Topics Covered Aligned with Chapters in CourseKata Statistics

1. Probability
    a. Law of large numbers (chapters 2, 3, 4, 9, 10, 11)
    b. Sampling with and without replacement (2, 3)
    c. Contingency tables (2, 3, 4)
2. Research methods
    a. Sampling (2, 3, 4)
    b. Measurement: categorical v. quantitative variables (2)
    c. Organizing data (2)
    d. Research design: correlational v. experimental (4)
    e. Correlation, causality, and confounding (4, 7, 8, 11)
3. Descriptive statistics
    a. Univariate visualizations: histograms, box plots, bar graphs (3)
    b. Bivariate visualizations: frequency tables, faceted histograms, scatterplots, bar graphs, box plots (4)
    c. Summary statistics:
        i. center (mean, median, mode) (3, 5)
        ii. shape (skew, normal, uniform, multimodal) (3, 5)
        iii. spread (standard deviation, sums of squares, variance) (3, 5, 6)
        iv. five number summary (3)
        v. regression, correlation coefficient (8)
    d. Quantitative and categorical predictors; quantitative outcomes (2)
    e. Z score (6)
4. Inferential statistics and sampling distributions
    a. Mathematical distributions
        i. Probability under mathematical distributions (6, 9, 10, 11)
        ii. Central limit theorem (9)
        iii. normal/Z distribution, t distribution, F distribution (6, 9, 10, 11)
    b. Computational techniques
        i. Simulation (2, 4, 6, 9, 10, 11)
        ii. Bootstrapping (3, 9, 10, 11)
        iii. Randomization (4, 9, 10, 11)
    c. Hypothesis testing
        i. t-test (11)
        ii. ANOVA (7, 8, 11)
        iii. Regression (8, 11)
        iv. Type I and Type II error (4, 10, 11)
        v. Concepts of power and effect size (10, 11)
    d. Confidence intervals (10)
5. Organizing concepts (throughout textbook)
    a. Modeling: DATA = MODEL + ERROR
    b. General linear model; GLM notation
    c. Data analysis using R

6. We currently do not cover: paired t tests, Chi-square tests, probability rules, multiple regression, factorial/multivariate ANOVA (our recent paper in Journal of Statistics and Data Science Education includes evidence that students who learn with CourseKata materials have intuitions that prepare them to *transfer* to multivariate models by the end of the course: https://www.tandfonline.com/doi/full/10.1080/10691898.2020.1844106)