

Title: Introduction to Statistics

Catalog

Description: Descriptive statistics, basic concepts of probability and sampling with the aim of introducing fundamental notions and techniques of statistical inference. Students will be given periodic writing assignments, which encourage them to express various concepts of the course.

Prerequisites: Math 9 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of the ELM requirement and a passing score on the Intermediate Algebra diagnostic test.

Learning

Objectives: Organize, Summarize, and Interpret data in tabular, graphical, and pictorial formats. Organize and interpret bivariate data and learn simple linear regression and correlation. Understand the basic rules of probability. Use of the binomial distribution as a model for discrete variables. Understand the Normal distribution as a model for continuous variables. Learn Statistical Inference techniques of parameter estimation such as Point Estimation, and Confidence Interval Estimation. Learn techniques of testing various statistical hypotheses concerning population parameters.

Text: *Elementary Statistics* by Neil A. Weiss, Sixth edition.

Coverage: The course will closely follow the text and cover chapters 1 - 12.
The use of statistical software software will be discussed.

Writing

Component: STAT 1 satisfies Area B4 of the GE requirements. Students are advised to practice interpreting the results of statistical analyses using technical and non-technical language while solving assigned word problems dealing with real life situations. Class discussions will emphasize this writing component requirement of the course through the above criterion.

Examinations: There will be three midterm tests and a *comprehensive* final examination.

- Test 1 on 02/24/05 (Thursday, 10:30 a.m. - 11:45 a.m.)
- Test 2 on 03/17/05 (Thursday, 10:30 a.m. - 11:45 a.m.)
- Test 3 on 04/21/05 (Thursday, 10:30 a.m. - 11:45 a.m.)
- Final Exam on 05/19/05 (Thursday, 10:15 a.m. - 12:15 p.m.)

Grading: Written work is scored on the following scale and your grade in this course is assigned according to the following percentages.

Homework	100 (10.0%)	88% - 100%	A
Midterms (150 pts each)	500 (50.0%)	76% - 87%	B
Final	400 (40.0%)	65% - 76%	C
		50% - 64%	D
Total	1000	below 50%	F

Topics covered: Stat 1

I. Descriptive Statistics (3 1/2 weeks)

1. What is statistics?
2. Basic terminology and concepts
3. Graphical presentations of statistical data
4. Frequency distributions, histograms, and ogives
5. Measures of central tendency
6. Measures of variability
7. Measures of position
8. Bivariate data and scatter diagrams
9. Linear correlation
10. Linear regression

II. A Probability (IIA 2 weeks)

1. Experiments, sample space, events
2. Different approaches to probability
3. Probability axioms
4. Rules of probability:
 - a. generalized addition rule
 - b. complement rule
5. Conditional probability, independence, and the multiplication rule
- * 6. Bayes' rule

II. B Discrete Random Variables (IIB 2 weeks)

1. Random variables and their probability distributions
2. Connection between relative frequency distributions and probability distributions of discrete random variables
3. Mean and variance
4. The binomial probability distribution
- * 5. Using the binomial distribution tables; mean and variance of the binomial distribution

III. A The Normal Probability Distribution (IIIA 3 weeks)

1. Continuous random variables
2. The normal distribution
3. The standard normal distribution
4. Normal approximation of the binomial distribution
- * 5. Digression: How to MINITAB!
6. Sampling distributions
7. The Central Limit Theorem and its applications

III. B Inference (4 ½ weeks)

1. Introduction to inference - estimation and testing of hypotheses
2. Point and interval estimation
3. Testing statistical hypotheses:
 - a. Type I and Type II errors
 - b. Critical regions
 - c. p - values
4. Inferences concerning one population
 - a. Tests and confidence intervals for the population mean (large and small samples).
 - b. Tests and confidence intervals for proportions
 - c. Inference about the population variance
5. Inferences concerning two populations
 - a. The differences of two means (large and small samples)
 - b. Paired t - tests and the pooled t - test
 - c. The difference between two proportions
 - d. The ratio of two variances
6. Uses of chi-square statistics
 - a. Tests of goodness of fit
 - b. Contingency tables
- * 7. Introduction to one-way ANOVA
- * 8. Nonparametric methods