STATISTICS and PROBABILITY OVERVIEW

Interpreting Categorical and Quantitative Data

- Summarize, represent, and interpret data on a single count or measurement variable.
- Summarize, represent, and interpret data on two categorical and quantitative variables.
- Interpret linear models

Making Inferences and Justifying Conclusions

- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

Conditional Probability and the Rules of Probability

- Understand independence and conditional probability and use them to interpret data.
- Use the rules of probability to compute probabilities of compound events in a uniform probability model.

Use Probability to Make Decisions

- Calculate expected values and use them to solve problems.
- Use probability to evaluate outcomes of decisions.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Semesters at a Glance

Semester 1	Semester 2
1. Introduction to Statistics (3 weeks)	5. Normal Probability Distribution (4 weeks)
2. Descriptive Stats for Univarite Data (6 weeks)	6. Confidence Intervals (3 weeks)
3. Probability (4 weeks)	7. Hypothesis Testing for one sample (5 weeks)
4. Discrete Probability Distribution (3 weeks)	8. Correlation & Regression (2.5 weeks)
	9. Chi-Square Testing (2.5 weeks)
	10. Hyp Testing two samples (3 weeks-optional)
TOTAL: 16 weeks	*TOTAL: 17 weeks*

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MATHEMATICAL PRACTICES

Mathematical Practice	Explanation and Examples
MP.1 Make sense of problems and persevere in solving them.	Students correctly apply statistical concepts to real-world problems. They understand what information is useful and relevant and how to interpret the results they find.
MP.2 Reason Abstractly and quantitatively	Students understand that the outcomes in probability situations can be viewed as *random variables—that* is, functions of the outcomes of a random process, with associated probabilities attached to possible values.
MP.3 Construct viable arguments and critique the reasoning of others	Students defend their choice of a function to model data. They pay attention to the precise definitions of concepts such as *causality* and *correlation* and learn how to discern between these two concepts, becoming aware of potential abuses of statistics.
MP.4 Model with mathematics	Students apply their new mathematical understanding to real-world problems. They also discover mathematics through experimentation and by examining patterns in data from real-world contexts. Mathematical Practice Standard 4 holds a special place throughout the higher mathematics curriculum, as Modeling is considered its own conceptual category. Though the Modeling category has no specific standards listed within it, the idea of using mathematics to model the world pervades all higher mathematics courses and should hold a high place in instruction. Readers will see some standards marked with a star symbol (⋆) to indicate that they are *modeling standards*, that is, they present an opportunity for applications to real-world modeling situations more so than other standards.

MP.5 Use appropriate tools strategically	Students continue to use spreadsheets and graphing technology as aids in performing computations and representing data.
MP.6 Attend to precision	Students pay attention to approximating values when necessary. They understand margins of error and know how to apply them in statistical problems.
MP.7 Look for and make use of structure	Students make use of the normal distribution when investigating the distribution of means. They connect their understanding of theoretical probabilities and find expected values in situations involving empirical probabilities, correctly applying expected values.
MP.8 Look for and express regularity in repeated reasoning	Students observe that repeatedly finding random sample means results in a distribution that is roughly normal; they begin to understand this as a process for approximating true population means.

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