

MATH 150 MATH AND BASEBALL FALL 2013 SYLLABUS

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Office Hours: MWF 9 - 9:50, TR 9:30 - 11:30, or by appointment.

Text: *Practicing Sabermetrics* by Gabriel Costa, *The Physics of Baseball* by Robert Adair, *Moneyball* by Michael Lewis, and *The Bill James Handbook* by Bill James. You will need a graphing calculator, like the TI-83 or 84.

Goals: This course satisfies General Education Goal 5, which is an understanding of mathematical thought and the ability to conceptualize and apply mathematical logic to problem solving; (three credits at a commonly agreed upon skills level comparable to college algebra).

Outcomes: The Outcomes of General Education Goal 5 are that the students will

- Understand how mathematical and/or statistical models can be used to study real-world situations
- Understand the limitations of and assumptions behind typical mathematical models
- Use mathematical and statistical analysis to interpret such models by testing hypotheses, making predictions, drawing conclusions, checking results for plausibility, and finding optimal results
- Understand when technology might be helpful in mathematical or statistical analysis and apply technology when appropriate

Objectives:

- The student will be able to explain in some depth the historic background involved in using mathematics in baseball. In particular, they will be able to discuss the Bill James abstracts and their effects on the game.
- The student will be able to solve algebraic problems involving means in standard deviations.

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- The student will be able to solve geometric problems in baseball and have a general idea of the mathematics governing velocity and motion.
- The student will be able to use Excel and the TI-Calculator to solve mathematical problems in topics such as Markov Chains.
- The student will be able to explain the advantages and disadvantages of technology in specific applications

Course Description: Math 150. *Math And* An in depth study of the practice of mathematics in a specific application area such as baseball, voting, finance, or architecture. Both algebraic and geometric applications in the chosen area will be covered. Historical topics will also be considered. 3 credits *Fulfills General Education Goal 5.

Tentative Outline:

Week	Dates	Topics Covered
1	Aug 22 - Aug 26	Introduction to the Physics needed, Adair Ch. 1 - 3
2	Aug 29 - Sept 2	Pitching and Batting, Adair Ch. 4 - 6
	Sept 5	Labor Day Holiday
3	Sept 6 - Sept 9	More Physics, Adair Chapters 7 - 8
4	Sept 12 - Sept 16	Physics Experiments
5	Sept 19 - Sept 23	Introduction to Basic Statistics, Costa Ch. 1 - 4
6	Sept 26 - Sept 30	More Descriptive Statistics, Costa Ch. 5 - 10, TEST I
7	Oct 3 - Oct 7	Presenting Descriptive Statistics and Projects
	Oct 10 - Oct 11	Fall Break
8	Oct 12 - Oct 14	WHIP and Power Quotient, Ch. 11 - 15
9	Oct 17 - Oct 21	Power and Range, Ch. 15 - 20
10	Oct 24 - Oct 28	Introduction to Regression, Ch. 21, Test II
11	Oct 31 - Nov 4	More Regression and Regression Projects
12	Nov 7 - Nov 11	One Variable Hypothesis Testing with the TI Calculator
13	Nov 14 - Nov 18	Hypothesis Testing of Baseball Statistics, and Project
14	Nov 21 - Nov 22	Test III
	Nov 23 - Nov 25	Thanksgiving Break
15	Nov 28 - Dec 2	Moneyball, History, and Review
	Final Exam	Tues. Dec. 6, 8 - 10:30 a.m.

Requirements: There will be quizzes, labs, Projects, three tests, and a final exam. Each test is worth 15%, the final is worth 15%, quizzes and homework together are worth 15%, and projects are worth 25% . You are also required to regularly read the book and check your Longwood email. Any loss of grade due to your failure to read the book or check your Longwood email is not the fault of, or a problem for, the instructor.

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Grading: Suppose your numerical grade is x . If $92 \leq x < 100$ then you get an A. If $90 \leq x < 92$ then you get an A-. If $88 \leq x < 90$ then you get a B+. If $82 \leq x < 88$ then you get a B. If $80 \leq x < 82$ then you get a B-. If $78 \leq x < 80$ then you get a C-. If $72 \leq x < 78$ then you get a C. If $70 \leq x < 72$ then you get a C-. If $68 \leq x < 70$ then you get a D+. If $62 \leq x < 68$, then you get a D. If $60 \leq x < 62$ then you get a D-. If $x < 60$ then you get an F. **Please remember that pluses and minuses now count towards your GPA.**

Tests: The tests will assume that you have come to class, done everything asked of you in class, taken all the quizzes, and done all the homework. They will also assume that you understand all that stuff. If you do not understand all that stuff, I strongly suggest you do something about it. Assuming that everything will get better on its own never works.

Quizzes: These will be brief and will be given irregularly at the beginning of class or online. These quizzes are open book, notes, and calculator, but you cannot confer with anyone else. I do not have to have taught the material in order to give you a quiz, if I ask you to read the material before class then the quiz can be based on the reading. While I will try to email you if there is an online quiz, please get in the habit of checking Blackboard regularly the day before class just in case.

Labs: Labs may be done in groups of up to four students. You may use your book, notes, calculator, computer, and the help of the instructor or anyone in your group. You may not consult with students in the other groups. Each group should only turn in one assignment, with all the names on it.

Projects Projects will be assigned every three weeks or so. Some projects will be in groups but most will be done individually. Each student will present one project over the course of the semester. If a presentation day is coming up be sure you are ready to present. Details on how each project will be graded, what or who you can use for help, and when it is due will be given.

Attendance: Is expected at all classes. Students who do not attend class always seem to **fail**. Don't let this happen to you.

Honor Code: All of your turn in work is covered by the Longwood University Honor Code. If you are caught using resources that you are not allowed to use, you will get a zero on the assignment and your name will be turned over to the Longwood University Honor Board. If you are uncertain

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what you are allowed to use on an assignment, consult with the instructor immediately.