

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 SYLLABUS (Tentative)
 MATH 200 *Mathematics and Culture: Statistics through Baseball*

- Objective:** In general, to introduce students to the role of mathematics in culture. Specifically in this offering, to introduce students to the concepts of probability and statistics by means of playing with baseball statistics.
- Intended for:** 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.
- Prerequisite:** Three years of high-school mathematics, including geometry, or intermediate algebra at a college (MATH 100).
- Text:** *Teaching Statistics Using Baseball*, by Jim Albert; The Mathematical Association of America, 2003.
- Reference:** A collection of statistical formulas. Examples are the books, *CliffsQuickReview Statistics*, by Voelker, Orton, and Adams (Wiley Publishing, 2001), and *A First Course in Statistics* (any edition), by McClave and Sincich (Prentice Hall).

	Weeks
<i>An Introduction to Baseball Statistics</i>	2
Mathematical preliminaries: sets and functions. Probabilistic preliminaries: frequency- and probability-distributions. Statistical preliminaries: populations and samples, physical and statistical. Baseball preliminaries: basic measures of performance, and their relation to common statistical measures.	
<i>Exploring a Single Batch of Baseball Data</i>	2
Teams' offensive statistics: stem-and-leaf displays and the Five-Number Summary. A tribute to Cal Ripken: dotplots, time-series plots, and curve-fitting. A tribute to Roger Clemens: summary statistics and comparison of distributions. Analyzing baseball attendance: histograms. The use of sacrifice-bunts: more comparing of distributions.	
<i>Comparing Batches and Standardization</i>	1
"Slugging percentages are normal": normal probability distributions. Great batting averages and standardized scores.	
<i>Introduction to Probability Using Tabletop Games</i>	2
"What is Barry Bonds's home-run probability?": the relative-frequency interpretation of probability and the Law of Large Numbers. Big-league baseball: sample spaces, equiprobable outcomes. All-Star baseball: probability as area, multinomial experiments. Strat-O-Matic Baseball: theorems of probability; conditional probability.	
<i>Probability Distributions and Baseball</i>	2
Binomial distributions and hits per game: binomial probabilities, independence, expected counts, and simulation. Modeling runs scored: Negative-binomial distributions and Pearson Residuals.	
<i>Introduction to Statistical Inference</i>	2
Ability and performance. Simulating a batter's performance: Bernoulli Trials, Bayes's Rule. Interval-estimates for ability: confidence-intervals; subjective probability. Comparing Wade Boggs and Tony Gwynn: confidence-interval estimates for proportions, time-series plots.	
<i>Topics in Statistical Inference</i>	2
Observed situational effects for many players. Modeling batting averages for many players: Normal distributions.	
<i>Optional topics, as time permits</i>	<u>1</u>
Relationships between sets of measurements. A new measure of offensive performance. "Are batting slumps inevitable?" "Are seven-game playoff series fairer than five-game ones?"	

EVALUATION

Homework and class-participation	25 - 40%
Test 1	0 - 20%
Test 2	0 - 20%
Project	0 - 20%
Final examination	15 - 30%