SciencesPo
CAMPUS DE REIMS

SYLLABUS

APPLIED STATISTICS IN THE HUMANITIES AND SOCIAL SCIENCES

Professor: Thiago SCARELLI
Academic Year 2019/2020: Spring Semester

COURSE DESCRIPTION

The course provides an introduction to descriptive statistics, probability distributions and inference, with focus on the practice of empirical research.

Academic expectations

At the end of the semester, the student is expected to be familiar with the main statistical concepts and to be able to interpret the basic descriptive and inferential statistics used in applied social sciences.

Grading criteria + grading rubrics

10% - Participation
28% - First midterm (45 minutes, during session 4)
28% - Second midterm (45 minutes, during session 8)
34% - Final exam (90 minutes, during session 12)

Note that unjustified absence during an evaluation implies grade zero automatically. The participation grade will evaluate the student's interaction during classes and their engagement in the correction of the proposed exercises during the semester. Students might be randomly invited to solve short problems on the blackboard, in which case their willingness to participate will contribute to the grade.

Late arrival policy

After 20 minutes, late arrivals will be counted as absence.

"Screen-free" learning environment

This is a paper and pencil class, the use of mobile phones, computers and tablets is prohibited.

Detailed outline

Session 1 (Jan. 29): What is statistics and what do we need it for?
- Statistics as a tool for answering empirical research questions in the social sciences;
- Descriptive statistics and inferential statistics;
- Basic concepts;
- Types of variables.

Session 2 (Feb. 5): Using statistics to describe a single variable
- Measures of central tendency (mean, median, quartiles, mode);
- Measures of dispersion (variance, standard deviation, range, inter-quartile deviation) and skewness;
- Box-plot graphical representation;
- Frequency tables and histograms.

Session 3 (Feb. 12): Using statistics to describe association between two variables
- Bivariate analysis and variable types;
- Two-way tables (crosstabs): single, marginal and conditional frequencies;
- Covariance and correlation;
- Scatter plots and other bidimensional graphical representations.

Session 4 (Feb. 26): First midterm (45min.) + Introduction to random variables
- Definitions;
- Probability law.

Session 5 (Mar. 4): Discrete random variables
- Probability Mass Function (PMF);
- Cumulative Distribution Function (CDF);
- Graphical representation of PMF and CDF and interpretation;
- Calculating probabilities of the form $P(a < X < b)$.

Session 6 (Mar. 11): Continuous random variables
- Probability Density Function (PDF);
- Cumulative Distribution Function (CDF);
- Graphical representation of PMF and CDF and interpretation;
- Introduction to the normal distribution.

Session 7 (Mar. 18): Normal distribution
- Normal distribution (general and standardized);
- Equations, graphs, interpretations;
- Reading of a Z-table, for calculating probabilities of the form $P(a < X < b)$.

Session 8 (Mar. 25): Second midterm (45min.) + Introduction to inference
- Introduction to statistical inference.

Session 9 (Apr. 1) and Session 10 (Apr. 8): Basic inference tools
Confidence intervals
- Interpreting confidence intervals;
- The 95% interval and the general case of (1 - a)%.

Hypothesis testing
- Null and alternative hypotheses;
- Decision: rejection or not of H0;
- P-value;
- Student's t-test.

Session 11 (Apr. 15): Introduction to regression
- Ordinary least squares (OLS);
- Interpretation of the R2 coefficient of determination;
- Reading and interpretation of an econometric input-output table (estimators, standard errors, different specification models);
- The limits of the regression and introduction to the problem of causality.

Session 12 (Apr. 29): Final exam (60 min.)

BIBLIOGRAPHY

Agresti, Alan. 2018. *Statistical Methods for the Social Sciences*. 5th ed. Boston: Pearson.
[The material we're covering corresponds broadly to chapters 1 to 9.]

Navarro, Danielle. 2018. *Learning Statistics with R: A Tutorial for Psychology Students and Other Beginners.* Version 0.6. https://learningstatisticswithr.com.
[Freely available and especially useful for those with interest in learning the statistical language R.]