MATH G080: PRE-STATISTICS

Item	Value
Curriculum Committee Approval Date	09/21/2021
Top Code	170100 - Mathematics, General
Units	4 Total Units
Hours	72 Total Hours (Lecture Hours 72)
Total Outside of Class Hours	0
Course Credit Status	Credit: Non-Degree Applicable (C)
Material Fee	No
Basic Skills	Basic Skills (B)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

This course covers requisite topics from Intermediate Algebra including evaluating algebraic expressions with exponents, square roots, fractions, absolute values, presents, scientific notation, working with algebraic formulas, linear equations, graphing, linear regression analysis, descriptive statistics, probability, sampling distributions including the Binomial and Normal distribution, and the use of calculators and/or statistical websites. Not Transferable.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Analyze data by producing descriptive statistics including measures of center, spread, and position, and interpreting the results in context.
3. Construct relevant algebraic models in one and two variables including linear regression models.
4. Analyze graphs including bar graphs, pie charts, histograms, stem and leaf plots, boxplots, and/or scatterplots.

Course Objectives

- 1. Perform order of operations and evaluate algebraic expressions with exponents, square roots, fractions, absolute value, percents, and scientific notation.
- 2. Solve linear equations, evaluate formulas, and solve a formula for a given variable.
- 3. Find equation of a line and use linear equations to solve various application problems.
- 4. Solve linear inequalities, including compound inequalities, and use interval notation.
- 5. Work with data to perform basic regression analysis including interpretations of slope and y-intercept when appropriate.
- 6. Identify various sampling methods, types of errors in sampling, types of data, and the design of experiments.
- 7. Summarize data by constructing tables, charts, and graphs such as pie charts, histograms, stem and leaf plots, boxplots, and scatterplots.
- 8. Numerically summarize data using measures of central tendency, dispersion, and position.
- 9. Use various probability rules, formulas, and models including the Binomial and Normal Probability models.
- 10. Compute probabilities of simple and compound events, and conditional probabilities using counting techniques.
- 11. Determine the probability distribution of random variables and compute the expected value and standard deviation.
- 12. Describe the sampling distribution of the sample mean and sample proportion and compute related probabilities.
- 13. Read, investigate, and communicate both verbally and in written form trends in data and statistical application problems.
- 14. Use a graphing calculator to perform algebraic and statistical computations.

Lecture Content

Algebra Simplify Expressions with Fractions, Percents, Exponents (integer and rational), Radicals, Absolute Value, and inequalities using Order of Operations Evaluate Algebraic Expressions, Formulas, and Functions Solve Formulas for Specified Variable Solve Linear Equations and Inequalities Solve Compound Inequalities The Rectangular Coordinate System and Plotting Points Slope, Intercept, and Finding Equations of Lines Represent and Analyze Linear Functions Algebraically, Graphically, Verbally, and with a Table Dimensional analysis as relevant for Statistics Sampling Types of Variables and Data Sampling Methods Including Simple Random, Stratified, Cluster, Systematic, and Convenience Sampling Design of Observationa Studies and Experiments Types of Bias, Sampling, and Nonsampling Errors Graphical Summaries of Data Frequency Tables, Relative Frequency Tables, and Their Graphs Pie Charts and Two-way Tables Graphs of Quantitative Data including Histograms, Dotplots, Stemplots, Time-Series Plots, and Boxplots Graphical Misrepresentation of Data Numerical Summaries of Data Measures of Center Measures of Spread Measures of Position Summarizing Bivariate Data Scatterplots and Their Characteristics Correlation and its Interpretation Equations of Least Squares Regression Line and its use for Prediction Features and Limitations of the Regression Line including Interpretation of Slope and Intercept, and Residual Analysis Probability Theory Basic Concepts of Probability The Addition Rule and Complements Conditional Probability and the Multiplication Rule Counting Principles, Permutations, and Combinations Discrete Probability Distributions Discrete Random Variables Discrete Probability Distributions and their Mean and Standard Deviation The Binomial Distribution Continuous Probability Distributions Continuous Random Variables The Normal and Standard Normal Distributions Applications of the Normal Distribution Sampling Distributions Commonly Used Parameters and Statistics Sampling Distribution of Sample Means Sampling Distribution of Sample Proportions Probability Involving Sample Statistics Analyze and Understand Application Problems Understand the Difference Between Population versus Sample Statistics Apply Statistical Techniques and Effectively Communicate Trends in the Data in Context Identify Given Statistics and Write Their Interpretations Analyze Published Articles and Apply Experimental Design Principles Use Technology to Perform Statistical Computations and Representations of Data in Applications

Lab Content

Algebra Topics including algebraic expressions, exponents, radicals, inequalities, and equation of lines. Sampling methods Graphical and Numerical Summaries of Data. Bivariate data analysis. Probability including discrete and continuous probability distributions. Sampling distributions and applications. Use of technology to perform statistical analysis.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

Lecture/Discussion Collaborative group learning Article handouts Multimedia presentations Web-enhanced Homework assignments Group or individual projects Problem solving and technology sessions

Reading Assignments

Textbook Published articles Case studies

Writing Assignments

Projects Reports Exam questions which require written explanation of a topic or a concept

Out-of-class Assignments

Textbook or online homework assignments Projects Problem-solving applications requiring critical thinking

Demonstration of Critical Thinking

Students will demonstrate critical thinking and problem-solving skills by using logic, in conjunction with past mathematical solving techniques, to solve and interpret a variety of applications not previously seen. Demonstrations will be shown by completing assignments, participating in discussions, and completing required exams and quizzes.

Required Writing, Problem Solving, Skills Demonstration

A minimum of 3 exams, the majority of which shall not be multiple choice or true/false. Students must show their written work and the work must be evaluated. A comprehensive final exam to be given.

Eligible Disciplines

Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Navidi, W., Monk, B.. Elementary Statistics, 2nd ed. New York: McGraw Hill, 2016 2. Required Custom. Custom, ed. MacGraw Hill, 2017 3. Required Bluman, Allan G. Elementary Statistics, 10 ed. McGraw Hill , 2017

Other Resources

1. It is expected that some amount of supplemental in-class materials will be necessary for this class.