Short Syllabus s22

STATS 8 short syllabus - spring 2022

This is meant to help students select their classes. A full syllabus will be available with the rest of the Canvas course shortly before classes start.

This course has a **hybrid format**, with some asynchronous video material plus one weekly live discussion (Wed) and one weekly live lecture (Thu). Both the lecture and the discussion are scheduled to be held in-person.

Class objectives

Objectives

My objective is to provide both an understanding of, and hands-on experience with basic, data-centric statistics. This class is similar to a regular statistics class except that we focus the application of statistics on examples of actual studies from a wide array of biological interests: from biomedical studies and pharmacology, to ecology, genetics, physiology and related socio-economic questions.

By the end of this course, you should be able to analyze and present data, design observational and experimental studies, use probabilities to model and predict random events, and use inference procedures to test hypotheses and estimate population parameters to reach conclusions in context. What you learn in this class should help you understand broadly the methodology, results, and issues of studies presented in your other classes or in news stories. I also hope that you will come to appreciate statistics as a cool and really interesting subject.

GE requirement

Note that STATS 8 satisfies the **General Education requirement for Category Va, Quantitative Literacy**, with these learning outcome objectives: Students should be able to
1) Identify appropriate tools for quantitative analysis of processes or events.
2) Have a basic familiarity with fundamental principles underlying quantitative descriptions of natural or social processes.
3) Be able to do one or more of the following: evaluate studies and reports that assess risk and probability in everyday life; use models of natural phenomena to make quantitative predictions of future behavior or events; use models of economic and social structures to make quantitative predictions of future behavior or events.

Topics covered

1. Data collection: random samples, observational designs, experimental designs
2. Descriptive statistics: data organization, graphs, summaries, interpretation in context
3. Association: correlation, regression, two-way tables, association versus causation
4. Probability concepts: fundamental rules, conditional probabilities, independence
5. Probability distributions: continuous distributions, Normal distributions and computations, sampling distributions
6. Confidence interval for a population mean: one sample and matched-pairs *t* intervals
7. Hypothesis test for a population mean: one sample and matched-pairs *t* tests
8. Inference for several means: two-sample *t* interval, two-sample *t* test, one-way ANOVA
9. Inference for categorical data: confidence intervals for proportions (one- and two-sample *z* intervals), chi-square test for two-way tables (+intro to chi-square for goodness of fit)

Class organization

1. Self-paced learning: This class has a hybrid-learning format which starts with every student learning asynchronously from a set of short **interactive** videos hosted on Canvas. The interactive aspect of these videos is really important because humans do no learn particularly well just from watching (or just reading notes, for that matter).

2. Coached training: You will need opportunities to practice your new analytical skills with expert guidance. The class offers live training with your TA (in-person, Wednesday discussion) and with Dr. Baldi (in-person, Thursday lecture). Because live participation is vastly preferable for learning, work done during lecture will be used for participation points (iClicker app, free with Achieve).

> *To offer flexibility and facilitate attendance, students will be allowed to attend any one of the 4 discussion times listed on WebSOC for Stats 8, regardless of their official enrollment times. [If some sessions become too full, we may place some reasonable limits to this.]*

3. Self-paced practice: Each topic has assignments to help you solidify your skills with repeated practice. This is also a good time to complement your learning with the textbook explanations and examples. And, of course, be sure to seek help during Dr. Baldi's or the TAs' live office hours on Zoom, or asynchronously on the Ed Discussion help forum.