Probability and Statistics provides a curriculum focused on understanding key data analysis and probabilistic concepts, calculations, and relevance to real-world applications. Students are challenged to work toward mastery of computational skills, apply calculators and other technology in data analysis, deepen their understanding of key ideas and solution strategies, and extend their knowledge through a variety of problem-solving applications.

Course topics include types of data, common methods used to collect data, and representations of data, including histograms, bar graphs, box plots, and scatterplots. Students learn to work with data by analyzing and employing methods of extending results, involving samples and populations, distributions, summary statistics, experimental design, regression analysis, simulations, and confidence intervals.

Ideas involving probability — including sample space, empirical and theoretical probability, expected value, and independent and compound events — are covered as students explore the relationship between probability and data analysis.

Extended projects allow for more open-ended, extended applications of concepts and skills. Students collect and analyze statistical data about a topic that interests them, and they apply probability concepts in a real-world context.

Length: Two Semesters

Unit 1: Introduction to Statistics

- What Is Statistics?
- Collecting Data
- Random Sampling
- Experimental Design
- Introduction to Statistics Wrap-Up

Unit 2: Describing Data Graphically

- Categorical Data
- Numerical Data
- Two-Way Frequency Tables
- Describing Data Graphically Wrap-Up

Unit 3: Measures of Center and Spread

- Measures of Center
- Measures of Spread
- Box Plots
- Project
- Measures of Center and Spread Wrap-Up

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Unit 4: Describing Data Sets

- Describing Distributions
- Comparing Distributions
- Transforming Univariate Data
- Describing Data Sets Wrap-Up

Unit 5: Modeling Data

- Linear Models in Data
- Correlation
- Regression Methods
- Assessing Data Models
- Nonlinear Models
- Transforming Bivariate Data
- Modeling Data Wrap-Up

Unit 6: Semester 1 Review and Exam

Unit 7: Introduction to Probability

- Random Outcomes, Sample Spaces, and Events
- Permutations and Combinations
- Independent and Dependent Events
- Conditional Probability
- Introduction to Probability Wrap-Up

Unit 8: Applications of Probability

- Using Two-Way Frequency Tables
- Using Probability to Make Decisions
- Simulations
- Project
- Applications of Probability Wrap-Up

Unit 9: Discrete Probability Distributions

- Discrete Random Variables
- Binomial Probability
- Cumulative Binomial Probability Distributions
- Discrete Probability Distributions Wrap-Up

Unit 10: Continuous Probability Distributions

- Continuous Random Variables
- Normal Distributions
- z-Scores
- Continuous Probability Distributions Wrap-Up

Unit 11: Sampling and Confidence Intervals

- Sample Means
- Sample Proportions

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- Confidence Intervals: Sample Means
- Confidence Intervals: Sample Proportions
- Evaluating Statistical Studies
- Sampling and Confidence Intervals Wrap-Up

Unit 12: Semester 2 Review and Exam

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