# WSSR WORKSHOPS ON SOCIAL SCIENCE RESEARCH

## Basics of Multivariate Analysis

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May 22, 2018
9:00am – 4:30pm

## Summary

This workshop is designed to teach students with a minimal background in statistics and mathematics and teach them the basics of multivariate analysis. We start with the logic of two variable hypothesis testing using correlation coefficients and two variable regression models and then provide a thorough presentation of the logic and the central assumptions underlying the multiple ordinary least squares regression model. This is essential background for the workshop "Modern Regression."

This is a hands-on workshop, meaning that a major goal is to have students learn about techniques by putting them to work with statistical software. To facilitate this, we will have lectures on each topic that will include example programs in Stata. The slides and programs presented in class will be available for students to use in Stata and in R. Depending on time and student interests, we may also spend some time in lab sessions where students can work with the example data sets or with their own data.

Textbook: Kellstedt, Paul M., and Guy D. Whitten. *The fundamentals of political science research*, 2nd edition. Cambridge University Press, 2013.

## Outline

### Topic 1    Placing Quantitative Methods in a Research Program
- Workshop Introduction
- Working with Stata
- The Place of Methodology in a Research Program
- Some Rules of the Road For Conducting Statistical Analyses
- Taking Command of Mathematical Notation
- Getting to know your data
- Readings:
    Nagler, Jonathan (1995) "Coding Style and Good Computing Practices." *The Political Methodologist*, 6:2-8. http://reserves.concordia.ca/ares/ares.dll/plink?14EEF898
    Chapters 1-5 of Kellstedt, Paul and Guy Whitten (2013) *The fundamentals of political science research*, 2nd edition. Cambridge University Press. Webster Course Reserve Room (3 hour loan)

### Topic 2        Two Variable Hypothesis Testing
- Some essential concepts from probability theory
- Covariance–Correlation

- Readings:
    Chapters 6-7 of Kellstedt, Paul and Guy Whitten (2013) "The Fundamentals of Political Science Research, 2nd edition" Cambridge University Press Webster Course Reserve Room (3 hour loan)

## Topic 3     Two Variable Regression

- Fitting a regression line
- Uncertainty in regression Part 1: Overall uncertainty–Goodness-of-Fit
- Uncertainty in regression Part 2: Uncertainty about individual components
- Assumptions and minimum mathematical requirements
- Introduction to regression simulation
- Suppressing the intercept
- Readings:
    Chapters 8 & 12 of Kellstedt, Paul and Guy Whitten (2013) *The fundamentals of political science research*, 2nd edition. Cambridge University Press.

## Topic 4     X → Y controlling for Z

- All the differential calculus you need for right now
- Extending to multiple regression
- Omitted variable bias
- Readings:
    Fair, Ray C. (1988) "The effect of economic events on votes for president: 1984 update" *Political Behavior*, 10:168-177. http://reserves.concordia.ca/ares/ares.dll/plink?14EF224C
    Kellstedt and Whitten Chapter 9 Webster Course Reserve Room (3 hour loan)

*If you are registered for non-credit and are unable to access these readings, please send us an email at wssr@concordia.ca and we will do our best to assist you.