

COMMON COURSE OUTLINE: Course discipline/number/title: MATH 2208: Fundamentals of Statistics

A. CATALOG DESCRIPTION

1. **Credits: 4**
2. **Hours/Week: 4 or as scheduled**
3. **Prerequisites (Course discipline/number):** MATH 0099 or MATH 1111 with a grade of C or better or appropriate score on RCTC placement test; college level reading.
4. **Co-requisites (Course discipline/number):** None
5. **MnTC Goals (if any):** CT, MA

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): February, 2006

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, range), and Measures of Position (percentiles, quartiles, deciles, 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, from the correct Histograms, and/or boxplots using a 5-number summary
The above may be generated using the computer and/or graphing calculator.
7. Solve Probability Problems involving simple or compound events, independent or dependent events, and conditional probability
8. Find Probabilities through Simulation using the computer and/or graphing calculator (optional)
9. Set-up and solve Applications of Baye's Theorem (optional)
10. Set-up Probability Distributions and determine the mean, standard deviation, variance, and expected value
11. 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
12. Determine Probabilities from Normally Distributed sets of data
13. Apply the Central Limit Theorem to find probabilities involving the sample mean
14. 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
15. 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
16. Determine Sample Sizes needed to estimate a parameter to a specified level of confidence and within a specified error
17. 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
18. 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
19. Determine the Equation of the Regression Line from bivariate (paired) data
20. Graph the Regression Line equation on the xy-axes along with the Scatter Diagram
21. Use the Regression Line Equation to Predict the value for the y variable when substituting in an x value if significant linear correlation exist
The linear correlation coefficient and regression line equation may be calculated using formulas, computer and/or graphing calculator
22. Run One-Way or Two-Way ANOVA when testing hypotheses regarding population means when Applicable
Output involving One-Way or Two-Way ANOVA may be generated on the computer and/or graphing calculator.
23. Run a Non-Parametric test to test a hypothesis when applicable
Output involving non-parametric tests may be generated on the computer

- D. LEARNING OUTCOMES (GENERAL):** The student will be able to:
1. Calculate and interpret measures of center, dispersion and position.
 2. Find and interpret probabilities and expected values.
 3. Find and interpret confidence intervals.
 4. Find correlation coefficient and regression equation for a given data set. Make predictions.
 5. Run the appropriate hypothesis test on a given data set and draw a conclusion from the resulting test statistic and/or p-value.
 6. Determine when to use parametric vs. a non-parametric test for a given data set.
 7. Be able to do all of the above on a graphic calculator and computer.
 8. Be able to analyze and interpret a computer printout.
- E. LEARNING OUTCOMES (MNTC):** Competencies from the Minnesota Transfer Curriculum (MNTC):
- Goal 2: Critical Thinking (CT): The student will be able to:
1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
 2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives, which can give alternative meanings or solutions to given situations or problems.
 3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
 4. Recognize and articulate the value assumptions, which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.
- Goal 4: Mathematics/Symbolic Systems (MA): 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. 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 the scientific calculator