

statistics + you (the neurobiology research student)

a brief, unofficial guide to Harvard stats courses you might find useful,
if not downright fascinating

by Judy Fan '10

Why bother?

So you've heard that taking a Stats class while you're here is a good idea: for your research, for your math requirement, or perhaps to attract potential mates. Sure, that's all plausible enough, but this page you're holding hopes to revitalize that stale bit of academic advice. Here you'll find a few tips from a fellow Neurobiology concentrator on how to choose from among the Statistics department's many course offerings in such a way that is most appropriate to your individual needs: whether you're wondering what on earth a p-value *really* means, or you've been running Markov chain Monte Carlo simulations in your spare time for years. Immediate benefits include being a better reader: as you wade through primary scientific literature that is increasingly saturated with statistical jargon and baffling computational techniques, you'll be better equipped to provide incisive and informed criticism of experimental findings that you might have otherwise have had to simply take for granted. Learning the tools to think *critically* about statistical methods will be an invaluable asset to you as your research develops, and I can guarantee that statistical reasoning is so much cooler (and more fun) than just recognizing how to plug-and-chug your data into some mythical one-size-fits-all t-test.

Where to start...

The three Stat 100-level flavors.

- Stat 100. 'Social sciences and Humanities'
- Stat 101. 'Psychology and behavioral sciences'
- Stat 104. 'Economics'

These are all great places to start whether you took Stats AP in high school or you've never heard of a probability distribution. Despite the differences in course title, they'll all offer you the same menu of introductory concepts and tools – with superficial differences in which fields of application will be discussed. 100 and 104 have been offered for a number of years, and are quite comparable, though 104 is slightly faster-paced and just a touch more Econ-flavored, though both courses cover examples from a variety of fields. 101 is a newer course aiming to draw psychologists and behavioral scientists, though really all three will provide a decent, broad introduction to stats. It might be a good idea to shop a couple of these to see which professor's lecture style is the best fit for you.

The next step...

Building a theoretical foundation...

- Stat 110: Introduction to Probability (a.k.a. Why Joe Blitzstein is Amazing)
- Stat 111: Introduction to Theoretical Statistics

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So you're hooked on Stats. Or you've heard dynamite reviews of Stat 110 (well-deserved). What's next? For a more theoretically motivated (yes that means more Greek, fewer numbers to crunch) introduction to probability and statistics, I would highly recommend the 110 + 111 yearlong course combo. The material is interesting, provocative, sticks to the ribs, but can be quite challenging. Strong-ish math backgrounds are helpful, but you don't have to be a 55-whiz kid to get a *lot* out of these courses, I promise! These courses are unlikely to present immediate rewards in the analysis of your own data, but they will give you a solid theoretical context for some of the tools you might have only learned on faith/by rote in Stat 100/101/104.

Mo' Stats, plz!

- Stat 115: Intro to Computational Biology and Bioinformatics
A nice mixture of biology, statistics, and computing. Great if you have an interest in how genomic information is handled. Stat 110 and 111 not required.
- Stat 139/149: Linear Modeling and Generalized Linear Modeling
These intro to modeling provides a little dose of why people sometimes say that Statistics is an Art. You'll learn many useful analytical tools for your research (much multiple regression in 139), some powerful computing software (R), and a satisfying big-picture appreciation of how we wield Statistics to help us identify and explain patterns in the world. Stat 110 recommended, but not required.
- Stat 171: Introduction to Stochastic Processes
Since Markov chains and branching processes are becoming popular ways of conceptualizing biological processes, this is a wonderful follow-up to 110 (111 not required).

Additional advising resources

The Stat Department is a notoriously friendly and cozy bunch. If you have any more questions, or want to speak to a live person, don't hesitate to get in touch.

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