

Statistics 3136

Course description:

Statistics is an advanced mathematics course that uses meaningful problems and appropriate technologies to use statistical concepts developed in previous courses to develop more advanced means of statistical analyses, interpretations, and predictions.

Standard 1.0 Experimental Design

Students will design and conduct statistical experiments.

Learning Expectations:

The student will:

- 1.1 design studies that can be addressed with data;
- 1.2 collect data based on an appropriate sample.

Student Performance Indicators:

formulate questions that can be addressed with data;
describe the role of randomization in surveys and experiments;
select and use a method such as a survey or an experiment to collect data;
demonstrate understanding of bias in sampling;
demonstrate an understanding of the Law of Large Numbers;
demonstrate an understanding of the probability of independent events and conditional probability;
using appropriate probability models, design a method for simulating data from a particular situation, and use the generated data to analyze the situation;
design and conduct a statistical experiment to study a problem, and interpret and communicate the outcomes;
test hypotheses using appropriate statistics.

Standard 2.0: Data Analysis

The student will select and use appropriate statistical methods to analyze data and to develop and evaluate inferences and predictions based on the data.

Learning Expectations:

The student will:

- 2.1 select and use appropriate displays to represent and summarize the data collected in statistical studies or experiments;
- 2.2 select and use appropriate statistical methods to analyze data;
- 2.3 develop and evaluate inferences and predictions based on data.

Student Performance Indicators:

construct and interpret charts, tables, and graphs that display univariate and bivariate data;
calculate and apply measures of central tendency and dispersion in order to make inferences about a data set;
analyze the effects of data transformations on measures of central tendency and variability;
calculate and apply the correlation between data sets.
apply the properties of a normal distribution or a Chi-square distribution in appropriate situations in order to make inferences about a data set;
demonstrate an understanding of the Central Limit Theorem;

use curve-fitting with appropriate technology to make regression equations in order to represent a data set algebraically and to make inferences;
demonstrate an understanding of confidence intervals.