

## Statistics, Sports, and School

2013-2014

Harvard Westlake

Instructor: William Thill

email: [wthill@hw.com](mailto:wthill@hw.com)

phone: 818-487-6538

**Purpose of the course:** In this year-long course, you will create and answer a substantive, interesting research question related to sports or sports medicine. Throughout the year, you will learn about your topic, investigate past work related to your question topic, design a plan, collect data, analyze the data, communicate your results, revise your project, and publicize your results. To help you succeed, you will study related topics in library research, sports data, sports medicine, and statistics.

### Topics in the course:

Topic	%	Rough Time Frame	Topics/goals for the unit
1: Chokes and Clutches	6%	September (q1)	Learning the statistical process, short term <i>PERFORMANCE</i> vs. long term <i>ABILITY</i> , exploring research topics
2. Sports Advantages	7%	September (q1)	Understanding Null/ Alternate Hypotheses, interpreting p-values, fundamentals of an experiment, extracting data from website to use for analysis
3. Research part 1: developing a question	7%	Sept/ Oct (q1)	Read/ understand components of a research study, using research databases, citing references appropriately, discover hot topics in sports analytics, sports research.
4. Exploratory Data analysis:	7%	October (q2)	Display quantitative data with appropriate graphs/ summary statistics, understand properties of measures of center/ spread, Creating an effective visual presentation with data management and statistical tools
5. Detecting statistical significance in experiments	8%	Nov/Dec (q2)	Construct hypothesis tests via simulation; understand random assignment, double blindness. Making appropriate conclusions from studies, the benefits of paired designs.
6. Research, Part 2: Finding a question, Research plan development	13%	Dec/Jan (q2)	Constructing a precise research question. Construct a detailed background, review of past research, design for the study, and references. Provide researchers constructive feedback, and respond effectively to peer feedback.
7. Research part 3: Implementing the plan, data analysis	14%	Jan/ Feb (q3)	Implementing the research project according to protocol. Revising existing design after receiving feedback. Organize your work so others may contribute/ give feedback. Choose an appropriate method for analyzing data, and summarize the results of the analysis. Construct a first draft of the project.
8.* <sup>1</sup> Using the Standard Deviation	9%	Feb / March (q3)	Understand / use sophisticated measures of spread (MAD, SD). Use standardized scores to compare disparate groups. Understand/ apply normal models when appropriate. Interpret/ construct 95% confidence intervals via formula and bootstrap methods.
9* Scatterplots, Modeling Relationships	8%	March (q3)	Interpret construct scatterplots and linear models. Use correlation coefficients and the SD of the residuals to assess strength of a linear model. Recognize and avoid misconceptions related to the "regression to the mean" effect in sports contexts.
10.* Advanced Modeling techniques	6%	March/April (q3/q4)	Construct multiple predictor models with technology, Non-linear models, logistic models
11. Research, part 4: Completing and Sharing your research	15%	April /May (q4)	Construct, edit, and proofread a final draft of research project. Present your work to a non-expert audience using appropriate presentation methods (blogging, video, poster, presentation, activity). Connect with stakeholders at HW and beyond to impact the larger community.

<sup>1</sup> Topics with an asterisk (\*) will be prioritized and sequenced to create as much overlap with student projects developed in the first semester. Other topics may be substituted to support student research.

**How will I be graded?** Each assignment will be given a point value, a set of expectations, and criterion for earning full/ partial points. While promptness in submitting assignments is expected / valued in the grade, revisions/ improvement are also important. For this reason, *most assignments can be re-submitted for a higher grade if substantial improvements are made.* A detailed breakdown of each proposed assignment, point value, and rubric will be provided to students.

Rough division: Research Tasks: 50% Statistical Tasks: 50%

Types of Minor Assignments (somewhere between 2-8 points each, typically):

- Completing individual versions of HW assignments, class notes.
- Contributing to class notes/homework examples on a collaborative Google Doc. This will be a shared responsibility for the class, distributed to all members of the class.
- Completing class homework assignments, and sharing on the collaborative class document.
- Show/ Tell / Present: share research progress, updating the class blog, participate in class discussions, etc. This will be especially important when we have special guests visiting the course
- Connecting with project mentors: Emails/ meetings / follow-through with your professional mentor.

More Major Assignments (8 points or more, depending on its importance):

- Unit Investigations: A presentation/ poster / analysis that demonstrates mastery of statistical topics. Rubrics provided.
- Research Progress Tasks (bigger point totals):
  - Unit 3: Research topic summary, literature review (q1)
  - Unit 6: Research question and review of literature, data collection plan (q2)
  - Unit 7: Project implementation and draft (q3)
  - Unit 11: Final Draft, presentation (q4)

**Materials for the course: Every Day, you should bring:**

- LAPTOP with internet access
- Access to textbook: *Statistical Reasoning in Sports*. You should have received an access card for the course, which gives you access to the e-book and Student resources online. Real or online book just fine.
- Course binder (notes, paper, syllabus, existing work)

**My Schedule (unavailable in shaded areas):**

	Day 1	Day 2	Day 3	Day 4	Day 5
1st	APSTAT		APSTAT	APSTAT	APSTAT
2nd	APSTAT				
3rd	Precalc	Precalc	Precalc	Precalc	
4th	Precalc	Precalc	Precalc	MEETING	Precalc
5th	SSS	SSS		SSS	
6th	Lunch	SSS	Lunch	Lunch	Lunch
7th		APSTAT	APSTAT	APSTAT	APSTAT
8th	MEETING			APSTAT	