BROWARD COLLEGE
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Course Outline

Course Title: Pathway To Statistics
Common Course Title: STA1001
Effective Term: Spring 2017 (Jan 9, 2017)
Credit Hours: 3 Units

Next Review : Aug 1, 2019
Contact Hour Breakdown: *(Per 16 week Term)*
Total: 48
Lecture: Lab:
Clinic: Other:

Requirements

This course does not have any required pre-requisites or co-requisites.

Course Description:

STA1001 will lay the foundation for further statistical study. This course introduces basic statistical concepts and focuses on data analysis and quantitative reasoning. This course emphasizes both written and verbal communication of statistical concepts and helps prepare the student for inferential statistics courses. STA1001 is designed for students who do not intend to major in math, science, computer science, business, etc. Please check your degree requirements before enrolling in this course. Students who complete this course will be prepared to enter STA2023, MGF1106, and MGF1107. This course will not serve as a prerequisite for MAT1033 or MAC1105.

Course Outline

UNITS

Unit 1 : Algebra for Statistics and Geometry

General Outcome
1.0 The student shall be able to perform key operations with decimals, fractions, and percentages for upcoming statistical calculations, solve linear equations, solve formulas for a given variable, and translate English phrases into mathematical expressions from statistical contexts.

Specific Learning Outcomes
1.1 Solve linear equations.
1.2 Solve statistical formulas for a selected variable when values are given for the remaining variables. For example, solve $z = (x - \mu)/s$ for z when $x = 10, \mu = 3$ and $s = 7$.
1.3 Solve geometric formulas for a selected variable when values are given for the remaining variables. For example, solve $p = 2l + 2w$ for w when $p = 40$ and $l = 10$.
1.4 Translate English phrases into mathematical expressions, especially involving comparisons such as “more than,” “less than,” “at least,” etc., as is typically used in statistics.
1.5 Round decimals to given place values.
1.6 Round numbers to appropriate significant figures.
1.7 Convert between fractions, decimals, and percentages.
1.8 Translate between scientific notation and standard notation.

Unit 2 : Statistical Terminology and Data Collection Methods

General Outcome
2.0 The student shall be able to utilize basic statistical vocabulary and identify appropriate data collection methods.

Specific Learning Outcomes
2.1 Define the terms data, statistic, sample, parameter, and population, and identify them in context.
2.2 Define explanatory and response variables, and identify them in context.
2.3 Define quantitative variables, categorical variables, and labels, and identify them in context.
2.4 Define nominal, ordinal, interval, and ratio variables, and identify them in context.
2.5 Define bias, and identify sources of bias in context.
2.6 Define blind and double blind studies, and identify them in context.
2.7 Define placebo, and identify it in context.
2.8 Identify sampling techniques such as cluster sampling, stratified sampling, convenience sampling, systematic sampling, and simple random sampling in context. Determine the utility of the various techniques.
2.9 Define retrospective and longitudinal studies, and identify them in context.
2.10 Think critically about survey design and misleading statistics.
2.11 Define observational studies and experiments, and identify them in context
2.12 Define confounding variables, and identify them in context.

Unit 3 : Introduction to Probability

General Outcome
3.0 The student shall be able define probability and apply basic probability calculations.

Specific Learning Outcomes
3.1 Define and identify a set and its elements.
3.2 Describe sets by a rule or by listing. For example, "E is the set of positive even numbers less than 10" and "E = {2, 4, 6, 8}".
3.3 Determine the union and intersection of sets, and use Venn diagrams for visualizing this.
3.4 Define classical probability, subjective probability, and relative frequency probability, and identify each in context.
3.5 Define sample space, and identify the elements in a sample space.
3.6 Identify the size of a sample space for simple events.
3.7 Translate a probability problem into common probability notation (e.g. P(A)).
3.8 Apply classical probability.
3.9 Apply relative frequency probability.
3.10 Define and identify the complement of an event.
3.11 Translate an applied probability problem with complement into probability notation.
3.12 Calculate the probability of a complement in context.
3.13 Compute probability P(A or B).
3.14 Compute probability P(A and B).
3.15 Compute probabilities using the multiplication rule with and without replacement.
3.16 Translate English phrases into probability notation, especially involving comparisons such as “more than”, “less than”, “at least”, etc.
3.17 Calculate probabilities from two-way tables.

Unit 4 : Organizing Data

General Outcome
4.0 The student shall be able to organize data into table and graph form and interpret such tables and graphs.

Specific Learning Outcomes
4.1 Construct and interpret a frequency table.
4.2 Construct and interpret a two-way table.
4.3 Calculate row and column totals for two-way tables.
4.4 Calculate row, column, and cell percentages for two-way tables. Decide which percentages are relevant to addressing a research question.
4.5 Construct and interpret dot plots.

4.6 Construct and interpret quantitative histograms.
4.7 Construct and interpret categorical bar charts.
4.8 Construct and interpret line graphs.
4.9 Interpret pie charts.

Unit 5 : Descriptive Statistics

General Outcome
5.0 The student shall be able to calculate and interpret measures of center and spread.

Specific Learning Outcomes
5.1 Identify and interpret the minimum and maximum data values.
5.2 Calculate and interpret the mean.
5.3 Utilize correct notation for sample mean (x-bar) and population mean (μ).
5.4 Calculate and interpret the median.
5.5 Calculate and interpret the mode.
5.6 Differentiate between mean and median and identify the utility of each measure of center. That is, use the mean and standard deviation for normal distributions and the median and IQR for skewed distributions or those with outliers.
5.7 Calculate and interpret means and medians from dotplots.
5.8 Estimate means and medians from histograms.
5.9 Identify symmetry and skewness on histograms.
5.10 Identify the connection between the mean and skewness.
5.11 Calculate and interpret quartiles.
5.12 Calculate and interpret the range.
5.13 Calculate and interpret the interquartile range (IQR).
5.14 Calculate and interpret five number summaries.
5.15 Construct and interpret boxplots.
5.16 Find related percentiles (multiples of 25%) for given data values on boxplots and vice versa.
5.17 Match boxplots with corresponding histograms.
5.18 Identify outliers in boxplots.
5.19 Calculate and interpret standard deviation.
5.20 Calculate and interpret variance.
5.21 Use correct notation for sample and population standard deviation and variance.

Unit 6 : The Normal Distribution

General Outcome
6.0 The student shall be able to identify the basic characteristics of the normal distribution and apply the empirical rule.

Specific Learning Outcomes
6.1 Identify a unimodal distribution. Identify the normal distribution.
6.2 Draw the density curve for the normal distribution for a given mean and standard deviation.
6.3 Locate the mean on a normal distribution.
6.4 Estimate the standard deviation using the point of inflection on a normal curve.
6.5 Locate approximately three standard deviations above and below the mean on a normal distribution.
6.6 Explain the 68 - 95-
99.7 rule for normal distributions. Apply this rule to determine related data values for given percentages for normal distributions and vice versa (including fewer than, more than, between, etc.).

Unit 7 : Modeling Bivariate Data

General Outcome
7.0 The student shall be able to select an appropriate model for bivariate data.

Specific Learning Outcomes
7.1 Construct scatterplots.
7.2 Define slope.
7.3 Determine whether a line has positive slope, negative slope, or a slope of 0.
7.4 Identify m as the slope and (0,b) as the y-intercept in y = mx + b.
7.5 Interpret slope and y-intercept in context.
7.6 Recognize that equations are a way of modeling a correspondence between two quantitative variables.
7.7 Recognize that linear equations are appropriate for modeling situations that involve constant rates of change.
7.8 Estimate and interpret linear correlation coefficients from scatterplots.
7.9 Construct a model for data that exhibits perfect linear correlation.
7.10 Recognize that exponential models are appropriate for modeling data that exhibit exponential growth and decay.
7.11 Construct a model for data that exhibit perfect exponential growth or decay.