
SECTION HEADING

MATH 1105: Introduction to Probability and Statistics

Description

Introduction to Probability and Statistics introduces the measures of central tendency, measures of dispersion, frequency distributions, probability, sampling distributions and the central limit theorem, testing of hypotheses, analysis of variance, linear regression and correlation analysis.

Credits

4

Prerequisite

MATH 1107 or NURS 1130 or Co-Req MATH 0115 or placement by multiple measures

Corequisite

None

Topics to be Covered

1. Introduction to Statistics – Descriptive and Inferential
2. Organizing data – graphs and charts
3. Numerical descriptive measures – grouped and ungrouped data
4. Probability concepts
5. Discrete random variables and their probability distributions
6. Continuous random variables and normal distributions, sampling distributions and the Central Limit Theorem
7. Estimating means and proportions
8. Hypothesis tests about the mean and proportion
9. Inferences from two samples
10. Correlation and Regression
11. Goodness-of-Fit and Contingency Tables
12. Analysis of Variance

Learning Outcomes

1. Critically analyze statistics and their representation in professional and popular publications.
 - A. Identify types of data including qualitative versus quantitative and discrete versus categorical.
 - B. Identify sampling techniques.
 - C. Determine key aspects of good statistical design such as replication, blinding and randomization.
 - D. Recognize error and common mistakes made in statistical designs.
2. Describe data using graphs and descriptive statistics.
 - A. Organize data into graphs using frequency distributions, scatterplots and other graphs.
 - B. Summarize data using measures of center, variation and relative standing.
 - C. Employ technology to perform calculations and generate graphs.
3. Explore probability theory in order to apply key concepts to inferential statistics.
 - A. Calculate probabilities for simple and compound events.
 - B. Apply the addition and multiplication rules to calculate probabilities.
 - C. Compute complements and conditional probabilities.
 - D. Apply fundamental counting rules such as factorials, combinations and permutations.
4. Use discrete and continuous probability distributions to determine actual and expected results.
 - A. Describe random variable and probability distribution.

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- B. Compute the mean and standard deviation of a discrete probability distribution and determine if results are significantly high or low.
 - C. Describe characteristics of the standard normal and normal distribution.
 - D. Find probabilities of some range of values in a normal distribution.
 - E. Apply the Central Limit Theorem.
5. Estimate population parameters and test claims.
- A. Construct and interpret confidence intervals about population proportions.
 - B. Construct and interpret confidence intervals about population means.
 - C. Determine optimal sample sizes to estimate population proportions or means.
 - D. Establish hypothesis testing to test claims about proportions and means.
6. Calculate correlation and the linear association of two variables.
- A. Generate and interpret a correlation coefficient that determines the level of relationship between two variables.
 - B. Construct a regression line to describe the relationship between two variables.
 - C. Make predictions by applying regression equations.
7. Select and apply the appropriate statistical test.
- A. Conduct formal hypothesis test of a claim made about two proportions, two means or matched pairs.
 - B. Construct confidence intervals to estimate the difference of two proportions, two means or matched pairs.
 - C. Create contingency tables and apply chi-square goodness of fit to make conclusions about categorical data partitioned into different categories.
 - D. Test equality of three or more population means using analysis of variance (ANOVA).

Credit Details

Lecture: 4

Lab: 0

OJT: 0

MnTC Goal Area(s): Goal Area 04- Mathematics/Logical Reasoning

Minnesota Transfer Curriculum Goal Area(s) and Competencies

Goal Area 04: Mathematics/Logical Reasoning

- 1. illustrate historical and contemporary applications of mathematical/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.