Course Number and Title: MAT 256 Statistics II

Campus Location:
Georgetown, Dover, Stanton, Wilmington

Effective Date:
2018-51

Prerequisite:
MAT 255

Co-Requisites:
None

Course Credits and Hours:
3.00 credits
3.00 lecture hours/week
1.00 lab hours/week

Course Description:
This course covers hypothesis testing of means and proportions, chi-square test, analysis of variance, regression and correlation analysis, non-parametric testing methods, and statistical process control. Topics include techniques of applied problem solving using data analysis software such as Excel.

Required Text(s):
Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
Graphing calculator. The math department strongly recommends the TI-84.

Schedule Type:
Classroom Course
Hybrid Course
Online Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Calculate point and interval estimate of means and proportions. (CCC 2, 6)
2. Perform tests of hypothesis on means and proportions. (CCC 2, 6)
3. Apply analysis of variance (ANOVA) to test hypothesis on three or more means. (CCC 2, 6)
4. Apply chi-square analysis to test the independence of two variables. (CCC 2, 6)
5. Apply non-parametric testing methods to appropriate data. (CCC 2)
6. Employ correlation and simple regression to analyze the association between two variables. (CCC 2, 6)
7. Apply multiple regression to analyze the relationship between the dependent and independent variables. (CCC 2, 6)
8. Apply principals of statistical process control. (CCC 2, 6)
9. Interpret and perform statistical analysis of time series data. (CCC 2)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Calculate point and interval estimate of means and proportions.
    1. Differentiate between point and interval estimates.
    2. Construct confidence interval for a population mean from a large sample, using the normal distribution.
    3. Construct confidence interval for a population mean from a small sample, using the T-distribution.
    4. Construct confidence interval for the proportion.
    5. Determine the sample needed for the estimate of means and proportions.
2. Perform tests of hypothesis on means and proportions.
    1. Test hypothesis of one mean from a large sample.
    2. Test hypothesis of one mean from a small sample.
    3. Test hypothesis of two means from large samples.
    4. Test hypothesis of two means from small samples.
    5. Test hypothesis on one proportion.
    6. Test hypothesis on two proportions.
3. Apply analysis of variance (ANOVA) to the hypothesis on three or more means.
    1. Explain the underlying assumptions for ANOVA model.
    2. Test for the equality of three or more means, using one-way ANOVA test.
    3. Perform pairwise comparison of means.
    4. Perform two-factor ANOVA tests using the randomized block design.
    5. Use appropriate technology to perform calculations needed for analysis of variance, and interpret the results.
4. Apply chi-square analysis to test the independence of two variables.
    1. Test for the equality of three or more proportions.
    2. Test for the goodness of fit of an observed frequency distribution.
    3. Test for the independence of two variables from data.
    4. Use appropriate technology to perform calculations for chi-square tests, and interpret the results.
5. Apply non-parametric testing methods to appropriate data.
    1. Explain the advantages and disadvantages of non-parametric methods.
    2. Use the Spearman's rank correlation to test hypothesis about a matched pair of observations.
    3. Use the Wilcoxon signed rank coefficient to test hypothesis about a matched pair of observations.
    4. Use the Wilcoxon rank sum coefficient to test hypothesis about independent variables.
6. Employ correlation and simple regression to analyze the association between two variables.
    1. Construct scatter plots for two variables.
    2. Calculate the regression equation using the least squares method.
    3. Obtain a point estimate of the dependent variable from the equation of the regression.
    4. Calculate and explain the correlation coefficient and the coefficient of determination.
    5. Perform residual analysis to determine the mean square error.
    6. Use appropriate technology to perform the calculations needed for regression analysis and interpret the results.
7. Apply multiple regression to analyze the relationship between the dependent and independent variables.
    1. Determine the regression equation for a dependent and two or more independent variables.
    2. Perform a global test of significance of the regression equation using the F-test.
    3. Perform individual tests of significance of the regression coefficients using the T-test.
    4. Use appropriate technology to perform multiple regression analysis, and interpret the results.
8. Apply principals of statistical process control.
    1. Construct R and $\bar{x}$ charts for changes in variation and mean of process data.
    2. Construct P charts for changes in proportions of attributes.
    3. Interpret process control charts to determine statistical stability.
    4. Use appropriate technology to create and evaluate process control charts.
9. Interpret and perform statistical analysis of time series data.
    1. Define and interpret trend, cyclical, seasonal, and irregular components of time series.
    2. Calculate seasonal indices of time series by the ratio to moving average method.
    3. Use seasonal indices to provide forecasts.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	–	100	=	A
83	–	91	=	B
75	–	82	=	C
0	–	74	=	F

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
None

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the <u>disabilities services - https://www.dtcc.edu/disabilitysupport</u> web page or visit the campus Advising Center.