

Objectives

IE 220, APPLIED STATISTICS

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Catalog Description: Introduction to probability and statistical methods including descriptive statistics, probability and probability distributions, sampling, estimation, regression, time series, index numbers, ranking, and analysis of variance. Applications to administrative and production-service functions will be emphasized.

Environment: Students range from sophomore through senior level in several curricula; however, three of these curricula are textile oriented. The pre-requisite of MH 161 is the highest required level for some of the students. Class meetings are five days per week without a laboratory.

Goals

1. To assist students in understanding and applying a limited aspect of descriptive statistics.
2. To assist students in understanding and applying elementary probability theory.
3. To assist students in understanding, applying, and interpreting a limited amount of material from the field of statistical inference.
4. To provide students an opportunity to practice and gain experience in analyzing elementary problems of a statistical nature, choosing the proper statistical methodology, and interpreting the results both statistically and physically.

Objectives Derived from Goals

1. **Goal 1: Descriptive Statistics:** The student will be able to --
 - a. Construct frequency distributions, histograms, and polygons.
 - b. Compute the mean, standard deviation, various fractiles, coefficient of variation, and Pearsonian coefficient of variation for both raw and grouped data.

- c. Interpret the various statistics indicated in "b" in a comparative sense.
- d. State the meaning of a population and a sample and the relationship between them.
- e. Demonstrate proficiency in performing statistical calculations.

2. **Goal 2: Probability Theory:** The students will be able to --

- a. Count by use of the multiplication principle, permutation formulae, and combination formulae.
- b. State the definitions and rules of elementary set algebra and the modern definition of "probability."
- c. State appropriate definitions and results under the general heading of rules of probability, such as conditional probability, independence, and the theorem on total probability.
- d. Define random variable, discrete probability distribution, continuous probability distribution, and specific distributions such as the binomial, hypergeometric, Poisson, normal, and exponential.
- e. Define the mean and standard deviation of a random variable.
- f. Use the Central Limit Theorem within an elementary study of sampling distribution.
- g. Compute results from various aspects of probability theory, including the use of tables.
- h. Identify appropriate random variables and probability distributions from worded statements of applied problems.

3. **Goal 3: Statistical Inference:** The students will be able to --

- a. Compute and interpret confidence intervals for means and standard deviations.
- b. Perform tests of hypotheses on means and standard deviations.
- c. Perform linear, multiple, and non-linear regression analyses and to compute related confidence intervals and prediction intervals.
- d. Perform one-way and two-way analyses of variance.
- e. Demonstrate proficiency in performing the various listed methods of statistical inference and in interpreting the results.
- f. Demonstrate proficiency in deciding which method of statistical inference is appropriate from worded applied problems.

4. **Goal 4: Practice:**

Detailed objectives for Goal 4 have been included within the objectives for Goals 1, 2, and 3.

Classroom Approach

The basic classroom style might be classified as informal lecture with questions and discussions strongly encouraged. At the beginning of most lectures a brief review of the material from the preceding day is given with some overview comments on what is to come next. The basic pattern of presentation usually includes definitions, developments, examples, and interpretation. Some attempt is usually made to indicate the breadth of applicability of the results. At the end of the class a brief summary is given along with comments about the following day's lecture. Problems related to the lecture are assigned on a daily basis for submission and grading.
