Short syllabus

STATS 8 preliminary short syllabus - spring 2021

This is meant to help students decide whether the course fits their schedule and academic needs. A full syllabus will be available with the rest of the Canvas course shortly before the quarter starts.

The course aims to strike a balance in accommodating the particular challenges of school-wide remote learning. Except for exams (details soon), live attendance will not be mandatory for this course in spring 2021. However, live Zoom discussions (also recorded) and Zoom office hours will also be available.

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 the following 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, numerical 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, sampling distributions
6. Confidence interval for a population mean: one sample and matched-pairs
7. Hypothesis test for a population mean: one sample and matched-pairs
8. Inference for several means: two-sample t interval, two-sample t test, analysis of variance
9. Inference for categorical data: chi-square test for two-way tables and for goodness of fit, confidence interval for a population proportion

Class organization

1. Self-paced learning: This class has a remote-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.

2. Coached training: You will need opportunities to practice your new analytical skills with expert guidance. The class offers live training with your TA (one weekly Zoom discussion section). While live attendance is vastly preferable for learning, it may not be practical for everyone in these exceptional times. For this reason, attendance to the live events will not be mandatory (and not graded). If you must miss a discussion, know that an edited recording will be posted to Canvas within 24 hours of the Zoom event.

3. Review and 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 to seek help either live on Zoom during the instructor's or the TAs' office hours or asynchronously on the Canvas help forum.