

# PSYCH 790 : Fall 2019

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Location TBA

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KU BlackBoard: <http://courseware.ku.edu>. Has copies of some reading assignments, old tests.

Course Webpage <http://pj.freefaculty.org/stat>

1. Lectures & Guides, topically organized: <http://pj.freefaculty.org/guides>.

**CAUTION:** I'll be updating the lectures as we go through the semester, usually the night before class.

My lectures are in a Git repository that you could track. If you are a Git user, ask me for an address and I'll fix you up.

2. R support page. <http://pj.freefaculty.org/R>. That also has WorkingExamples.
3. L<sup>A</sup>T<sub>E</sub>X document Preparation. <http://pj.freefaculty.org/latex>.

## Textbooks

At the bookstore:

Cohen, Jacob, Cohen, Patricia, West, Stephen G. West and Leona S. Aiken. 2003. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, 3ed

In Blackboard folder "Course\_Documents/Readings" you'll find chapters

Johnson, Paul. *Stuff Worth Knowing*. Newest edition always available in the KU Blackboard system.

**Prerequisites:** One semester of statistics and/or research design. Algebra is vital and will be used regularly.

## Grades

Tests: Midterm Exam: 2 x 25%

Final Exam: 30%

Homework Exercises: 20%

## Please Use the Blackboard Forum! Don't Ask For Help In Private Emails.

We have a "forum". Ask questions there. Michael or PJ will answer.

If you are asking an R question, include

1. Output from R command "sessionInfo()".
2. R code to reproduce the problem you are seeing.

## Computer Tips

1. Keep your exercises projects organized into separate folders. BE HIERARCHICAL.

```
psyc790/  
  assign_1  
  assign_2  
  pj-lectures
```

**Keep It Separated** so that, all of the data and code stays together. To exchange same information to others, you can simply “zip” and send a folder.

2. Never put blank spaces in file names or directory names. Also don't use symbols like ! \* & or [ ]

## Conduct

Students are expected to comply with University codes, policies, laws, and guidelines. Information on academic misconduct is available at the following address: <http://www.studenthandbook.ku.edu/codes.shtml#Academic%20Misconduct>. The work that students submit must be their own work. We recognize the fact that people do study together and exchange ideas, but, at the end of the day, each student is responsible for doing her/his own work.

## Preserving Flexibility

This syllabus is not a binding contract. Dates may be adjusted, material may be altered. All changes will be announced in class.

## Schedule of Readings

1. Aug 26. Welcome, Howdy, Install your software and get going.
  - (a) Install R. That's pretty easy on all platforms. We uploaded installation guides for Windows and Mac on <http://crmda.ku.edu/setup>. You also need a good Editor. The easiest install is “RStudio”, but that's so horribly restrictive I hate to encourage it. I still think Emacs is the best.
  - (b) Think about document preparation. Are you stuck with MS Word? Want to try L<sup>A</sup>T<sub>E</sub>X or Markdown? Sometimes you have trouble and my only response is “Yes, you are using a bad program.” I have guides (<http://pj.freefaculty.org/latex>) and an R package stationery that will help to make sense of some of this.

### Lecture:

**stat/Regression/Overview** <http://pj.freefaculty.org/guides/stat/Regression/Overview/Regression-Overview.pdf>

2. Aug 28: R Workshop day 1

**Read:** Read something about R! In Blackboard, look for “R Introductory Guides” by Lumley, Paradis, and Owen. There are plenty of books and other websites as well.

**Lecture:** R overview. [guides/Rcourse/summerR\\_workshop](http://pj.freefaculty.org/guides/Rcourse/summerR_workshop)

3. Sept. 2: R Workshop day 2

**Read:** Run some of my examples in [R/WorkingExamples](http://pj.freefaculty.org/WorkingExamples). Make sure your results match my html files.

**Read:** Try to install the packages “rockchalk”, “kutils”, and “stationery” installed. Look at the vignettes

**Lecture:**

- (a) Project setup: As I recall, my summeR-2-1-workflow lecture was dull, so we’ll probably substitute this one I prepared for graduate student orientation:  
[Keeping a Project Together](#)
- (b) Data import [Rcourse/summeR\\_workshop/summeR-2/summeR-2-2-import](#), inspect
- (c) Time permitting: Dates in data [Date and Time Information in R](#)

4. Sept. 4: R Workshop day 3

**Read:** Practice!

**Lecture:**

- (a) Recoding [Rcourse/summeR\\_workshop/summeR-2/summeR-2-3-recoding](#)
- (b) Regression with R [summeR-2/summeR-2-4-analysis](#)

5. Sept. 9 Describing One Variable (primarily numeric variables)

**Read:** Verzani, Ch. 1 & 2

**Priorities:** histogram, kernel density, mean, median, mode, standard deviation, variance, scaling

**Lecture:** /stat/Descriptive/CentralTendencyAndDispersion <http://pj.freefaculty.org/guides/stat/Descriptive/CentralTendencyAndDispersion/CentralTendencyAndDispersion.pdf>

6. Sept. 11. R Workshop: Exploring statistical distributions

**Read:**

- (a) Paul E. Johnson, “Distribution Overview: Probability by the Seat of the Pants,” <http://pj.freefaculty.org/guides/stat/Distributions/DistributionOverview/DistributionReview.pdf> *An essay I have created just for this purpose!* Same as last chapter in *Stuff Worth Knowing*.
- (b) Browse through this: *Regress+ Compendium of Statistical Distributions* I put a copy on the Blackboard [http://www.causascientia.org/math\\_stat/Dists/Compendium.pdf](http://www.causascientia.org/math_stat/Dists/Compendium.pdf)

**Lecture:** /Rcourse/rRandomVariables

<http://pj.freefaculty.org/guides/Rcourse/rRandomVariables/rRandomVariables.pdf>

7. Sept. 16 Describing Two Variables

**Read:** 1) Verzani, Ch. 3

2) Fox, Chapter 3.2, 3.3

**Priorities:** scatterplot, barplot, boxplot, correlation

**Lecture:** /stat/Descriptive/ScatterBoxBarPlots <http://pj.freefaculty.org/guides/stat/Descriptive/ScatterBoxBarPlots>

8. Sept 18. Central Limit Theorem and Sampling Distributions

**Read:** Bowen & Weisberg, *An Introduction to Data Analysis*, Ch. 10 “Statistical Inference” (available in the Blackboard)

**Lecture:** stat/Inferential/CentralLimitTheorem <http://pj.freefaculty.org/guides/stat/Inferential/CentralLimitTheorem/CLT-lecture1.pdf>

9. Sept 23. Confidence Intervals

**Read:** Verzani, Ch. 7

**Lecture:** stat/Inferential/ConfIntervals

<http://pj.freefaculty.org/guides/stat/Inferential/ConfIntervals/ConfIntervals-lecture.pdf>

10. Sept 25. Hypothesis Testing

**Read:** Verzani, Ch. 8

**Lecture:** stat/Inferential/HypoTesting

<http://pj.freefaculty.org/guides/stat/Inferential/HypoTesting/SignifTests-lecture.pdf>

11. Sept 30. Regression: One Input Variable

**Read:**

(a) Cohen, Chapter 2.

(b) Verzani, Ch. 3.4, and Ch. 10;

(c) Wooldridge, *Introductory Econometrics*, Chapter 2. This is a VERY EXCELLENT regression introduction.

**Lecture:** stat/Regression/ElementaryOLS

<http://pj.freefaculty.org/guides/stat/Regression/ElementaryOLS/Regression-1-lecture.pdf>

12. Oct 2. Regression: Hypo testing: t tests, F test, Confidence Intervals

**Read:**

**Lecture:** stat/Regression/ElementaryOLS <http://pj.freefaculty.org/guides/stat/Regression/ElementaryOLS/Regression-2-lecture.pdf>

13. Oct 7 More Worked Examples

**Lecture:** In this folder, I so far have 3 full worked examples of elementary regression

</stat/Regression/ElementaryOLS>

Look for files named Regression-Example-1, and so forth.

14. Oct 9 Test 1

Oct 14: Fall Break

15. Oct 16 Regression: Multiple Inputs

**Read:** 1) Verzani, Ch. 11

2) Wooldridge, *Introductory Econometrics*, Ch 3 (Blackboard).

3) Fox, Ch 5.2-end, Ch 6.2-end

**Lecture:** stat/Regression/MultipleRegression <http://pj.freefaculty.org/guides/stat/Regression/MultipleRegression/Regression-MultipleInputs-lecture-1.pdf>

16. Oct 21 Regression Assumptions and Plots For Checking Them

**Read:** Cohen, Ch. 4

**Lecture:** stat/Regression/MultipleRegression <http://pj.freefaculty.org/guides/stat/Regression/MultipleRegression/Regression-MultipleInputs-lecture-3.pdf>

17. Oct 23. Topic: Multicollinearity

**Read:** Fox Ch. 13

**Lecture:** /stat/Regression/Multicollinearity

<http://pj.freefaculty.org/guides/stat/Regression/Multicollinearity/Multicollinearity-1-lecture.pdf>

18. Oct 28 Regression II: Variable Selection, Variable Importance

**Read:**

(a) Cohen, Ch. 5.5

(b) King, Gary. (1986). "How Not to Lie with Statistics: Avoiding Common Mistakes in Quantitative Political Science." *American Journal of Political Science*, 30(3), 666-687.

**Lecture:** stat/Regression/MultipleRegression <http://pj.freefaculty.org/guides/stat/Regression/MultipleRegression/Regression-MultipleInputs-lecture-2.pdf>

**Lecture:** /stat/Regression/StandardizedBeta <http://pj.freefaculty.org/guides/stat/Regression/StandardizedBeta/Standardized-1-lecture.pdf>

19. Oct 30 Categorical Predictors. From Model "frame" to "Design matrix"

**Read:** Cohen, Ch 8

Most of my lecture is my effort to understand Cohen's terminology

**Lecture:** /stat/Regression/CategoricalPredictors/lecture-1

<http://pj.freefaculty.org/guides/stat/Regression/CategoricalPredictors/>

20. Nov 4 Nonlinear Regression I

**Read:** Fox, Ch. 12.3, Fox, Ch 17

**Lecture:** /stat/Regression-Nonlinear/Nonlinear-Overview <http://pj.freefaculty.org/guides/stat/Regression-Nonlinear/Nonlinear-Overview/Nonlinear-1-Overview-lecture.pdf>

21. Nov 6 Nonlinear Regression, II

**Read:** Fox, Ch 18

**Lecture:** /stat/Regression-Nonlinear/Nonparametric-Loess-Splines <http://pj.freefaculty.org/guides/stat/Regression-Nonlinear/Nonparametric-Loess-Splines/Nonparametric-1-lecture.pdf>

22. Nov 11. Outliers and Influence Diagnostics (The Hat Matrix)

**Read:** 1) Cohen Ch. 10.1-10.5

2) Fox Ch. 11

**Lecture:** /stat/Regression/RegressionDiagnostics <http://pj.freefaculty.org/guides/stat/Regression/RegressionDiagnostics/RegDiagnostics-1-lecture.pdf>

23. Nov 13. Interactions: "mean centering" does not ameliorate multicollinearity. Period.

**Read:** Cohen, Ch. 7

**Lecture:** /stat/Regression-Nonlinear/Interaction-Categorical <http://pj.freefaculty.org/guides/stat/Regression-Nonlinear/Interaction-Continuous/Interaction-Continuous-1-lecture.pdf>

**Additional Reading:**

Echambadi, R., & Hess, J. D. (2007). Mean-Centering Does Not Alleviate Collinearity Problems in Moderated Multiple Regression Models. *Marketing Science*, 26(3), 438-445.

Kromrey, J. D., & Foster-Johnson, L. (1998). Mean Centering in Moderated Multiple Regression: Much Ado about Nothing. *Educational and Psychological Measurement*, 58(1), 42 -67.

24. Nov 18. Interactions: Categorical with Continuous

**Read:** 1) Cohen, 9.3

**Lecture:** [/stat/Regression-Nonlinear/Interaction-Categoricall](#)

25. Nov 20. Heteroskedasticity

**Read:** Fox, Ch. 12.2

**Lecture:** [/stat/Regression/Heteroskedasticity-WLS](#) <http://pj.freefaculty.org/guides/stat/Regression/Heteroskedasticity-WLS/Heteroskedasticity-WLS-lecture.pdf>

**Note:** I am removing “time series autocorrelation” from this lecture material.

26. Nov 25. Review session

27. Dec 2. Midterm Exam #2

28. Dec 4. Logistic Regression

**Read:** Verzani, Ch. 12; Cohen, 13.1-13.2

**Lecture:** [/stat/Regression-Categorical/LogitProbit](#) <http://pj.freefaculty.org/guides/stat/Regression-Categorical/LogitProbit/LogitProbit-1-lecture.pdf>

29. Dec 9. Logit II, Course Evaluations

**Read:** Same

**Lecture:** [/stat/Regression-Categorical/LogitProbit-WorkedExample](#)

30. Dec 11. Catch Up.

Final Exam: Weds Dec 18 4:30PM. [Please double-check me that.](#)