

**May 22nd—June 9, 2017**

**2017 SUMMER STATISTICAL INSTITUTE**  
**BUILD YOUR TOOLKIT AT STATS CAMP**

- Learning statistical terminology and computing tools
- Strategies for reproducible research
- Suitable for research in academic, corporate, and government settings

Sessions individually priced: \$50-70 per day  
Please see [CRMDA.KU.edu/statscamp](http://CRMDA.KU.edu/statscamp)  
for more information

**Sessions:**

- Statistical Software: R  
May 22nd—May 26th
- Statistical Software: Stata  
May 30th—June 2nd
- Structural Equation Models  
June 5th—June 9th

## **KU SUMMER STATISTICAL INSTITUTE: WEEK 1: R      MAY 22ND-26TH, 2017**

### **Day 1—Installation & Getting to Know R**

**Instructor: Dr. Paul Johnson, CRMDA Director and Professor, Political Science**

- Installation
- R documentation, interacting with the R help system, packages
- User interfaces: Comparing Windows R, Emacs, Notepad++, Macintosh
- Line aRt: Illustrating functions, create publication quality line art and graphic displays

### **Day 2—Establishing a Replicable Research Process**

**Instructor: Dr. Paul Johnson, CRMDA Director and Professor, Political Science**

- Data import and Recode data: Wrestling with numerical, text, and factor variables
- Graphical exploration and presentation scatterplots, barplots, boxplots, etc.
- Exporting tables for presentations in documents: cross tabulations regression, and other tables

### **Day 3—Statistical Analysis the R Way**

**Instructor: Dr. Paul Johnson, CRMDA Director and Professor, Political Science**

- Regression & ANOVA
- Structural Equation Modeling
- Moderation and Mediation

### **Day 4—R Toolkit for Interacting with Data**

**Instructor: Dr. Paul Johnson, CRMDA Director and Professor, Political Science**

- Matrix Algebra with R
- Iteration concepts in R: for, lapply
- Subsetting data, processing subsets and merging results
- Creating R functions to customize analysis

### **Day 5—Monte Carlo Programming and Power Analysis**

**Instructors: Dr. Paul Johnson and Dr. Ben Kite**

- Monte Carlo simulation in R
- Power analysis: definition and implications
- Using Monte Carlo simulation to estimate power

## **KU SUMMER STATISTICAL INSTITUTE: WEEK 2: STATA     MAY 30TH-JUNE 2ND, 2017**

### **Day 6—An Introduction to Stata for Statistical Analysis**

**Instructor: Dr. Jacob Fowles, CRMDA and School of Public Affairs & Administration**

- The Stata interface: point & click, menus, command line, and the do-file editor
- Finding help, including web sources
- Editing data within Stata, the project, data, and variable views
- Managing collaborative projects
- Reproducibility and documentation options within Stata

### **Day 7—Reliable and Reproducible Workflows Using Stata**

**Instructor: Dr. Jacob Fowles, CRMDA and School of Public Affairs & Administration**

- Common syntax and structure for writing code
- Alternatives for editing do-files
- Workflow concepts, customized do-file template that facilitates project organization
- Importing, organizing, recoding, and labeling variables
- Generating descriptive plots and tables

### **Day 8—Automating Common Tasks in Stata**

**Instructor: Dr. Jacob Fowles, CRMDA and School of Public Affairs & Administration**

- Installing and using prepared Stata packages
- Estimating quantitative models and capturing estimation output
- Stata macros
- Produce “pretty” output (summary statistics, regressions results, etc.), using the **estout** suite of command and **putexcel** commands

### **Day 9—Data Visualization in Stata**

**Instructor: Dr. Jacob Fowles, CRMDA and School of Public Affairs & Administration**

- Programs for creating plots, charts, and graphs
- Customizing graphics using Stata’s suite of graphing commands
- Stata’s “margins” and “marginsplot” command for visualizing regression results

## **KU SUMMER STATISTICAL INSTITUTE: WEEK 3: SEM      JUNE 5TH-9TH, 2017**

### **Day 10—Introduction to Structural Equation Modeling**

**Instructor: Dr. Edgar Merkle, University of Missouri, Department of Psychological Sciences**

- Factor Analysis Overview
- Confirmatory Factor Analysis By Example
- Visualizing SEM with Path diagrams
- Diagnostics for Estimated Models

### **Day 11—Using Mplus and R**

**Instructor: TBA**

- Introducing the CRMDA SEM Code Repository
- Mplus
- Using R for basic SEM: the lavaan package

### **Day 12—Interaction Effects in SEM**

**Instructor: Dr. Holger Brandt, University of Kansas, Department of Psychology**

- Lavaan overview and Product Indicators
- The R package nlsem
- Latent moderate structural equations (LMS)
- Graphical illustrations

### **Day 13—Extensions to semiparametric approaches**

**Instructor: Dr. Holger Brandt, University of Kansas, Department of Psychology**

- Structural equation mixture modeling (SEMM)
- SEMM with the R packages nlsem and plotSEMM
- Robust alternatives for non-normality

### **Day 14—Bayesian alternatives and multilevel SEM**

**Instructors: Dr. Holger Brandt, University of Kansas, Department of Psychology**

- (Short) introduction to Bayesian modeling
- Introduction to stan (a Bayesian analysis framework) and rstan (a R package for usage of stan)
- Interaction models with regression and the multilevel framework in stan
- Multilevel SEM with interaction effects in stan