

On Beyond Stat 401

Specialized areas and courses

Statistical methods for research (Stat 416)

Intro stat course at the 400 level; Stat 251 *or*
Stat 416 are prereqs for Stat 401

Statistical analysis (Stat 431, formerly Stat 401;
fall/spring)

Second semester course in statistical methods for
researchers— categorical data, analysis of variance,
multiple regression, basic experimental designs

Sampling design & analysis (Stat 422 fall)

surveys— sociology, poly sci, nat resources,
marketing, ...
sampling— sciences, social sciences

SAS Programming (Stat 426 fall)

Quality control/management (Stat 456 fall)

business, engineering

Experimental design (Stat 507 fall)

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

Nonparametric statistics (Stat 514 spring)

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

Applied regression (Stat 516 spring)

multiple regression, nonlinear regression, generalized
linear & nonlinear models
agriculture, life sciences, engineering, experimental
psych, education research

Multivariate analysis (Stat 519 spring)

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

Courses probably requiring some mathematical statistics theory

Geostatistics (Stat 428 fall)

the original name for what is now called spatial
statistics: study of dependent data in space
geology, geography, landscape ecology

Econometrics (Stat 433 fall)

Statistical models used in economics and
finance/investment (systems of regression
equations, time series)

Time series analysis (WS Stat 539)

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

Regression (Stat 550 spring)

theory as well as applications

Statistical ecology (Stat 555 spring/alt yrs)

building stochastic models of nonstandard ecological
data:

mark-recapture, aggregation, population growth,
genetics

Computer intensive statistics (Stat 565 spring)

many recent statistical techniques are computationally
intensive: generalized linear models,
bootstrapping, Bayesian statistics, etc

Genomic statistics (WS Stat 566)

many emerging and specialized techniques

Theory of linear models (WS Stat 575)

matrix-based theory of normal fixed, random, and
mixed effects models

Courses not offered at UI/WSU

Survival analysis

longitudinal data

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

Bayesian statistics

R

Data visualization

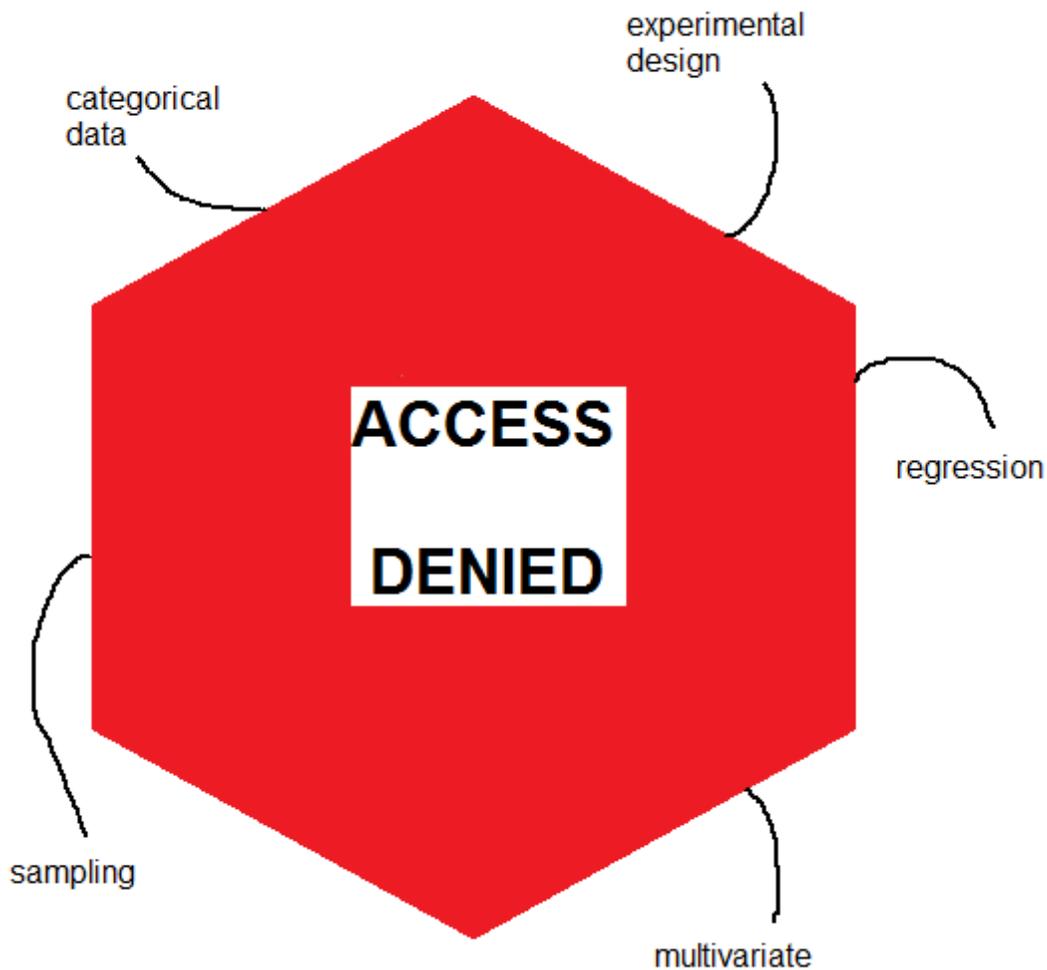
Theory of multivariate models

Data mining

Advanced mathematical statistics

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 (Probability), followed by Stat 452 (Mathematical Statistics)
- (a course in linear/matrix algebra is helpful too)

Graduate degree in statistics?

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

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 toward
degree can be in supporting sci/soc sci/tech field