# Introduction to Statistics

**Course Abbreviation & Number:** Mathematics 1070

**Course Title:** Introduction to Statistics

**Credit Hours:** 3

**Prerequisites:**
- Any collegiate level mathematics course with a “C” or better.

**Co-requisites:**

**Course Description:**
This course is designed for students whose programs require a course in statistics as well as for those who wish to elect such a course. Topics to be covered include descriptive statistics, basic probability, discrete and continuous distributions, sample estimation of parameters, hypothesis testing, tests on means and proportions, chi-square tests, correlation and linear regression.

**Expected Educational Results:**

As a result of completing this course, the student will be able to:

1. Analyze statistical problems using critical thinking skills, such as deciding on appropriate statistics to measure and suitable tests to be performed.
2. Support statistical analyses using the course-required calculator whenever possible.
3. Define basic descriptive and inferential statistical terms.
4. Define terms of Experimental Design.
5. Select a random sample.
6. Construct frequency and relative frequency tables, histograms and boxplots, and categorize the shape.
7. Define the mean, median, mode, standard deviation, range and quartiles and calculate their values for a set of data using a course required calculator.
8. Identify outliers from a data set.
9. Calculate, interpret and apply z-scores.
10. Understand and apply basic concepts of probability.
11. Compute regular, compound and conditional probabilities of events from a contingency table.
12. Compute binomial probabilities and their mean and standard deviation.
13. Make appropriate checks for normality of distributions and apply the
properties of normal and standard normal distributions to determine probabilities
14. Use the Central Limit Theorem to describe the sampling distribution of the sample mean and sample proportion
15. Determine confidence intervals for the mean and proportion of one population for large samples or normally distributed populations
16. Apply the basic model of hypothesis testing and select the appropriate distribution to make inferences about a population mean and proportion or the difference between two population means and proportions, including the use of z-, t-, statistics
17. Apply hypothesis tests using the chi-square distribution
18. Write a regression line equation which best represents data relating two variables and interpret and/or make predictions from the line
19. Compute the linear correlation coefficient and coefficient of determination for a regression line using the course required calculator and interpret its significance

General Educational Outcomes:

Students who complete the core curriculum at GPC will be able to do the following:

1. Students produce well-organized communication that exhibits logical thinking and organization, uses appropriate style for the audience and meets conventional standards of usage.
   - Mathematics and Statistics students demonstrate the correct use of specialized vocabularies.
   - Students improve mathematical communication skills through general class discussions and small group activities.
   - Students logically organize and communicate information using mathematical vocabulary by completing assignments such as projects.

2. Students demonstrate the ability to interpret and analyze quantitative information; apply mathematical principles and techniques; and use mathematical modules to solve applied problems.
   - Students demonstrate the comprehension and application of statistical principles and techniques by following the instructional goals for this course.
   - Students completing this course successfully will be able to interpret, understand, and communicate fundamental ideas about quantitative data.

3. Students demonstrate effective problem-solving and critical thinking skills through interpreting, presenting or evaluating ideas.
   - Students demonstrate individual and group problem-solving skills
by completing a variety of assessments such as unit tests, examinations, projects and homework.

- Students employ critical-thinking skills on tests and other assignments.

Course Content:

1. Descriptive Statistics (data analysis)
   - Sampling Techniques
   - Experimental Design
   - Frequency and Relative Frequency Tables, Histograms and Boxplots
   - Mean, Median, Mode, Variance, Standard Deviation, Range, Quartiles, and z-Scores

2. Probability
   - Regular, Compound, and Conditional Probabilities
   - Binomial Probability

3. Probability Distributions
   - Normal and Standard Normal Distribution
   - Student’s t-Distribution
   - Central Limit Theorem
   - Chi-Square Distribution

4. Inferential Statistics
   - Confidence Intervals for the Population Mean and Proportion for One and Two Populations
   - Hypothesis Tests for the Population Mean and Proportion for One and Two Populations
   - Goodness-of-Fit Test

5. Linear Regression and Correlation
   - Equation of the Linear Regression Line
   - Linear Correlation Coefficient
   -Coefficient of Determination

Assessment of Outcome Objectives

Course Grade:

The course grade will be determined by the individual instructor using a variety of evaluation methods. A portion of the course grade will be determined through the use of frequent assessment using such means as tests, quizzes, projects or homework as developed by the instructor. Some of these methods will require the student to demonstrate ability in problem solving and critical thinking as evidenced by explaining and interpreting solutions. A comprehensive final examination is required which must count at least one-fifth and no more than one-third of the course grade.

Course Assessment:
Course assessments should be conducted every three years. These assessments may be conducted more frequently. In no case, however, should the period between assessments exceed three years. The method for assessment will be common questions that are created by the Math 1070 committee targeting selected objectives. These common questions will be included in the final exams for all statistics sections scheduled the semester during which the assessment is conducted. The method of assessment may be altered if the results warrant a change.

**Use of Assessment Findings:**

The required proficiency for the assessment questions will be 65% correct. If proficiency is not met, the Math 1070 committee will take selected actions to improve the results. Once proficiency is achieved the Math 1070 Curriculum Committee will target other objectives for assessment.

The Math 1070 Curriculum Committee will analyze the results of the assessment and based on these results the committee will determine implications for curriculum changes. These could include the creation of worksheets or a list of suggested teaching techniques which will be shared with all faculty teaching this course. The committee will prepare a report for the Academic Group summarizing the findings.

**Last Revised:**

Last Reviewed on February 2015