

Salisbury University Department of Mathematical Sciences

MATH 105 : Liberal Arts Mathematics: Statistics through Baseball
Syllabus (Tentative)

Description: Study of the beauty and structure of mathematics, with emphasis on quantitative and analytical reasoning skills. Various areas of mathematics or its applications will be used as a vehicle for this study. Designed for students whose major area of study does not have specific requirements in mathematics. 4 Hours Credit: Meets 4 hours per week. Meets General Education IVB or IVC.

Prerequisites: Three years of high school mathematics including geometry or college-level intermediate algebra.

Intended Audience: Students whose major areas of study do not have specific requirements in mathematics, who want to learn elementary probability and statistics, and who have an interest in baseball.

Objective: To introduce students to mathematical modeling, computation, and statistics in the context of major league baseball.

Textbooks: *Teaching Statistics Using Baseball*, by Jim Albert; The Mathematical Association of America. 10th Edition.

Technology: Minitab (available on campus lab computers)

Topic	Weeks
An Introduction to Baseball Statistics	2
Probabilistic fundamentals: frequency- and probability-distributions. Statistical fundamentals: populations and samples, means and proportions. Baseball fundamentals: basic rules and measures of performance, and their relation to common statistical measures.	
Exploring a Single Batch of Baseball Data	2
Teams' offensive statistics: stem-and-leaf displays and the Five-Number Summary. A tribute to Derek Jeter: dotplots, time-series plots, and curve-fitting. A tribute to Randy Johnson; summary statistics and comparison of distributions. Analyzing Babe Ruth's HR per season: histograms. The use of sacrifice-bunts: comparing distributions.	
Comparing Batches and Standardization	2
"Slugging percentages are normal": normal probability distributions. Great batting averages, comparing stats from different eras, and standardized scores. Linear correlation.	
Introduction to Racial Equality in the MLB	1
Black professional baseball history, Jackie Robinson, Hank Aaron, Dick Allen, and the 2021 GA voting law and All-Star Game relocation.	
Probability Distributions and Baseball	2
Binomial distributions and hits per game: binomial probabilities, independence, expected counts, and simulation. Modeling runs scored: Negative-binomial distributions and Pearson Residuals.	
Introduction to Statistical Inference	2
Ability and performance. Simulating a batter's performance: Bernoulli Trials, Interval estimates for ability: confidence intervals; subjective probability. Fantasy Baseball.	
Topics in Statistical Inference	3
Observed situational effects for many players. Modeling batting averages for many players: normal distributions. Leverage Index and Win Probability Added basics.	
Total	14

Evaluation

Homework and class participation	40%
Midterm and Final Examinations	30%
Projects	30%

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.