Course Number and Title: MAT 062 Statistical Reasoning Support

Campus Location:
Georgetown, Dover, Stanton, Wilmington

Effective Date:
2022-52

Prerequisite:
None

Co-Requisites:
MAT 162

Course Credits and Hours:
2.00 credits
2.00 lecture hours/week
0.00 lab hours/week

Course Description:
Statistical Reasoning Support is designed to be taken simultaneously with Statistical Reasoning (MAT 162). This course supports students in developing foundational skills and learner skills, strategies, and reasoning needed to succeed in Statistical Reasoning (MAT 162) including communication and appropriate use of technology. Topics include but are not limited to: number ratio and proportional reasoning, calculating the mean, understanding graphical representations, arithmetic with positive and negative numbers, comparing numbers, calculating percentages and probabilities.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - 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

Schedule Type:
Classroom Course
Video Conferencing
Web Conferencing
Hybrid Course
Online Course
Hyflex

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Analyze data using graphical and numerical methods to study patterns and departures from patterns. (CCC 2,6)
2. Develop an appropriate data-collection plan in order to answer a given research question. (CCC 2,6)
3. Use probability concepts and simulation. (CCC 2,6)
4. Draw conclusions from data using statistical models. (CCC 2 ,6)

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. Analyze data using graphical and numerical methods to study patterns and departures from patterns.
    1. Construct graphical displays of distributions of univariate data to include dotplots, boxplots, and histograms.
    2. Interpret graphical displays of distributions of univariate data using center, shape, spread, clusters, gaps, outliers, and other unusual features.
    3. Summarize distributions of univariate data by computing measures of center (mean and median), measures of spread (range, interquartile range, standard deviation) and measures of position (quartiles, other percentiles, standardized scores).
    4. Compare multiple distributions using back-to-back stemplots, parallel boxplots, and dotplots.
    5. Analyze scatterplots for patterns, linearity, and influential points.
    6. Interpret the equation of a least-squares regression line including the slop and intercept in context.
    7. Calculate correlation coefficient and coefficient of determination.
    8. Construct and interpret residual plots.
    9. Create and interpret frequency tables and bar charts.
    10. Compare distributions of categorical data using two-way tables to analyze and interpret marginal, joint, and conditional relative frequencies.
    11. Estimate the probability of events in context.
2. Develop an appropriate data-collection plan in order to answer a given research question.
    1. Identify population.
    2. Identify characteristics of a good study.
    3. Differentiate between an observational and experimental study.
    4. Differentiate between random selection and random assignment.
    5. Determine when a census or a sample survey is appropriate in observational studies.
    6. Develop and implement a sampling plan (including the use of simple random, stratified, and cluster sampling) for an observational study.
    7. Identify sources of bias in sampling and surveys for an observational study.
    8. Explain the purpose of a control group and blinding in an experimental study.
    9. Identify potential sources of confounding in an experiment.
3. Use probability concepts and simulation.
    1. Interpret a probability as a long-run relative frequency of occurrence.
    2. Calculate the probability of a specified event in a chance experiment with equally likely outcomes.
    3. Determine probabilities using the complement rule, the addition rule for disjoint events, and the multiplication rule for independent events.
    4. Analyze and conduct simulations to estimate the probability of an event.
    5. Use probability distributions to describe the behavior of discrete and continuous random variables.
    6. Distinguish between discrete random variables and continuous random variables.
    7. Compute and interpret the mean and standard deviation of the probability distribution of a discrete random variable.
    8. Analyze the mean, standard deviation, and shape of a continuous probability distribution (uniform, normal, skewed).
    9. Distinguish between the distribution of a sample and a sampling distribution.
    10. Describe the sampling distributions of a sample mean and a sample proportion in terms of center, shape, and spread.
    11. Identify when the normal distribution is appropriate and use in modeling.
4. Draw conclusions from data using statistical models.
    1. Estimate population parameters using confidence intervals when appropriate.
    2. Construct one – and two-sample confidence intervals for means and proportions.
    3. Interpret confidence intervals in context and interpret the confidence level associated with a confidence interval estimate.
    4. Analyze authentic statistical studies that report confidence intervals to determine whether conclusions are reasonable.
    5. Conduct tests of significance when appropriate.
    6. Carry out one-and two-sample hypothesis tests for means and proportions and for chi-squared tests.
    7. Identify appropriate hypotheses.
    8. Describe type I and type II errors in context.
    9. Interpret the meanings of rejection of the null hypothesis and of failure to reject the null hypothesis, in context.
    10. Demonstrate understanding of the use of a p-value to reach a conclusion and the difference between practical significance and statistical significance.
    11. Analyze authentic studies that report the results of a hypothesis tests to determine if the conclusions are reasonable.

Evaluation Criteria/Policies:
The grade will be determined using the Delaware Tech grading system:

90	–	100	=	A
80	–	89	=	B
70	–	79	=	C
0	–	69	=	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.

Final Course Grade:
Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Projects – Summative (Equally Weighted)	40%
Short Response Checkpoints - Formative (Equally Weighted)	20%
Weekly Activities - Formative	40%
TOTAL	100%

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 disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.