*
	QUIZ 2 on 9/16-9/30 Material
	PART V. CHANCE VARIABILITY
M 10/12	Ch. **16**: *Law of Averages.* Ch. **17**: *Expected Value and Standard Error*.
W 10/14	Ch. **18**: *The Normal Approximation for Histograms (Central Limit Theorem).*
M 10/19	**TEST 2 on 9/16-10/7 Material**
	PART VI. SAMPLING
W 10/21	Ch. **19**: *Sample Surveys.* Ch. **20**: *Chance Errors in Sampling.*
M 10/26	Ch. **21**: *Estimation and Confidence Interval for a Population Percentage.*
W 10/28	Ch. **23**: *Estimation and Confidence Interval for a Population Mean. The t-distribution.*
	PART VIII. TESTS OF SIGNIFICANCE
M 11/2	Ch. **26**: *Hypothesis Testing. The One-Sample z-Test.*
	QUIZ 3 on 10/12-10/26 Material
W 11/4	Significance Level. P-Value. The One-Sample t-Test.
M 11/9	***TEST 3 on 10/12-10/28 Material***
W 11/11	Ch. **27**: *Matched Data Tests. Two-Sample Tests of Means and Proportions.*
M 11/16	*☺ The Sign Test. The Wilcoxon Rank Sum Test ☺*
W 11/18	Ch. **28**: *The Chi-Square Distributions. The Chi-Square Test of Goodness of Fit.*
M 11/30	*Chi-Square Test of Independence. ☺ Chi-Square Test of Homogeneity ☺*
W 12/2	*☺ The F-Distributions. Analysis of Variance: The One-Way Layout ☺*
	QUIZ 4 on 11/2-11/18 Material
M 12/7	*☺ Analysis of Variance: The Two-Way Layout ☺*
W 12/9	**TEST 4 on 11/2-12/7 Material**

Course Policies

Quizzes and Tests	There will be 4 *closed-book 20-minute quizzes*. There will be 4 *closed-book 60-minute tests*. The quizzes and tests will be based on a specified range of course content (text, handouts, class sessions, recommended exercises). See the previous table for their coverage. In general, each quiz will be based on the material covered since the previous quiz up to (and including) the material covered in the previous week. The quizzes and tests are not intended to strain memory. As a practical matter, however, we need to be able to call forth from memory at least some basic information and details. I would not ask a student to state a complicated formula from memory but would require selecting the correct one from given choices. *Depth and scope of understanding of concepts and methods will be tested*. Each quiz will be comprised of 10 multiple-choice questions of equal value, and each test will be comprised of 25 multiple-choice questions of equal value. **For each quiz and test, each student must bring a Scantron score sheet, FORM NO. F-1712-PAR-L. It should be *clean and not bent or mutilated*. These are available in the bookstore. (The instructor will NOT be providing these.)** **Also, for each quiz and test, each student must bring a *NUMBER 2 pencil with a good eraser,* for use with the scantron sheet. (The instructor will NOT be providing these.)** Due to the modular style of the course and the associated timely testing during the course, *a final exam will not be necessary*. No final exam will be scheduled. Note. Students must bring their UTD IDs to every test, in case IDs are checked before or after the test.
Clicker	This course will require the use of a clicker. A clicker is an audience response device that resembles a small calculator. This allows you to provide real-time feedback to your instructor during class. Class summary results are displayed graphically, providing students and the instructor a gauge as to how well the class is grasping the material. You can purchase (and sell back) your clicker at the UTD Bookstore.

Grading Criteria	Class Participation will count for 5% of the ***overall course score***. ***Clicker will be used for this purpose.*** Multiple choice questions will be asked in class and students have to choose an answer using their clickers. The multiple choice questions are worth 2 points, of which 1 point is just for participation. So, correct answer = 2 points, incorrect answer = 1 point, no answer chosen/absent = 0 point. ***Lowest Participation grade will be dropped***. ***Lowest Quiz grade will be dropped***. The remaining 3 quiz grades will be averaged together to count for 25% of the course grade. The ***lowest grade of Tests 1-4 will be dropped***. The remaining 3 test grades will be averaged together to count for 70% of the course grade. ***The course grade is based on the overall course score***, as follows: A+ 98-100; A 93-97.9999; A- 90-92.9999; B+ 87-89.9999; B 83-86.9999; B- 80-82.9999; C+ 77-79.9999; C 73-76.9999; C- 65-72.9999; D+ 60-64.9999; D 55-59.9999; D- 50-54.9999; F 0-49.9999 In the interest of *equitable treatment of all students*, **no individual requests for special projects, extra assignments, extra tests, etc., will be granted**. *The course grade is based on the quizzes, tests, and classroom performance.*
Missed Tests and Quizzes	If one of Tests 1-4 is missed, it will count as the dropped test. If one of Quizzes 1-4 is missed, it will count as the dropped quiz. In the case of a further missed quiz or test, *if the absence is excused*, then a make-up test or quiz will be arranged. Otherwise, the further missed quiz or test receives the grade of zero. ***Absences due to oversleeping, car troubles, forgetfulness, etc., will not be excused***.
Student Conduct And Discipline	The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of university business. See the UTD publication, *A to Z Guide*, issued to each registered student.
Academic Integrity	The faculty expects from students a high level of responsibility and academic honesty. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, and falsifying of records. Violators face disciplinary proceedings.
Email and Technical Support	UTD encourages faculty to consider email from students official only if it originates from a UTD student account. This allows UTD to maintain a high degree of confidence in the identity of all individuals corresponding and in the security of the transmitted information. UTD furnishes each student with a free email account.
Withdrawal	Deadlines for withdrawal from courses are published in each semester's course catalog. *A faculty member cannot drop or withdraw a student.* Tt is the student's responsibility to handle withdrawal procedures from any class to avoid receiving a grade of "F".

Incomplete Grades	As per university policy, incomplete grades are granted only in the case of work unavoidably missed (and excused) and not already covered by the professor's policy on missed work or activities, and only if at least 70% of the course work has been completed. An incomplete grade must be resolved within eight weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade becomes changed automatically to F.
Disability Services	Disability Services seeks to provide students with disabilities educational opportunities equivalent to those of their non-disabled peers. The Office of Disability Services is located in room 1.610 in the Student Union, and its hours are Monday-Thursday 8:30 a.m. to 6:30 p.m. and Friday 8:30 a.m. to 5:00 p.m. Essentially, the law requires colleges and universities to make reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally, an assignment requirement may be modified (for example, a research paper versus an oral presentation for a student who is hearing impaired).Classes including students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance. The student should notify the professor of the need for such accommodations. Disability Services provides students with letters to present to faculty members.
Religious Holy Days	The University of Texas at Dallas excuses students from class or other required activities for the purpose of travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. In the case of such an absence, the student is encouraged to notify the instructor as soon as possible, preferably in advance. Missed assignments, quizzes, tests, or exams, will be covered by the professor's policy for excused missed or late work.
Copyright Notice	A UTD student is required to follow the UTD copyright policy. See http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm.