

## Unit 4 – Probability and Random Variables (3.5 Weeks)

### Enduring Understandings

- Probability models are useful tools for making decisions and predictions. [C2c]
- Students will understand that probability is the basis of statistical inference. [C2c]
- The notion and behavior of a random variable is foundational to understanding probability distributions. [C2c]

**C2c:** The course provides instruction in each of the following four broad conceptual themes outlined in the Course Description with appropriate emphasis on anticipating patterns.

### Essential Questions

- When is probability a sure thing?
- How can we base decisions on chance?
- What is a random variable?
- How may random variables be combined?

### Knowledge and Skills

- Create and interpret probability models
- Find and interpret long-run relative frequencies
- Apply the Law of Large Numbers
- Apply the addition and multiplication rules
- Understand independence and disjoint
- Understand conditional probability
- Create and apply simulations to access their probability distributions [C5]
- Mean and standard deviation for sums and differences of independent random variables.

### Sample Assessments/Activities

- Students design and play a game of chance (using dice or cards) to illustrate their understanding of the rules of probability, expected value, the law of large numbers, and the nature of random variables. Students first use simulation [C5] to 'test' the variance of their game and follow up by actually playing the game with classmates and subsequently write a summary of their results. Results help students to conceptualize the notions of sampling variability and set the stage for the study of sampling distributions. [C2c]
- Students complete a variety of released free response items focused on probability and expected value.

**C5:** The course teaches students how to use graphing calculators and demonstrates the use of computers and/or computer output to enhance the development of statistical understanding through exploration and analysis of data, assessment of models, and simulations.