Course Number: MAT 120
Course Title: Elementary Statistics
Credits: 3 Semester Hours
Prerequisites: C or better in Mat 100 or appropriate placement score

Objectives: At the successful completion of this course, students should

Understand why:
- Variability is natural and is also predictable and quantifiable.
- Random sampling allows results of surveys and experiments to be extended to the population from which the sample was taken.
- Statistical significance does not necessarily imply practical importance, especially for studies with large sample sizes.
- Finding no statistically significant difference or relationship does not necessarily mean there is no difference or no relationship in the population, especially for studies with small sample sizes.

Recognize:
- Common sources of bias in surveys and experiments.
- How to determine the population, to which the results of statistical inference can be extended, if any, based on how the data were collected.
- How to determine when a cause and effect inference can be drawn from an association, based on how the data were collected (e.g., the design of the study)
- That words such as “normal”, “random” and “correlation” have specific meanings in statistics that may differ from common usage.

Understand the parts of the process through which statistics works to answer questions, namely:
- How to obtain or generate data.
- How to graph the data as a first step in analyzing data, and how to know when that’s enough to answer the question of interest.
- How to interpret numerical summaries and graphical displays of data - both to answer questions and to check conditions (in order to use statistical procedures correctly).
- How to make appropriate use of statistical inference.
- How to communicate the results of a statistical analysis.

Understand the basic ideas of statistical inference:
- The concept of a sampling distribution and how it applies to making statistical inferences based on samples of data (including the idea of standard error)
- The concept of statistical significance including significance levels and p-values.
- The concept of confidence interval, including the interpretation of confidence level and margin of error.

Know:
- How to interpret statistical results in context.
- How to critique news stories and journal articles that include statistical information, including identifying what's missing in the presentation and the flaws in the studies or methods used to generate the information.

Catalog Description: An introduction to the practices of statistics, for non-science or math majors, that emphasize elementary data analysis and inference. Topics include correlation, regression, probability models, estimation, and hypothesis testing. Examples will be selected from many fields, such as anthropology, business, medicine, psychology, sociology, and education. Students will be expected to use appropriate computer software. (Not open to students who have passed MAT 115)

Course Outline:

I. Distributions
   A. Displays
      1. histograms
      2. stem and leaf displays
      3. box and whisker plots
      4. simple time plots
   B. Numerical descriptions
      1. Measures of center
      2. Measures of Dispersion

II. Normal Distributions
   A. Calculations
   B. Assessing Normality

III. Relationships between two variables
   A. Scatterplots
   B. Correlation vs. causation
   C. Regression:
      1. Residuals
      2. Outliners
      3. Influential observations
   D. Two-way tables

IV. Sampling and sampling distributions

V. Probability Models
   A. Binomial distributions - proportions
   B. Central Limit Theorem - means

VI. Topics in Inference
   A. Confidence intervals
   B. Tests of significance
   C. Inference for
      1. a population mean
      2. for the difference between two means
      3. proportions and differences between proportions
      4. two-way tables