London Interdisciplinary Social Science Doctoral Training Partnership

Advanced Research Methods in Social Sciences

Course Code & Title	**LISS005 Introduction to Quantitative Research**				
Convenor(s)	Dr Yang Ye, School of Human Sciences, the University of Greenwich				
Institution	KCL, QMUL & Imperial		**Department**	LISS DTP	
Academic Year	2020-21		**Term**	Summer	
Number of sessions	10	**Research Platform**	Quantitative Research	**Length of Session(s)**	3 hrs (2 lectures + 1 seminar)
Day, Date			**Start : End**	**Room Location**	
Every Monday and Thursday from 6th May to 10th June (no class 31st May due to bank holiday)			13:00 to 16:00 (Zoom room opens at 12:45)	Online via Zoom – URL available upon enrolment	
Enrolment Links:	https://bit.ly/LISS005 You may be prompted to log into SkillsForge				

Course Description:

The main purpose of this course is to introduce students to quantitative data, basic concepts in statistics, the basic logic of statistical reasoning and null-hypothesis significance testing, and the fundamentals of quantitative research design. The course will provide students introductory-level practical ability to choose, generate, and properly interpret descriptive and inferential statistics, and to design quantitative surveys and experimental studies.

The course does not assume any prior knowledge in statistics. The only prerequisite is basic algebra. It will require the usage of Microsoft Excel, various free online statistical tools and the free software JASP (https://jasp-stats.org).

The course uses materials from the open course "Statistical Reasoning" by Carnegie Mellon University under the Creative Commons Attribution: Noncommercial-Share Alike 4.0 License, Copyright 2020 Open Learning Initiative.

Course Schedule:

Session date	Lecture	Lecture topic	Seminar topic	Unit
May 6th	1	Distribution	Depicting a single variable	Unit 1: Exploring data
May 10th	2	Covariation	Depicting relationships	

May 13th	3	Probability	Normal distribution and probability	Unit 2: Probability and sampling
May 17th	4	Sampling	Sampling bias	
May 20th	5	The sampling distribution	Sampling and probability	
May 24th	6	Statistical estimation	Confidence interval	Unit 3: Statistical inference
May 27th	7	Hypothesis testing: The basics	The z-test	
June 3rd	8	Hypothesis testing: Specific methods	The chi-square test	
June 7th	9	Research design basics	Experimental design	Unit 4: Research design basics
June 10th	10	Measurement basics	Review	

Course Outline:

Unit 1: Exploring data

In this unit we will learn about the basics of quantitative data. We will start with the concept of quantification: turning observations of real-life phenomena into numbers. We will then learn a few key data-related concepts: variable, distribution, and co-variation. We will study how to depict a simple variable using statistics or graphics, and how to depict the relationship between two variables.

Lecture 1: Distribution

- Overview of the course
- Variable
    - Categorical variable
    - Quantitative variable
- Distribution
    - Graphic depictions
    - Numerical descriptions

Keywords: variable, distribution, mean, standard deviation, median, mode, range

Lecture 2: Covariation

- Depicting relationships
  - Categorical and categorical variables
  - Categorical and quantitative variables
  - Quantitative and quantitative variables

Keywords: two-way table, boxplot, scatterplot

Unit 2: Probability and sampling

In this unit we will learn about the foundation of statistics. We will have a brief overview about the basics about probability. We will then learn about how we could make highly precise conclusions about a large population while only having access to small samples - where the power of statistics lies.

Lecture 3: Probability

- Relative frequency
- Probability distribution
  - Random variables
  - Normal distribution

Keywords: probability, random variable, normal distribution

Lecture 4: Sampling

- Sample and population
- Methods of sampling
- Sampling bias

Keywords: sampling, population, sampling bias

Lecture 5: Sampling distribution

- Sample mean and standard error
- Sample size
- The central limit theorem

Keywords: standard error, central limit theorem

Unit 3: Statistical inference

In this unit we will learn about how to make estimations about populations, and to test hypotheses about the relationships between variables within populations, both on the basis of samples.

Lecture 6: Statistical estimation

- Point estimation
- Interval estimation

Keywords: sample statistics, population parameters, confidence intervals

Lecture 7: Hypothesis testing: Basics

- Null and alternative hypotheses
- P-value and type 1/2 errors
- Four steps of hypothesis testing

Keywords: null hypothesis, p-value, testing statistics

Lecture 8: Hypothesis testing: Methods

- Testing differences
- Testing relationships

Keywords: t-tests, chi-square tests, ANOVA, regression

Unit 4: Research design basics

In this final unit we will learn about the basics of research design: How to make plans for collecting high-quality quantitative data that address our research questions.

Lecture 9: Research design: Basics

- Theory and hypothesis
- IV, DV, and other types of variables
- Experimental design
- Research validity

Keywords: research hypothesis, experimental design, internal validity, external validity

Lecture 10: Measurement: Basics

- Measurement validity
- Measurement reliability
- Review

Keywords: validity, reliability

Useful link

- The Open Course "Statistical Reasoning" at Open Learning Initiative: https://oli.cmu.edu/courses/statistical-reasoning-copy/

About the course instructor:

Dr. Yang Ye is a Lecturer in Psychology at the School of Human Sciences, University of Greenwich, where he teaches introductory research methods in psychology and social psychology. Yang received his PhD in Social Psychology at Western University, Canada. Before joining the University of Greenwich, he did post-doctoral research in experimental psychology at Ghent University, Belgium and in sociolinguistics at Queen Mary University of London. His research focuses on explicit and implicit forms of attitudes, stereotypes and bias in judgment and decision making.