RPOS 517: Quantitative Research Methods

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Course description and objectives

Welcome to RPOS/RPAD 517! Assuming little to no participant familiarity with quantitative methods—and even some trepidation toward statistics—this course provides an introduction to basic statistical methods for the social sciences, with an eye toward applications you will be likely to use in your theses and dissertations. Course participants will become better consumers of statistical methods, will acquire competence and understanding of introductory statistics and be able to apply these methods to social science problems of interest to them. The course also prepares participants for taking more advanced and specialized quantitative methods courses. Special emphasis is placed on applied data analysis.

Although the purpose of this class is to insure participants acquire a fair degree of mathematical/statistical knowledge, no prior statistical knowledge is assumed. While the course has a core of set goals, we will slow down or speed up according to participant needs. Variation in enthusiasm and ability will be respected. At the other extreme, if participants have had appropriate statistical background, we will move more quickly.

Upon successful completion of this course, participants will have acquired an understanding of:

- how quantitative methods can contribute to study social and political phenomena, make inferences about relationships, and test theories
- differences between experimental and observational data and implications for interpreting quantitative analyses
- how to describe quantitative data
- how to make inferences and test hypotheses using quantitative data
- how to identify, assess, and interpret relationships among variables
- the logic and assumptions of linear regression modeling
- diagnostics of linear regression models
- common problems in fitting linear regression models to empirical data
- criteria for building and choosing models for empirical data
- limitations of quantitative approaches to social science

Participants will acquire practical skills in:
· using software for data management, analysis, and creating presentable summaries of findings
· documenting a workflow from beginning to end
· building on a core set of skills to learn new tools and commands in other, subsequent courses

Prerequisites

The prerequisites for POS graduate students are RPOS 514 (The Discipline of Political Science) and/or, depending on individual cases, RPOS 516 (Introduction to Political Inquiry). Exceptions may be granted on an individual basis and for graduate students in programs other than POS.

Communication

We use Blackboard exclusively for communication in this course. If I have any announcements, I will make them via Blackboard. Blackboard forwards announcements to your albany.edu email address. If you have any questions for me related to the course (about assignments, being stuck with an exercise, or any other problems), please use the appropriate discussion board on our Blackboard site rather than emailing me. This is not because I do not want to respond to your emails; rather, there is a high chance that you are not the only participant with a question. Using Blackboard for asking & answering questions makes any exchanges available to the whole seminar and much more efficient.

Materials

The readings for this course are split into technical (mostly textbook) readings [T], lighter background readings [B], and applications [A] of the techniques as you will encounter them in your work as social scientists. [T] readings are required (unless otherwise noted). [B] readings are strongly recommended. You should read at least one [A] article for each week and you need to read those that are highlighted orange (i.e. required). My goal is to keep the financial cost of this course as low as possible for you. But you may find it worthwhile to purchase some of the recommended resources; in that case, consult with me first to see what might make the most sense for you.

Books

You need to have access to three books and one website for this course:


AR Fox, J. (2008). Applied Regression Analysis and Generalized Linear Models. Sage Publications, Thousand Oaks. This is a more technical textbook on regression analysis that will serve you far beyond this course. While we will not work through all 22 chapters of the book, you will be able to study them independently after you successfully complete our course. The companion website at tinyurl.com/arabook provides useful appendices, data sets, and exercises.

NS Wheelan, C. (2013). Naked Statistics: Stripping the Dread from the Data. W. W. Norton, New York, NY. This light background reading addresses many “so what” questions in a broader context. It will be useful to contextualize the methods we learn in our course.

QR Kabacoff, R. Quick-R. Available at statmethods.net. This website offers well-explained computer code to complete most, if not all, of the data analysis tasks we work on in this course.

The required books will help you successfully complete this course. The following specific recommended books will be useful if you find the required books to be too narrow and want to learn more about the math behind the concepts we discuss and the programming language we use.


Basic introduction to Statistics and R: Field, A., Miles, J., and Field, Z. (2012). Discovering Statistics Using R. SAGE Publications, Thousand Oaks. If you learn better with a lightly written textbook with many applied examples, tests, and definitions, you will like this book. It covers much of the content of our course. While it lacks the mathematical depth of the main texts for our course, it can be quite helpful as a step-by-step background reading that combines concepts and execution in R.

Econometrics in general: Greene, W. H. (2012). Econometric Analysis, Seventh Edition. Prentice Hall, Upper Saddle River, NJ. This book is a good investment if you realize you will be using quantitative methods throughout your career; it will be useful as a backup when you keep learning new methods.

There are dozens of other quantitative methods books out there, though, and I’d like you to be aware of some that you will likely find helpful if you continue using quantitative methods in your career. Come see me at office hours to chat about other books you may want to look into—I have a good number of books in my shelf that I can recommend based on your specific applications and interest.

Articles

Articles are available through the UAlbany library (http://library.albany.edu). The library website offers helpful tutorials on how to retrieve scholarly articles here: (http://library.albany.edu/usered/find/index.html). Any book chapters/excerpts not available through the library are posted on Blackboard (https://blackboard.albany.edu).

Videos

I will introduce some of the topics in this course through video recordings. You are required to watch these videos before the day to which they are assigned. Take good notes and write down any questions you have before you come to class meetings. Videos usually elaborate on ideas that are either not in the reading for a particular day or not addressed in sufficient detail in the readings. For each day, videos are linked on the course website at (jkarreth.net/rpos517.html).

Computing

We will primarily rely on R, a highly versatile open source software package. R can be downloaded for free at r-project.org. You must also download RStudio as an R interface at rstudio.com. We will go over installing R in our first meeting on January 26. Resources on using Stata will also be made available in the course for self-study for participants interested in broadening their software skills. To complete this course, you need to bring your laptop computer to every seminar meeting.

Tutorials. For each day, I provide detailed tutorials that you can access through the course website. Read these tutorials before class and work through them on your own. In the assignments, I will ask you to complete some tasks that will use the skills you encounter in these tutorials.

Reproducible computing. All work you do as a social scientist, particularly any data analysis you use to reach conclusions, needs to be reproducible. To this end, our course puts special emphasis on techniques and tools that help you create reproducible research. Using scripts and data analysis notebooks are some of these tools. If you’d like to have a closer look at resources and techniques for reproducible research, I recommend the following print books:
Online resources

The following resources will be useful for you to keep up to date on current issues in quantitative social science and data analysis:

- Stats Blogs (blog aggregator): http://www.statsblogs.com
- R Bloggers (blog aggregator): http://www.r-bloggers.com
- The Society for Political Methodology’s listserv: http://polmeth.wustl.edu/mailing.php
- The Political Methodologist: http://thepoliticalmethodologist.com

Requirements and assignments

As in every graduate seminar, you need to be prepared for each course meeting. In the schedule below, four tasks are listed for each day. The first three, read, watch, and do, need to be completed before the session. TERMS TO KNOW are for your self-assessment purposes: you should be familiar with these terms after the session. Use these terms to guide your reading, especially of the AR book. In addition, SOFTWARE SKILLS lists the data analysis steps you should be able to conduct on your own after the session.

1. Weekly assignments (20%)

You will receive short assignments before each seminar meeting that you have to complete before or during class, as indicated in the individual assignment. Specific assignments are noted under do for each week and available for download on the course website. You submit the at-home part of these assignments via Blackboard by 8pm on Sunday evenings before class. The in-class part of assignments will be collected at the end of our class meetings. For assignments involving work in R, you have to submit these assignments as RMarkdown data analysis notebooks, following the template rpos517_assignment_template.Rmd on the course website. Group work is encouraged on in-class assignments, but you need to indicate on the assignment with whom you worked on them (if applicable).

2. Two take-home midterm exams (30%)

In weeks 5 and 10, you will receive exams that I ask you to complete at home on your own. These assignments must be submitted as PDF files via Blackboard on the indicated due dates.

3. Replication project (25%)

Replicating (or more precisely, reproducing) other scholars’ work is a key element of the scientific process. To engage with quantitative social scientific studies, you will replicate (reproduce) a study of your choice or from a list of suggestions using the methods you are learning in our course. This assignment will also give you some insight on how to conduct your own data analysis. By week 4, you need to identify a scholarly article from a political science journal that uses quantitative methods (from bivariate associations to multiple linear regression) and for which replication data is publicly available. After you send me the article, you will complete the following steps and turn in your final replication project by the beginning of class on week 12:

1. Retrieve the replication data for the article
2. Write an outline of your replication plan (template provided)
3. Write a replication script
4. Conduct the replication analysis of the main model in the article
5. Complete a replication memo, summarizing your findings (template provided)

4. Research plan (15%)

To facilitate your use of the methods learned in this course, you will compose a research plan that will help you write a publishable paper. This research plan is also similar to the type of document you would submit to pre-register a study at a journal. See issue 1, volume 21 of Political Analysis and the call for proposals for a forthcoming of Comparative Political Studies for details on pre-registrations. Your document needs to contain a summary of your research question, preliminary answer(s), research design, and a data analysis plan. You will submit this document (no more than 7 single-spaced pages) to me on May 6. I will then send the document to a randomly assigned colleague for review.

5. Review of a colleague’s research plan (10%)

Reviewing others’ work (e.g., journal articles, grants, or commissioned studies) will be an important part of your work as a scholar or professional. To prepare you for this and to practice your use of statistical methods, you will provide constructive feedback to a colleague’s research plan. Between May 6 and May 13, you will produce a 2-page review of a randomly assigned colleague’s research plan. I will provide guidelines for this review. Your colleague will receive your review after May 13.

Grading

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>Weekly assignments</td>
<td>20 pts</td>
</tr>
<tr>
<td>Two midterm exams</td>
<td>30 pts</td>
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<tr>
<td>Replication project</td>
<td>25 pts</td>
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<tr>
<td>Research plan</td>
<td>15 pts</td>
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<tr>
<td>Review</td>
<td>10 pts</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100 pts</strong></td>
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</tbody>
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Grading Scale:

- **A** 100 - 93
- **A-** 92.99 - 90
- **B+** 89.99 - 87
- **B** 86.99 - 83
- **B-** 82.99 - 80
- **C+** 79.99 - 77
- **C** 76.99 - 73
- **C-** 72.99 - 70
- **D** 69.99 - 60
- **E** 59.99 - 0

Class policies

**Attendance.** Success in this course will heavily depend on students’ engagement with the course materials. All students are expected to attend all classes and to complete all required readings and assignments when due.

**Disability accommodations.** Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and psychiatric disabilities. If you believe you have a disability requiring accommodation in this class, please notify the Director of the Disability Resource Center (Business Administration Building Room 120, 442-5490). That office will provide the course instructor with verification of your disability, and will recommend appropriate accommodations. If you wish to discuss academic accommodations for this course, please also inform me as soon as possible. While I will make every effort to accommodate valid requests, students should not expect that, if they do poorly on an exam or other assignment, to claim, at that time, the need of an accommodation. This statement is to preclude that problem, and allow people with a need for accommodations to be treated fairly and appropriately.
Religious observance. I will also make every effort to accommodate religious observances and obligations. You are asked to bring any possible conflicts to my attention as soon as possible. Students should not expect that, if they do poorly on an exam or other assignment, to claim, at that time, the need of an accommodation. This statement is to preclude that problem, and allow people with a need for accommodations to be treated fairly and appropriately.

Academic honesty. All students of the University at Albany are responsible for knowing and adhering to the academic integrity policy of our institution. Please familiarize yourself with this policy at ⟨http://www.albany.edu/undergraduate_bulletin/regulations.html⟩. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. The policy also precludes submitting material that was previously submitted in another course. If you are involved in plagiarism, the penalty will be failure in the course and you will be reported to judicial affairs. In this one regard there are no second chances. If you are not sure if something violates standards—ask. If you are not sure whether to cite or not to cite—cite. Every student must complete the following tutorial: ⟨http://library.albany.edu/usered/plagiarism/index.html⟩.
Schedule

This syllabus is a general outline for the class and may be modified as the course progresses. I will notify you via email of any changes. The latest version of the syllabus is always posted at http://www.jkarreth.net/rpos517.html. All videos, assignments, and other materials mentioned in the syllabus are posted on that site.

Day 1 (January 26)

Research design. Questions and models. Experimental vs observational data. Using your computer as a scientific workstation.

READ:


B: NS ch. 1


WATCH:

· Video: Welcome!
· Video: Questions & models
· Video: Computing

DO:

· At home: Make sure your computer has Microsoft Word or Libre Office installed.
· At home: Download and install R
· At home: Download and install RStudio
· At home: Download and install \LaTeX{} following the instructions under “Installation” at jkarreth.net/latex.html.
· At home: Read pp. 1–8 of the tutorial Intro to R
· Bring your laptop to class.
· Bring a hard copy of your research design assignment from RPOS 516 (if you took that seminar).
· In class: Work through pp. 9–13 of the tutorial Intro to R

TERMS TO KNOW:

· Causality
· Observational data
· Experimental data
· Treatment effect
· Console
· Object-based language
· Comment
· Script
· Dataset
· RMarkdown
· Package/library in R
· RStudio project

SOFTWARE SKILLS:

· Install R and RStudio
· Install and load packages in R
· Open, edit, and save an R script file
· Begin a project in RStudio
· Open and compile a template for an RMarkdown data analysis notebook in R
Day 2 (February 2)

Working with data. Descriptive & univariate statistics.

READ:

T: OI sections 1.6, 1.7, 1.8
B: NS chs. 2 & 3
A: RC ch. 2 [Blackboard]

WATCH:

• Videos: Working with Data & Descriptive and Univariate Statistics

DO:

• At home: Read the tutorial Intro to Data
• At home & in class: Complete the tasks listed in Assignments Day 2

TERMS TO KNOW:

• Data set/matrix/frame
• Vector
• Summary statistic
• Observation/case
• Variable (continuous, categorical, ordinal)
• Association
• Independence
• Population
• Sample
• Bias
• Explanatory variable
• Response variable
• Confounding variable
• Experimental design
• Scatterplot
• Mean vs. median
• Histogram
• Density
• Skew
• Modality
• Variance
• Standard deviation
• Quartiles
• Column & row proportion
• Bar plot
• Box plot
• Simulation

SOFTWARE SKILLS:

• Open a dataset in Excel/Open Office/Google Drive
• Import a dataset into R
• Summarize variables and datasets
• Create a well-designed, editable document with descriptive statistics and graphs
Day 3 (February 9)

Probability & distributions.

READ:

   T: OI ch. 3 (alternative advanced reading: MC chs. 9–11)
   B: NS ch. 5

WATCH:

   · Videos: Probability & Distributions

DO:

   · At home: Read the tutorial Probability & Distributions
   · At home & in class: Complete the tasks listed in Assignments Day 3

TERMS TO KNOW:

   · Probability of an outcome
   · Law of large numbers
   · Conditional probability
   · Bayes’ theorem
   · Expected value
   · Normal distribution
   · Parameters of a distribution
   · Z-Score
   · Percentiles
   · Normal probability table
   · 68–95–99.7 rule
   · Independent and identically distributed (iid)

SOFTWARE SKILLS:

   · Plot a distribution with histograms, density plots, and normal probability (“QQ”) plots
   · Sample data from a distribution
   · Document and organize code
Day 4 (February 16)

Inference & hypothesis testing.

READ:

T: OI sections 4.5 and 4.6 (and the rest of ch. 4 as needed after watching the videos)

B: NS chs. 8 & 9


WATCH:

· Videos: Inference & hypothesis testing

DO:

· At home: Read the tutorial Inference & hypothesis testing

· At home & in class: Complete the tasks listed in Assignments Day 4

· Before noon: Via the link provided on Blackboard, sign up for an article you have chosen to replicate.

· By 5pm on Wednesday (February 18): email me the replication data for your chosen article as a .csv file.

TERMS TO KNOW:

· Population mean

· Sample mean

· Point estimate

· Sampling variation

· Population parameter

· Sampling distribution

· Standard error of an estimate

· Confidence interval

· Central limit theorem

· Margin of error

· Null hypothesis

· Alternative hypothesis

· Type 1 error

· Type 2 error

· p-value

· One-sided and two-sided hypothesis tests

· Unbiased estimate

· Statistical versus practical/substantive significance

SOFTWARE SKILLS:

· Sample from a distribution

· Calculate and plot confidence around a mean
Day 5 (February 23)

Associations between variables.

READ:

T: OI chs. 5 & 6

DO:

- **At home**: Read the tutorial *Associations between variables*
- **At home & in class**: Complete the tasks listed in *Assignments Day 5*
- **Before noon**: Email me an outline of your replication plan
- **Exam**: Pick up midterm exam on Monday and submit to my mailbox by 5pm on Friday (February 27)

TERMS TO KNOW:

- Difference of means test
- Central Limit Theorem for normal data
- Degrees of freedom
- t-distribution
- Two sample (Student's) t-test
- ANOVA and F-test
- Degrees of freedom
- Hypothesis test for a proportion
- chi-square distribution
- chi-square test statistic

SOFTWARE SKILLS:

- Conduct and present a difference-of-means test
- Conduct and present a test for differences in two proportions
Day 6 (March 2)

Bivariate regression.

READ:

- **T:** AR ch. 5.1 & 6.1
- **T:** OI ch. 7 (recommended).
- **B:** NS ch. 11

WATCH:

- Video: Intro to Regression

DO:

- **At home:** Read the tutorial Intro to Regression
- **At home & in class:** Complete the tasks listed in Assignments Day 6

TERMS TO KNOW:

- Explanatory variable
- Response variable
- Residuals
- Correlation coefficient
- Intercept
- Slope coefficient
- Least-squares fit
- \( y_i = \alpha + \beta X_i + \varepsilon_i \)
- \( \hat{y} \)
- Least-squares coefficient
- Regression sum of squares
- Total sum of squares
- Residual sum of squares
- Linearity (A1)
- Constant variance (A2)
- Normality of the errors (A3)
- Independence of observations (A4)
- Fixed X (A5)
- Linear estimator (P1)
- Unbiased estimator (P2)
- Efficient estimator (P3)
- Gauss-Markov theorem
- Normal distribution of \( \alpha \) and \( \beta \)
- Standard error of \( \beta \)

SOFTWARE SKILLS:

- Create a scatterplot of two variables with a line of best fit
- Calculate the correlation coefficient of two variables
- Estimate a linear regression model with one predictor
- Create a residual plot
- Summarize and present regression results in a well-designed document
Day 7 (March 9)

Review.
Data management.

READ:


DO:

- **At home**: Read the tutorial Data management
- **At home & in class**: Complete the tasks listed in Assignments Day 7

TERMS TO KNOW:

- Data set/matrix/frame
- Filtering/subsetting
- Transforming
- Aggregating
- Sorting
- Summarizing

SOFTWARE SKILLS:

- Import datasets from different sources into R
- Clean a dataset for data analysis
- Merge two datasets with a common identifier
- Collapse a dataset
Day 8 (March 23)

Multiple regression.

READ:

T: AR ch. 5.2 & 6.2

DO:

- **At home**: Begin outlining your project proposal.
- **At home**: Read the tutorial [*Multiple Regression*](#).
- **At home & in class**: Complete the tasks listed in *Assignments Day 8*

TERMS TO KNOW:

- Partial coefficient
- “Holding a value constant”
- Standard error of the regression
- Squared multiple correlation $R^2$
- Standardized regression coefficient
- Omnibus F-test
- Collinearity
- Descriptive and causal interpretation of $\beta$

SOFTWARE SKILLS:

- Estimate a regression model with multiple predictors
- Present regression results graphically
- Calculate standardized regression coefficients
- Conduct an F-test
**Day 9 (March 30)**

Dealing with unusual & influential data.

**READ:**

**T:** AR ch. 11


**DO:**

- Before noon: Email me your replication script.
- At home: Begin conducting your replication analysis.
- At home: Read the tutorial *Regression Diagnostics I*
- At home & in class: Complete the tasks listed in *Assignments Day 9*

**TERMS TO KNOW:**

- Outlier
- Leverage
- Influence
- Hat-values
- Studentized residuals
- Cook's D statistic

**SOFTWARE SKILLS:**

- Diagnose outliers
- Assess outliers, leverage, and influence in one combined plot
- Create added-variable plots
Day 10 (April 6)

Diagnosing and dealing violations of the OLS assumptions, including endogeneity.

READ:

T: AR chs. 12 & 13
B: NS ch. 12

DO:

- **At home:** Read the tutorial *Regression Diagnostics II*
- **At home & in class:** Complete the tasks listed in *Assignments Day 10*
- **Exam:** Pick up midterm exam on Monday and submit to my mailbox by 5pm on Friday (April 10)

TERMS TO KNOW:

- Non-normally distributed errors
- White’s robust standard error
- Variance inflation factor
- Nonconstant error variance (heteroskedasticity)
- Nonlinearity
- Collinearity
- Limitations of “fixes” to collinearity

SOFTWARE SKILLS:

- Conduct numerical and graphical checks for violations of the OLS assumptions
- Create component-plus-residual plots
- Transform variables
- Calculate variance inflation factors
- Calculate “robust” standard errors for a regression model
Day 11 (April 13)

Moderating relationships: interaction terms.

READ:

T: AR ch. 7

WATCH:

- Video: Interaction terms

DO:

- At home: Create your replication table and/or graph and write your replication memo.
- At home: Read the tutorial Interaction terms
- At home & in class: Complete the tasks listed in Assignments Day 11

TERMS TO KNOW:

- Dummy variable
- Dichotomous factor
- Polytomous factor
- Interaction term
- Constitutive terms
- Principle of marginality
- Centering variables
- Marginal effects
- Centering variables

SOFTWARE SKILLS:

- Estimate linear regressions with interaction terms
- Present and interpret interaction terms numerically and graphically
- Create marginal effects plots for interactions
**Day 12 (April 20)**


**READ:**

**T:** AR chs. 13 & 22  

**B:** NS ch. 12


**DO:**

- Submit your replication memo via email by noon.
- At home & in class: Complete the tasks listed in *Assignments Day 12*

**TERMS TO KNOW:**

- Adjusted $R^2$  
- Problems with criteria for model selection  
- Model validation  
- Training and validation samples  
- Fake-data simulation  
- Loop

**SOFTWARE SKILLS:**

- Simulate predicted data from a regression model  
- Compare simulated and observed data  
- Assess model fit with numerical and graphical methods  
- Transform variables  
- Write a loop in R
Day 13 (April 27)

Generalized linear models.

**READ:**

**T:** AR chs. 14 & 15  
**A:** Bell, M. S. and Miller, N. L. (2015). Questioning the Effect of Nuclear Weapons on Conflict. *Journal of Conflict Resolution*, Forthcoming

**WATCH:**

- Video: Generalized linear models

**DO:**

- **At home:** Finish your project proposal.  
- **At home & in class:** Complete the tasks listed in Assignments Day 13

**TERMS TO KNOW:**

- Categorical response variables  
- Dichotomous response variables  
- Linear probability model  
- Probability of the response ($\pi$)  
- Linear predictor  
- Transformations: logit and probit  
- Unobserved/latent variable formulation  
- $\frac{\exp(X\beta)}{1+\exp(X\beta)}$  
- Maximum likelihood estimation  
- Deviance  
- Log-likelihood  
- Separation/separability  
- Ordered logit and probit  
- Multinomial logit

**SOFTWARE SKILLS:**

- Estimate generalized linear models using maximum likelihood  
- Present estimates using predicted outcomes (probabilities)  
- Diagnose problems with generalized linear models
Day 14 (May 4)

Returning to where we started: regression and causality.
Issues and problems in applied quantitative research.
Preview of advanced methods (based on student interests & project plans).

READ:


DO:

- Email your project proposal to me by 5pm on May 6.
- Look for a proposal to review in your inbox on May 7.
- Review the proposal I send you and email me the review by 5pm on May 13.

TERMS TO KNOW:

- Publication bias
- File-drawer problem
- Garbage-can model
- Explanation and prediction
- Reanalysis
- “Cult of Stars and P-Values”
- Statistical and experimental controls
- Randomized trial
- Pre-registration

SOFTWARE SKILLS:

- Splitting a sample in subsets
- Transporting your new R skills to other software packages
Acknowledgments

This course is influenced by and benefiting from syllabi and materials from (in no particular order) Sally Friedman, Dave Armstrong, Sara Mitchell, Jennifer Wolak, Ryan Bakker, Ann Kryzanek, Tim McDaniel, Chris Zorn, and Catherine de Vries.

Disclaimer

Last updated: January 20, 2015. This syllabus is a general outline for the class and may be modified as the course progresses. I will notify you via email of any changes.

The latest version of the syllabus is always posted at http://www.jkarreth.net/rpos517.html.