

COURSE OUTLINE
Introduction to Statistics

Course Description:

MA 119. Introduction to Statistics. 3 hours credit. Prerequisite: Placement score or MA 060 with a C or better or equivalent. This course will enable the student to identify misleading representations of data, summarize data, and interpret data.

Course Relevance:

The principles learned in this course will enable the student to recognize misleading graphs and biased statistics and to calculate and interpret statistics.

Required Materials:

Text & other materials:

Understanding Basic Statistics, 3rd edition by Charles Henry Brase and
Corrinne Pelillo Brase
Scientific or Graphing Calculator

Learning Outcomes:

The intention is for the student to be able to:

1. Identify misleading representations of data
2. Calculate statistics
3. Interpret statistics

Learning PACT Statement:

Butler prepares students to be principled, productive individuals who are responsible, involved lifelong learners. To accomplish this goal Butler has established a Learning PACT for the skills that learners need during their career and has integrated PACT skill-building activities and assessments through a variety of program coursework, extra curricular activities, and other learning opportunities.

The BCCC Learning PACT consists of:

P = Personal Development Skills

A = Analytical Thinking Skills

C = Communication Skills

T = Technological Skills

The Learning PACT Skills are vital for any adult to function successfully in the ever changing world of the 21st century. Butler expects learners to be full partners in the learning process and as such to assume primary responsibility for their own choices.

Through the student involvement in this course, he/she will develop and document his/her achievement of the following PACT skills:

Primary skills (developed and documented):

1. Problem Solving
 - Through the use of statistical methods the student will estimate parameters and calculate the likely error.
2. Critical Thinking
 - Through the study of words, visual representations, and sampling methods, the student will distinguish between reliable statistical information and biased or otherwise misleading statistics.

Secondary skills (developed but not documented):

Teamwork
Field-related technology
Reading
Writing
Listening
Ethical conduct

Assessment Tasks:

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. Calculating a confidence interval for a population mean given the sample (or the sample mean and the sample size) and, if necessary, information about the population distribution
2. Summarizing a given data set by calculating several meaningful statistics and conveying an accurate intuitive picture of the data with a graph

Course Content:

- I. Themes - Key recurring concepts that run throughout this course:
 - A. Representative data
 - B. Calculating statistics
 - C. Interpreting statistics
- II. Issues - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
 - A. Communicating mathematical concepts
 - B. Bias
- III. Concepts – Key concepts that must be understood to address the issues:
 - A. Bias
 - B. Graphs
 - C. Average
 - D. Spread
 - E. Probability
 - F. Normal distribution
 - G. Estimation of population mean
- IV. Skills - Actions that are essential to achieve the course outcomes:

- A. Read and use notation
- B. Recognize poor methods of gathering and presenting data
- C. Calculate statistics
- D. Calculate probability
- E. Describe a normal distribution

Learning Units:

- I. Statistical reasoning
 - A. Statistical concepts
 - B. Statistical studies

- II. Visual displays of data
 - A. Bar graphs
 - B. Time plots
 - C. Frequency distributions
 - D. Histograms
 - E. Stem-and-leaf displays

- III. Averages and variation
 - A. Measures of central tendency
 - B. Measures of spread
 - C. Box-and-whisker plots

- IV. Probability
 - A. Probability concepts
 - B. Compound events
 - C. Counting techniques

- V. Binomial distributions
 - A. Probability distribution
 - B. Binomial probabilities
 - C. Binomial distribution properties

- VI. Normal distributions
 - A. Normal graphs
 - B. Standard normal distribution
 - C. Areas under normal curves

- VII. Sampling
 - A. Sampling distributions
 - B. Central limit theorem

- VIII. Estimating means
 - A. Estimating with large samples
 - B. Estimating with small samples

Learning Activities:

Learning activities may include in-class presentations, homework assignments from the textbook, small group or class discussion, and individual or group projects or exercises.

Grade Determination:

The student will be graded on exams, satisfactory completion of learning activities, and/or attendance.