

AP Statistics

Mr. Diakoff (ddiakoff@immaculateheart.org)

Office hours: By appointment. I am available after school on most days.

Course Description: This class is an advanced level overview of the basic ideas of statistics and data analysis. It is intended to prepare students for the AP statistics exam in May. We should be able to get through the first 8 chapters of the book for the first semester.

Part I: Organizing data: Patterns and departures from patterns

Chapter 1: Exploring data (graphs and descriptive statistics)

Chapter 2: The normal distribution (shape; standard normal; z-scores)

Chapter 3: Examining relationships (scatterplots; correlation and regression)

Chapter 4: More two-variable data (transformations; extrapolation; categorical data)

Part II: Producing data

Chapter 5: Producing data (samples; experiments; simulation)

Part III: Probability: foundations of inference

Chapter 6: Probability and randomness (probability models and rules)

Chapter 7: Random variables (discrete/continuous; mean and variance)

Chapter 8: Binomial and geometric distributions (mean and variance; normal approximation of binomial)

We will then cover chapters 9-14 second semester, which will leave us some time to review before the AP test:

Part IV: Inference: conclusions with confidence

Chapter 9: Sampling distributions

Chapter 10: Confidence intervals

Chapter 11: Hypothesis testing

Chapter 12: Significance tests for means and proportions

Chapter 13: Significance tests for two means and two proportions

Chapter 14: Inference for categorical variables

Chapter 15: Inference for regression

After the AP test we will cover some additional topics (ANOVA, non-parametric statistics, etc)

Textbook & Required Material: The book for this class is The Practice of Statistics, 3rd Ed (Yates, Moore, and Starnes). There are also many good AP stats review books available; it would be good to purchase at least one of those to help you review in April before the test. We will be using the calculator (TI-83 or TI-84) extensively in this class, so make sure that you have it with you for every class period.

Course Goals & Benchmarks:

- **Advanced Placement Probability and Statistics**
 - **Benchmarks & Performance Standards**

Students completing course work in Advanced Placement Probability and Statistics will:

- Solve probability problems with finite sample spaces by using the rules for addition, multiplication, and complementation for probability distributions and understand the simplifications that arise with independent events.
- Know the definition of *conditional probability* and use it to solve for probabilities in finite sample spaces.
- Demonstrate an understanding of the notion of *discrete random variables* by using this concept to solve for the probabilities of outcomes, such as the probability of the occurrence of five or fewer heads in 14 coin tosses.
- Understand the notion of a *continuous random variable* and interpret the probability of an outcome as the area of a region under the graph of the probability density function associated with the random variable.
- Know the definition of the *mean of a discrete random variable* and can determine the mean for a particular discrete random variable.
- Know the definition of the *variance of a discrete random variable* and can determine the variance for a particular discrete random variable.

- Demonstrate an understanding of the standard distributions (normal, binomial, and exponential) and can use the distributions to solve for events in problems in which the distribution belongs to those families.
- Determine the mean and the standard deviation of a normally distributed random variable.
- Know the central limit theorem and use it to obtain approximations for probabilities in problems of finite sample spaces in which the probabilities are distributed binomially.
- Know the definitions of the *mean*, *median*, and *mode of distribution* of data and can compute each of them in particular situations.
- Compute the variance and the standard deviation of a distribution of data.
- Find the line of best fit to a given distribution of data by using least squares regression.
- Know what the *correlation coefficient of two variables* means and are familiar with the coefficient's properties.
- Organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line graphs and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.
- Be familiar with the notions of a statistic of a distribution of values, of the sampling distribution of a statistic, and of the variability of a statistic.
- Know basic facts concerning the relation between the mean and the standard deviation of a sampling distribution and the mean and the standard deviation of the population distribution.
- Determine confidence intervals for a simple random sample from a normal distribution of data and determine the sample size required for a desired margin of error.
- Determine the P-value for a statistic for a simple random sample from a normal distribution.

- Be familiar with the *chi*-square distribution and *chi*-square test and understand their uses.

Grading policy: Your grade for the class will be (approximately) 40% chapter tests, 25% final, 20% quizzes, and 15% homework. The grading scale is the standard 90-80-70-60 scale. Homework will be assigned on a regular basis, and checked periodically.

Homework should be organized, legible, and should demonstrate that some time and effort was put into it. I will occasionally collect a homework assignment and grade it for credit; I will let you know when I want to do this. If you are absent on the day that I collect an assignment, it is your responsibility to turn it in when you return.

We will have a quiz and a test over every chapter and a final at the end of the semester. Ordinarily, if you miss a quiz or a test due to absence, you will make it up on the day that you return (I strongly prefer that tests and quizzes NOT be made up during class time, so if you miss a test or quiz, plan on coming in early or staying after school to take it the next day). However, if you are absent for several days, we can make arrangements when you get back. If you know in advance that you will be absent on the day of a quiz or a test, talk to me and we will try to work something out.

General Classroom Expectations: The school policy on absences and tardies can be found in the student handbook. If you are absent from class, it is your responsibility to get the notes and any homework assignments from that day. When you are absent, please check the website for any homework assignments and upcoming quizzes/tests. When in class, you will conduct yourself with the honor and dignity that is expected of an Immaculate Heart student. This means that, among other things, you will pay attention, not create distractions for yourself or others, and always adhere to the academic integrity code of this school.