

# On Beyond Stat 401

## Specialized areas and courses

Sampling design & analysis (Stat 422)

surveys— sociology, poly sci, nat resources,  
marketing, ...

sampling— sciences, social sciences

Experimental design (Stat 507)

agriculture, life sciences, engineering, experimental  
psych, education research

Regression (Stat 525 or Stat 510)

Multivariate analysis (Stat 524)

more than 1 dependent variable measured from each  
subject (ex. height, weight): ecological sciences,  
agricultural sciences, psychology, etc.

Categorical data analysis (WS Stat 520)

social sciences (!), life/ag sciences

Time series analysis (WS Stat 539)

observations dependent through time: economics (!),  
ecological sciences, climatology, engineering

Spatial statistics (Stat 428)

“geostatistics”; observations dependent through  
space: geology/mining, nat resources

Nonparametric statistics (Stat 510)

“model free” statistics that make as few assumptions  
as possible

Generalized linear & nonlinear models  
non-normal models

Quality control/management (Stat 456)  
business, engineering

Survival analysis  
biomedical/health sciences, ecological sciences,  
engineering (plus reliability theory)

Bayesian statistics

Statistical computing (Stat 540)  
many recent statistical techniques are computationally  
intensive: generalized linear models,  
bootstrapping, Bayesian statistics, etc

## **Gaining better understanding of statistics**

It is an unfortunate fact that one's understanding of statistics does not and cannot improve from taking “methods” classes. In methods classes, the secrets of statistics are concealed:

The problem: statistics is a *post-calculus* topic. “Methods” courses have no calculus prerequisite, and so methods courses cannot explain statistical concepts in satisfactory ways.

The scientist without calculus-based understanding of statistics:

- confused
- insecure
- lacks confidence
- whining
- avoidance

The scientist with calculus-based understanding of statistics:

confident

powerful

secure

reads stat books like reading a newspaper

has a major professor too scared to ask

questions at thesis defense

employed (!)

The secrets of statistics are revealed in:

Math 170, followed by Math 175 (not Math 160)

Stat 451, followed by Stat 452

(a course in linear/matrix algebra is helpful too)

## **Degree in statistics?**

Statistics is traditionally awards degrees at the graduate level. A handful of stat bachelor's degree programs are available in the USA (ex. NC State University)  
statistics minor at UI (through Division of Statistics)

Graduate degree programs frequently welcome/seek applicants from strong science/social science backgrounds, provided they have had a good calculus sequence. With an MS in statistics, one can work in any scientific or social science field(!). An MS in stat is an excellent complement to a Ph. D. in a research field.

MS program at UI: part of coursework can be in supporting field