

**NEW RIVER COMMUNITY COLLEGE
DUBLIN, VIRGINIA**

COURSE PLAN

Course Number and Title: MTH 245 Statistics I /BUS 216 Statistics for Business (3 cr.)

Prepared by: Math Faculty Fall 2018
(Date)

Approved by: (Dean) Fall 2018
(Date)

I. Course Description

MTH 245 Statistics. Presents an overview of statistics, including descriptive statistics, elementary probability, probability distributions, estimation, hypothesis testing, correlation, and linear regression. Prerequisite: Placement or completion of MTH 154: Quantitative Reasoning or MTH 161: Precalculus I or equivalent with a grade of C or better. (Credit will not be awarded for both MTH 155: Statistical Reasoning and MTH 245: Statistics I.) Lecture: 3 hours per week.

BUS 216 Probability and Statistics for Business and Economics. Introduces methods of probability assessment and statistical inference. Includes data collection and presentation, descriptive statistics; basic probability concepts; discrete and continuous probability distributions; decision theory; sampling and estimation; and hypothesis testing. Emphasizes business and economic applications. Utilizes computer software as a tool for problems solving. Prerequisite: IST 117 and MTH 161 or MTH 154.

II. Introduction

This course is designed to develop the skills of probability and statistics which are needed in a variety of fields. BUS 216 is a part of the Business Administration degree program and both BUS 216 and MTH 245 will fit a general education statistics requirement as well as prepare students for a follow up course in probability or statistics.

III. Student Learning Outcomes

On successful completion of this course, students should be able to:

1. Solve application problems by interpreting the materials presented, including determining the nature and extent of the information needed, and presenting the answer in standard English
2. Estimate and consider answers to mathematical problems in order to determine reasonableness
3. Distinguish between a population and a sample and between a parameter and a statistic
4. Classify data as discrete or continuous; qualitative or quantitative; and determine

- the level of measurement
5. Determine the design of statistical studies
 6. Determine the type of sampling used to collect a sample
 7. Construct a frequency table, histogram, pie chart, bar graph, line graph, stem and leaf plot, and box and whisker plot
 8. Read statistical graphs and use the graphs to analyze data
 9. Calculate measures of location or center (mean, median and mode) and determine which is most appropriate in particular circumstances
 10. Calculate measures of dispersion or spread (range, variance and standard deviation)
 11. Calculate measures of relative position (percentiles, quartiles and standard scores)
 12. Determine if an observation is an outlier
 13. Use the Empirical Rule and Chebyshev's Theorem to determine proportions of the data that fall in a particular range
 14. Construct a scatterplot from bivariate data
 15. Determine the nature of a linear relationship from a scatterplot (negative, positive, weak, strong)
 16. Calculate the Pearson correlation coefficient
 17. Determine the sample space of a probability experiment
 18. Calculate probabilities using the classical rules of probability
 19. Calculate empirical probabilities
 20. Determine whether two events are mutually exclusive or independent.
 21. Construct and use probability distributions of discrete random variables
 22. Calculate probabilities for binomial random variables
 23. Calculate means, variances and standard deviations of discrete random variables
 24. Find areas under the standard normal distribution
 25. Calculate probabilities using the normal distribution
 26. Find z-values for given areas under the standard normal curve
 27. Use the Central Limit Theorem to estimate the mean and standard deviation of a sampling distribution of sample means and sample proportions
 28. Calculate probabilities for sample means
 29. Calculate probabilities for sample proportions
 30. Use a normal distribution to approximate the binomial distribution
 31. Find a confidence interval for a population mean using the z-distribution
 32. Find t-values for given areas under the Student t-distribution
 33. Find a confidence interval for a population mean using the t-distribution
 34. Find a confidence interval for a population proportion
 35. Find the sample size needed for a particular margin of error (for means and proportions)
 36. Write a complete, concise interpretation for a confidence interval using standard English
 37. Perform tests for significance (hypothesis tests) for population means and proportions using the P-value and rejection regions with z- and t-critical values as appropriate
 38. Calculate the coefficient of determination for bivariate data (r-square)
 39. Construct and interpret a confidence interval for the difference between two population means where the samples are independent and the population variances are assumed unequal. (0.5)
 40. Construct and interpret a confidence interval for the difference between two population means where the data consists of matched pairs. (0.5)
 41. Conduct a hypothesis test for the equality of two population means where the samples are independent and the population variances are assumed unequal. (0.75)

42. Conduct a hypothesis test for the equality of two population means where the data consists of matched pairs. (0.75) Calculate the coefficients in the least squares regression line.
43. Write a complete interpretation of the slope of a regression equation in Standard English
44. Calculate the variance of the slope and the variance of errors for regression.
45. Perform a hypothesis test for the slope of a regression equation.
46. Write a complete, concise conclusion for a hypothesis test for a given significance level using standard English
47. Use Microsoft Excel to do statistical calculations and construct statistical graphs

IV. **Instructional Methods**

The instructional procedures will include lectures, discussions, in class work, homework, reviews and tests.

V. **Instructional Materials**

- **eText:** Statistics: Informed Decisions Using Data. Michael Sullivan III, Pearson MyStatLab. It is not necessary to purchase the text. The online version is included with the software below. REQUIRED

- **Software:** Pearson MyStatLab. REQUIRED

Microsoft Excel which is available on all NRCC computers.

- **Calculator:** A calculator is REQUIRED. A scientific calculator is recommended. A graphing calculator ***will not be permitted on tests or quizzes.***
- Note paper, graph paper, pencils etc. Submitted work should be neat, legible and preferably written in pencil.

VI. **Course Content**

- Populations, parameters, samples and statistics
- Statistical graphs
- Probability and probability distributions
- Sampling distributions
- Estimation of parameters
- Two-Sample Statistical Inference
- Hypothesis tests for parameters
- Regression

VII. **Evaluation**

The grade for the course will be calculated from Tests, Hawkes Learning Systems homework, a final exam and other work as deemed appropriate by the instructor. See individual syllabus for details on percentages/points.

VIII. Attendance

Regular attendance at classes is required. When absence from a class becomes necessary, it is the responsibility of the student to inform the instructor prior to the absence whenever possible. The student is responsible for the subsequent completion of all study missed during an absence. Any instruction missed and not subsequently completed will necessarily affect the grade of the student regardless of the reason for the absence.

IX. Cheating Policy

The giving or receiving of any help from another student or unauthorized individual on any graded portion of the course is considered cheating and will not be tolerated. The use of books, notes, electronic devices or any other unauthorized material during tests is considered cheating, and will not be tolerated. Any student found cheating will receive a grade of "0" on that assignment and may receive an "F" for the course. This "0" cannot be replaced by any other score. Mobile phones are not permitted to be used as calculators.

X. Withdrawal Policy

Student Initiated Withdrawal Policy

A student may drop or withdraw from a class without academic penalty during the first 60 percent of a session. For purposes of enrollment reporting, the following procedures apply:

- a. If a student withdraws from a class prior to the termination of the add/drop period for the session, the student will be removed from the class roll and no grade will be awarded.
- b. After the add/drop period, but prior to completion of 60 percent of a session, a student who withdraws from a class will be assigned a grade of "W." A grade of "W" implies that the student was making satisfactory progress in the class at the time of withdrawal, that the withdrawal was officially made before the deadline published in the college calendar, or that the student was administratively transferred to a different program.
- c. After that time, if a student withdraws from a class, a grade of "F" or "U" will be assigned. Exceptions to this policy may be made under documented mitigating circumstances if the student was passing the course at the last date of attendance.

A retroactive grade of "W" may be awarded only if the student would have been eligible under the previously stated policy to receive a "W" on the last date of class attendance. The last date of attendance for a distance education course will be the last date that work was submitted.

Late withdrawal appeals will be reviewed and a decision made by the Director of Student Services.

No-Show Policy

A student must either attend face-to-face courses or demonstrate participation in distance learning courses by the last date to drop for a refund. A student who does not meet this deadline will be reported to the Admissions and Records Office and will be withdrawn as a no-show student. No refund will be applicable, and the student will not be allowed to attend/participate in the class or submit assignments. Failure to attend or participate in a course will adversely impact a student's financial aid award.

Instructor Initiated Withdrawal

A student who adds a class or registers after the first day of class is counted absent from all class meetings missed. Each instructor is responsible for keeping a record of student attendance (face-to-face classes) or performance/participation (DE classes) in each class throughout the semester.

When a student's absences equal twice the number of weekly meetings of a class (equivalent amount of time for summer session), the student may be dropped for unsatisfactory attendance in the class by the instructor.

Since attendance is not a valid measurement for Distance Education (DE) courses, a student may be withdrawn due to non-performance. A student should refer to his/her DE course plan for the instructor's policy.

In accordance with the No-Show Policy, a student who has not attended class or requested/accessed distance learning materials by the last day to drop the class and receive a refund must be withdrawn by the instructor during the following week. No refund will be applicable.

When an instructor withdraws a student for unsatisfactory attendance (face-to-face class) or non-performance (DE class), the last date of attendance/participation will be documented. Withdrawal must be completed within five days of a student's meeting the withdrawal criteria. A grade of "W" will be recorded during the first sixty percent (60%) period of a course. A student withdrawn after the sixty percent (60%) period will receive a grade of "F" or "U" except under documented mitigating circumstances when a letter of appeal has been submitted by the student. A copy of this documentation must be placed in the student's academic file.

The student will be notified of the withdrawal by the Admissions and Records Office. An appeal of reinstatement into the class may be approved only by the instructor.

XI. Disability and Diversity Statements

If you are a student with a documented disability who will require accommodation in this course, please register with the Disability Services Office located in the Counseling Center for assistance in developing a plan to address your academic needs.

The NRCC community values the pluralistic nature of our society. We recognize diversity including, but not limited to, race ethnicity, religion, culture, social class, age, gender, sexual orientation and physical or mental capability. We respect the variety of ideas, experiences and practices that such diversity entails. It is our commitment to ensure equal opportunity and to sustain a climate of civility for all who work or study at NRCC or who otherwise participate in the life of the college.

Evacuation Procedure: Please note the evacuation route posted at the classroom doorway. Two routes are marked in case one route might be blocked.