ROCHESTER COMMUNITY AND TECHNICAL COLLEGE COMMON COURSE OUTLINE

Course discipline/number/title: MATH 2208: Fundamental of Statistics

A. CATALOG DESCRIPTION

1. Credits: 4
2. Hours/Week: 4
3. Prerequisites (Course discipline/number): MATH 0099 or MATH 0100 or MATH 1111 or equivalent or higher-level math course with grade of C or better or appropriate math placement test score; placement at college level reading and writing.
4. MnTC Goals (if any): Goal 4/Mathematics/Logical Reasoning

This course is an introduction and overview of math statistics. Topics will include (but not limited to) descriptive statistics, probability and hypothesis testing. Computers and graphics calculators will be used extensively throughout the class in the classroom and computer lab setting.

B. DATE LAST REVISED (Month, year): January, 2014

C. OUTLINE OF MAJOR CONTENT AREAS:

1. Understand and use Statistical Terminology
2. Classify the Types of Data
3. Describe and Identify the Types of Sampling Used
4. Summarize Data using Frequency Tables, Relative Frequency Tables, Cumulative Frequency Tables and their corresponding Histograms.
   Histograms may also be produced using the computer and/or graphing calculator.
5. Calculate measures of Central Tendency (mean, median, mode, midrange), Dispersion Statistics (variance, standard deviation and range), and Measures of Position (percentiles, quartiles, deciles and Z-Score)
   All of the above may be calculated using formulas, computer and/or graphing calculator.
6. Determine the general Shape or Nature of the Distribution from: Stem-and-Leaf–Plots, the correct
7. Histograms and/or Boxplots with a 5-number summary.
   The above may be generated using the computer and/or graphing calculator.
8. Solve Probability Problems involving simple or compound events, independent or dependent events and conditional probability.
9. Set-up Probability Distributions and determine the mean, standard deviation, variance, and expected value.
10. Set-up and solve probability problems involving Binomial, Uniform and Normal Distributions.
    All of the above may be calculated using formulas, computer and/or graphing calculator.
11. Determine Probabilities from Normally Distributed sets of data.
12. Apply the Central Limit Theorem to find probabilities involving the sample mean.
13. Use the Normal Distribution as an Approximation to the Binomial when applicable.
    All of the above may be calculated using formulas, computer and/or graphing calculator.
14. Determine Interval Estimates from one and two samples to a specified level of confidence and within a specified error for the population parameters or their differences.
    All confidence intervals may be calculated using formulas, computer and/or graphing calculator.
15. Determine Sample Sizes for estimating a parameter to a specified level of confidence and within a specified error.
16. Run Hypothesis Tests on population parameters (one or two samples) using the traditional and/or p-value approach.
    Test statistics and p-value may be calculated using formulas, computer and/or graphing calculator.
17. Calculate the Linear Correlation Coefficient and determine if a significant positive, negative or no linear correlation exists between the two variables by running the appropriate hypothesis test.
18. Determine the Equation of the Regression Line from bivariate (paired) data.
19. Graph the Regression Line equation on the xy-axes along with the Scatter Diagram.
20. Use the Regression Line Equation to Predict the value for the y variable when substituting in an x value if significant linear correlation exists.
    Correlation and regression may be calculated using formulas, computer and/or graphing calculator.
21. Run One-Way or Two-Way ANOVA when testing hypotheses regarding population means when applicable.
    Output for One-Way or Two-Way ANOVA may be generated on the computer and/or graphing calculator.

C. OUTLINE OF MAJOR CONTENT AREAS: Continued. . .

22. Run a Non-Parametric test to test a hypothesis when applicable.
    Output involving non-parametric tests may be generated on the computer.
23. Optional: Find Probabilities through Simulation using the computer and/or graphing calculator.
24. Optional: Set-up and solve Applications of Baye's Theorem

D. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Calculate and interpret measures of center, dispersion and position.
2. Calculate and interpret probabilities and expected values.
3. Calculate and interpret confidence intervals.
4. Calculate the correlation coefficient and regression equation for a given data set and make predictions.
5. Select the appropriate hypothesis test on a given data set and draw a conclusion from the resulting test statistic and/or p-value.
6. Determine and use the appropriate parametric vs. a non-parametric test for a given data set.
7. Perform all of the above on a graphic calculator and/or computer.
8. Analyze and interpret a computer printout for the above accurately.

E. LEARNING OUTCOMES (MNTC):

Goal 4/Mathematics/Symbolic Systems: The student will be able to:

1. Illustrate historical and contemporary applications of mathematics/logical systems.
2. Clearly express mathematical/logical ideas in writing.
3. Explain what constitutes a valid mathematical/logical argument (proof).
4. Apply higher-order problem solving and/or modeling strategies.

F. METHODS FOR EVALUATION OF STUDENT LEARNING:

1. Tests over covered topics
2. Quizzes
3. Computer Labs
4. Homework
5. Group Assignments
6. Comprehensive Final Exam

G. RCTC CORE OUTCOME(S) ADDRESSED:

☐ Communication
☒ Critical Thinking
☐ Global Awareness/Diversity
☐ Personal/Professional Accountability

H. SPECIAL INFORMATION (if any):

RECOMMENDED ENTRY SKILLS/KNOWLEDGE:

1. Understand and be able to apply Order of Operations to evaluate or simplify algebraic expressions
2. Solve Equations: Linear, Quadratic and Rational
3. Solve Equations, Literal Equations and Formulas for a specific variable
4. Evaluate Equations for specified values of the variables
5. Understand and be able to find the Slope of a Line
6. Graph Linear Equations by:
   a) Plotting points
   b) Slope-intercept method
   c) Intercept method
7. Apply Properties of Exponents - integer and rational
8. Understand and be able to apply Basic Function Notation
9. Be able to set-up and solve Intermediate Level Application Problems
10. Be able to enter computations using sets of parentheses into a scientific or graphing calculator