

International Relations/Political Science

Academic year 2019-2020

Statistics for International Relations Research I

RI-SP038 - Autumn - 6 ECTS

Tuesday 12h15 - 14h00

Course Description

This course provides an introduction to statistical methods for students of International Relations and Political Science. The emphasis of the course will be on applications of core statistical ideas to real-world problems. After taking this course, students will develop an understanding of fundamental statistical concepts commonly used in international relations and political scientific research; be able to apply these concepts readily to solve particular exercises; and master the implementation of a number of important statistical techniques. No prior knowledge of mathematics beyond basic algebra required.

> PROFESSOR

[Natalia Malancu](#)

[Office hours](#)

> ASSISTANT

[Office hours](#)

Syllabus

Course Requirements and Evaluation

The course is built around eight intensive lectures in which key statistical concepts are presented and eight lab sessions in which these concepts will be applied to political and social scientific data sets. An outline of the lecture slides will be posted on the course Moodle page prior to each lecture that can be used to guide your reading, follow the lecture, and structure your revision. The slides themselves will not be distributed, however.

Lab sessions will review the lecture material and address student questions, and provide a tutorial on how to use the statistical software package R. There will be **XX** lab session slots offered on **XX**. Please ensure you keep at least one of these sessions free as the labs for this course are mandatory. Sign-up will be during the first lecture and on a first-come first-served basis.

Course grades will be assigned as follows:

Attendance (10%)

Attendance at both lectures and lab sessions is required. Of eight lectures, eight lab sessions, a mock midterm and a review session (18 sessions in total), you must attend 16 to receive a full attendance grade. Each subsequent session missed is a proportional reduction in the attendance grade.

Problem Sets (30%)

Problem sets will be distributed following each lecture and are due prior to the following week's lecture. They should be submitted to Moodle as a PDF of no more than 2- pages with your name as a header on each page. They must represent your own work and late problem sets will not be accepted.

In-Class Midterm Examination (30%)

The midterm examination will test your knowledge of material covered in the first four lectures and labs. The midterm is closed book, though ordinary calculators are allowed.

Take-Home Final Examination (30%)

The final assignment, to be released after the final review session, will require you to 1) apply your statistical knowledge (75% of the exam grade) and 2) reflect on a contemporary issue in statistics (25% of the grade). In the first, practical component, you will be asked to analyse your choice of one of four quantitative dependent variables given in the exam sheet descriptively and inferentially using multiple regression. In the second, essay component, you will be asked to write a short think piece answering one of four questions set out in the exam sheet that relate to a contemporary issue in statistics raised during class. Further research beyond the book will be required.

Course Materials

This course utilizes distinct textbooks for lectures and lab sessions.

The lectures (and the course overall) are related to three textbooks, slightly distinct in their manner of conveying the information - to account for different levels of familiarity with it, while simultaneously providing a comprehensive read:

- Statistics in plain English by Timothy C. Urdan
- Reading Statistics and Research by Schuyler Huck
- Elementary Statistics in Social Research by Jack A. Levin, James Alan Fox, David R. Forde

To keep things light and memorable ☺, try:

- The Cartoon Guide to Statistics by Larry Gonick
- What is a p-value anyway? 34 Stories to Help You Actually Understand Statistics by Andrew J. Vickers

The lab sessions rely on two practical introductions:

- Discovering statistics Using R by Andy Fields, Jeremy Miles and Zoe Fields
- R Cookbook, 2nd Edition by James (JD) Long and Paul Teetor – *available online* - <https://rc2e.com/index.html>

HOWEVER, since **R is a free software environment** for statistical computing and graphics, there are literally hundreds of alternative, free resources available to you online. Just to get you started:

Rdocumentation.org - a searchable database of R documentation

R cheat sheets - quick reminder about how to wrangle data, make a graph, or do some other common task in R

R Style Guide - advice on how to write readable, maintainable code

RStudio webinar - free events that teach you how do do useful things in R

swirl - an R package designed to teach you R straight from the command line.

Try R - a free R tutorial by Code School

Twotutorials - tutorials on various things in R!

Quick-R by DataCamp – tutorials plus various other resources

Start following:

R-bloggers - for a great number of tutorials about different R-related topics

RStudio blog - to hear about our latest features, packages, and workshops

Seek help at StackOverflow - searchable forum of questions and answers about computer programming - over 40,000 questions.

Course Policies

Auditing is possible, but auditors are expected to fulfil all obligations associated with the course including attendance and assignments. Auditors' will receive feedback on their assignments, but no grades.

Grading of problem sets is according to a 20 point scale. While I reserve the right to rescale the final grades at the end of the course so that they are roughly normally distributed, as a general guide a 10 is roughly a passing grade.

Plagiarism/incorrect citation is against the Institute's Internal Guidelines Governing Citation of Sources and Plagiarism and will not be tolerated. Please approach one of the TAs if you are ever unsure and please pay attention to correct citation in, e.g., the final take-home examination. Waivers are possible for this class if you can demonstrate a recent, equivalent statistical education. Please contact me for more details.

Course Schedule

Week 1	Introduction Lecture 0 Urdan Ch. 1; Huck Ch. 1; Fields et al. Ch. 1.1-1.4 <i>Introduction to social research/statistics</i> Lab 0 Fields et al. Ch. 3; in depth: R Cookbook ch. 1 – 4; <i>Introduction to R, creating a script, copying your results to a word processor, loading data</i>
Week 2	Sampling and Measurement Lecture 1 Huck Ch. 5; Levin et al. Ch.1; Fields et al. Ch. 1.5-1.6; <i>Samples and populations, probability and non-probability sampling, nonresponse and response biases, variables and levels of measurement</i> Lab 1 R Cookbook Ch.6 <i>Creating and modifying variables, reverse-code variables, creating scales</i>
Week 3	Descriptive Statistics Midday Problem Set 1 due Lecture 2 Urdan Ch.2-3; Huck Ch. 2; Levin et al. Ch. 3-4 <i>Description and inference, graphs, bar graphs and histograms, pie charts, measures of central tendency and dispersion, degrees of freedom, outlier</i> Lab 2 R Cookbook Ch.9.1. <i>Distribution centers, distribution dispersion</i>
Week 4	Probability Distributions Midday Problem Set 2 due Lecture 3 Urdan Ch.4,ch.6; Huck Ch. 5; Levin et al. Ch. 2, Ch.5 <i>Probability, marginal, joint and conditional, odds ratio, expected value and expected return, probability and cumulative distribution functions, normal and other distributions, central limit theorem, standard errors</i> Lab 3 Fields et al Ch.4; R Cookbook ch.10 <i>Graphs for nominal variables, ordinal variables, and quantitative variables</i>
Week 5	Confidence Intervals Midday Problem Set 3 due Lecture 4 Urdan Ch.7; Huck Ch.6; Levin et al. Ch.6 <i>Point and interval estimates, biased and inefficient estimates, confidence intervals, margins of error, the rule of thumb, t-distribution, sample size</i> Lab 4 Fields et al Ch. 3.9; R Cookbook Ch.5 <i>Data Structures, review in preparation for (mock) midterm</i>
Week 6	Mock Midday Problem Set 4 due Mock Midterm Examination Midterm Review Session
Week 7 In-class	Midterm Midterm Examination
Week 8	-no class -
Week 9	Significance Testing Lecture 5 Urdan Ch.7, Ch. 9-10, 12; Huck Ch. 7-8, 10,11,14; Levin et al. Ch.7-8 <i>Theories and hypotheses, test statistics and p-values, statistical and practical significance, type I and type II errors, independent and dependent t-tests</i> Lab 5 Fields et al ch 5.7-5.8, 9-10; R Cookbook ch.9.11, 9.15, 9.18-9.20 <i>One-sample test of means, two-sample test of group means, one-sample test of a proportion, two-sample test of a proportion, testing for unequal variances, repeated-measures test</i>
Week 10 Midday	Bivariate Analysis Problem Set 5 due Lecture 6 Urdan Ch.8; Huck Ch.9; Levin et al. Ch. 9-10 <i>Contingency tables, expected frequencies, chi-squared test, median splits,</i>

	<i>correlation</i>
	Lab 6 Fields et al Ch.6,18.1-18.6; R Cookbook ch. 9.3-9.4
	<i>Cross-tabulation, chi-squared test, degrees of freedom, measures of association</i>
Week 11 Midday	Linear Regression Problem Set 6 due Lecture 7 Urdan Ch.10, 13; Huck 16; Levin et al. Ch. 11
	<i>Regression, deterministic, probabilistic, residuals, sum of squared errors, total sum of squares, regression sum of squares, extrapolation, mean square error, conditional standard deviation, marginal standard deviation</i>
	Lab 7 Fields et al Ch.6, Ch. 7.1-7.5; R Cookbook Ch. 9.17, ch.11
	<i>Scattergrams, correlation, regression, plotting regression lines, Spearman's rho</i>
Week 12 Midday	Multiple Regression Problem Set 7 due Lecture 8 Urdan Ch.13; Huck 16; Levin et al. Ch. 11
	<i>Association, causation, sequencing, spuriousness, alternative explanation, intervening variables, interactions, dummy variables, reference categories, proportional reduction in error, F-tests</i>
	Lab 8 Fields et al ch.7.6-7.12, R Cookbook ch.11
	<i>Multiple regression, regression diagnostics, categorical predictors, interactions</i>
Week 13 Midday	Review Week Problem Set 8 due
Midnight	Review Session Take-Home Exam Set
Week 14 Midnight	Take-Home Take-Home Exam Due

– This syllabus is subject to change –