London Interdisciplinary Social Science Doctoral Training Partnership

Advanced Research Methods in the Social Sciences

Course Code & Title	**LISS005 Introduction to Quantitative Research**		
Convenor(s)	Dr Yang Ye: yang.ye@qmul.ac.uk		
Institution	Queen Mary University of London	**Department**	Department of Linguistics
Academic Year	2018-19	**Term**	Summer
Number of Sessions	9	**Length of Session(s)**	3hours
Day, Date		**Start : End**	**Room Location**
Monday 13 May 2019 Monday 13 May 2019 Monday 20 May 2019 Monday 3 June 2019 Monday 3 June 2019 Monday 10 June 2019 Monday 17 June 2019 Monday 17 June 2019 Monday 24 June 2019		10:00 - 13:00 14:00 - 17:00 10:00 - 13:00 10:00 - 13:00 14:00 - 17:00 10:00 - 13:00 10:00 - 13:00 14:00 - 17:00 10:00 - 13:00	Room GC2.04, Graduate Centre, Queen Mary
Enrolment Link:	http://tiny.cc/6sld5y You may be prompted to log into SkillsForge		

Course Description:
The main purposes of this course are to introduce students to 1) the basic concepts and logic of quantitative research methods, and 2) the fundamentals of statistical reasoning and 3) introductory-level practical ability to carry out quantitative research and data analysis.

Each session is divided into two components: research methods and data analysis. The first component involves introductions to key elements of the quantitative research process, such as developing hypothesis, research design, measurement, and sampling. The second component involves introductions to practical ways of examining quantitative data and testing statistical hypotheses using tools of statistical inference. In other words, research methods is about the production of high-quality quantitative data, while data analysis is about exploring, analysing and drawing conclusions from the data produced.

Note that the statistics parts of the course is largely based on the open course “Statistical Reasoning” as part of the Open Learning Initiative (2019) by Carnegie Mellon University (for a link to course, see end of the syllabus). The use of the course materials is under the Creative Commons Attribution: Noncommercial-Share Alike 4.0 License. Copyright 2019 Open Learning Initiative.

The data analysis component of the course involves the usage of the free statistical software R on the platform RStudio (https://www.rstudio.com/products/rstudio/download/). It is preferred that students download RStudio on their own working laptops and bring the laptops to the sessions. Students who do not have their own laptops should contact liss-dtp@kcl.ac.uk to discuss options for borrowing one.

Course Outline:

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Session 1: Introduction and exploratory data analysis, part 1

- Introduction
    - Welcome and pre-course survey
    - An overview of statistics
    - Getting started with R and R Studio

Session 2: Exploratory data analysis, part 1

- Examining distributions
    - One categorical variable
    - One quantitative variable
        - Histogram and boxplot
        - Measures of center and spread

Session 3: From theory to hypotheses

- Research methods

- The hypothetico-deduction paradigm
- Defining a research problem
    - From broad problem area to a specific problem
    - The critical literature review
- Theoretical framework and hypothesis development
    - Variables
    - Theoretical framework
    - Hypothesis

- Data analysis

- From variable to actual data
        - Coding and data entry
- Examining relationships beween variables
    - Categorical -> Quantitative
    - Categorical -> Categorical
        - Quantitative -> Quantitative

Session 4: Data collection and research design

- Research methods
    - Data collection methods
        - Observation
        - Qualitative interviews
        - Questionnaires
    - Research design
        - Experiment
        - Survey
- Data analysis
    - The formation and transformation of data
        - Data transformation and organization
        - Research design and data
            - Experimental data
            - Survey data

Session 5: Measurement

- Research methods
    - Operationalization
    - Scaling
        - Rating
        - Ranking
    - Goodness of measures
        - Reliability
        - Validity
- Data analysis
    - Testing reliability
    - Testing validity
    - Advanced methods

Session 6: Sampling

- Research methods

- Sampling process
- Sampling methods
    - Probability sampling
    - Non-probability sampling
- Determine sample size
    - Precision
    - Confidence

- Data analysis

- Estimation from sample to population
    - Parameters vs. statistics
    - Point estimation
    - Interval estimation
        - Confidence intervals
    - Testing population mean

Session 7: Experiment

- Research methods

- Experimental design
    - Completely randomized single-factor design
    - Factorial design with more than one factors
    - Repeated or mixed designs

- Data analysis

- Analysis for experiments
    - Two independent samples (independent t-tests)
    - Matched pairs (matched t-tests)
    - Analysis of variance (ANOVA)
    - Non-parametric tests
- Issues of replicablity
    - Effect size
    - Statistical power

- Sample size

Session 8: Survey

- Research methods

- Cross-sectional (one time measurement) design
  - Single level analysis
  - Multi-level data and analysis
- Repeated measurement design
  - Event sampling study
  - Longituidinal study

- Data analysis

- Regression
  - Correlations
  - Single and multiple regression
  - Logistic regression
- Advanced modelling methods
  - Multi-level modelling
  - Structural equation modeling

Session 9: Review, research communication, and advanced topics

- Review: research methods
  - Overview of research process
  - Framework and hypothesis
  - Research design
  - Measurement
  - Sampling
- Review of data analysis
  - Exploratory analysis: plotting and descriptives
  - Statistical inference
- Research communication
  - Reporting results of quantitative research

- Advanced topics
    - Replication
        - Questionnable research practices
    - Future of quantitative research
        - Open science initiatives
        - Big data

Useful reading

Research methods

- Sekaran, U., & Bougie, R. (2016). Research methods for business: A skill building approach. John Wiley & Sons.
- Reis, H. T., & Judd, C. M. (Eds.). (2000). Handbook of research methods in social and personality psychology. Cambridge University Press.

Data analysis and statistics

- Field, A., Miles, J. and Field, Z. (2012). Discovering Statistics using R. Sage.

R language

- Cotton, R. (2013). Learning R: A Step-by-Step Function Guide to Data Analysis. O'Reilly. Retrieved from http://duhi23.github.io/Analisis-de-datos/Cotton.pdf
- Venables, W. N. Smith, D. M. and the R Core Team (2019). An introduction to R: notes on R: a programming environment for data analysis and graphics. Retrieved from https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf

Useful links:

- "Statistical Reasoning" open course at Open Learning Initiative offered by Carnegie Mellow University: https://oli.cmu.edu/courses/statistical-reasoning-copy/

Course materials:

- Course materials such as powerpoint slides, R analytical scripts, and data files are shared in this dropbox folder: https://www.dropbox.com/sh/ormlulscr4le8kt/AABYJ2cbL_VAM0VFEjKIrzxna?dl=0

Number of students: 20