

Course Description

The course “Quantitative Data Analysis for the Social Sciences with SPSS” should enable learners to gain enough proficiency in SPSS (Statistical Package for the Social Sciences) so that they can perform the data analysis for their research project. Quantitative data analysis methods and statistical tests will be explained in sufficient detail so that learners will be able to decide which statistical tests they will need to use for which research question. At the end of the course, they should be able to distinguish between parametric and non-parametric tests and know when to use which. Moreover, learners should become familiar with descriptive statistics and be able to create graphs and tables in SPSS to summarize data.

Further, they should be able to perform inferential statistical tests measuring differences between groups, such as the Chi-square test, Mann-Whitney U test, t -test, Kruskal-Wallis H test, univariate analysis of variance (ANOVA), and multivariate analysis of variance (MANOVA). Learners should also be able to use inferential statistics to explore the relationships between variables by performing cross-tabulations, correlations, and different types of regression analysis. Learners should also develop the skills to calculate the effect size and test power of a statistical test. Moreover, learners should also be able to test the psychometric properties (validity and reliability) of questionnaires with the help of SPSS. Finally, they should be able to interpret the results of statistical tests and obtain knowledge on how to report them when writing a research paper.

Course Aims and Objectives

Overall objectives with bullets for specifics

- Gain an in-depth understanding of concepts of quantitative data analysis, such as measures of central tendency and dispersion, levels of measurements, normal distribution of the data, type I and II errors, so that they can be applied in one’s research study
- Gain the ability to distinguish between parametric and non-parametric tests and know when to use which
- Develop more advanced skills in summarizing and presenting data as graphs and frequencies in descriptive statistics using SPSS
- Know how to measure group differences and test for significance using inferential statistics in SPSS: Chi-square tests, t -tests, Mann-Whitney U tests, Kruskal-Wallis H tests, as well as ANOVA (Univariate Analysis of Variance) and MANOVA (Multivariate Analysis of Variance)
- Know how to explore the relationships between variables in SPSS using cross-tabulations, correlations, and different types of regression analyses
- Gain the ability to calculate effect sizes and test power, as well as the ability to report results from statistical tests in a scientific research paper
- Understand the foundations of validating research instruments in order to test for the validity and reliability

Course Outline

Unit No	Title of Unit	Content	Suggested teaching – learning methodology	Suggested no of class hours
I	Basic Concepts of Statistical Tests and First Steps with SPSS	<p>Basic concepts of statistical tests:</p> <ul style="list-style-type: none"> • Levels of measurement • Population vs sample • Normal distribution • Measures of central tendency and dispersion <p>First steps with SPSS:</p> <ul style="list-style-type: none"> • Variable View vs Data View • Naming variables in Data Editor • Selecting cases • Recoding the values of variables • Computing a new variable 	Lectures/ Discussions/ tutorial sessions/ educational videos/ class exercises	6
II	Descriptive Statistics versus Inferential Statistics	<p>Descriptive Statistics with SPSS:</p> <ul style="list-style-type: none"> • Purpose of descriptive statistics: summarizing and presenting data • Frequencies: absolute, relative, and cumulative frequency • Grouping variables that are at the interval/ratio level • Graphs with SPSS: bar chart, pie chart, histogram • Using SPSS to produce frequency tables • SPSS output for measures of central tendency and dispersion <p>Inferential statistics:</p> <ul style="list-style-type: none"> • Purpose of inferential statistics • Null hypothesis (H_0) and alternative hypothesis (H_A) • Type I and type II errors • Significance level Alpha (α) • Critical values (t, Z) and the confidence interval • One-tailed and two-tailed tests of significance 	Lectures/ Presentations/ Discussions/ tutorial sessions/ educational videos/ class exercises	6

III	Inferential Statistics Part 1: Measuring Differences Between Groups with SPSS	<ul style="list-style-type: none"> ● Parametric vs non-parametric tests ● Measuring differences between groups: <i>t</i>-test, univariate analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) ● Non-parametric equivalents: Chi-square test, McNemar's test, Mann-Whitney <i>U</i> test, Wilcoxon signed rank test, Kruskal-Wallis <i>H</i> test 	Lectures/written assignments/discussions/ class exercises/ educational videos	6
IV	Inferential Statistics Part 2: Exploring Relationships Between Variables with SPSS	<ul style="list-style-type: none"> ● Cross-tabulation ● Correlation (Spearman's rank correlation and Pearson's product-moment correlation) ● Linear regression ● Multiple regression analysis ● Binary logistic regression analysis 	Lectures/written assignments/discussions/ class exercises/ educational videos	6
V	Effect Size and Test Power; Validating Psychometric Scales with SPSS	<p>Effect size and test power:</p> <ul style="list-style-type: none"> ● What is the effect size, and why report it? ● Effect sizes of the different statistical tests ● Test power ($1-\beta$) ● Using G*Power to calculate test power and the sample size ● Reporting the effect size and test power in a research paper ● How to report the results of significance tests in APA format <p>Validating psychometric scales:</p> <ul style="list-style-type: none"> ● Avoiding errors in measurement ● Testing for validity (concurrent vs discriminant validity) ● Testing for reliability (Cronbach's Alpha) ● Performing factor analysis to confirm subscales 	Lectures/presentations/discussions/tutorial sessions/ educational videos/ class exercises	6

Course Tools to deepen understanding and knowledge acquisition

- Lectures
- Class discussions
- Educational videos
- Class exercises to practice using SPSS

Assessment

1. Brief quizzes & assignments
2. Class participation
3. SPSS practice: conducting statistical tests with SPSS and reporting results
4. End-semester exam

Methods of Assessment

Internal		External	Total
<i>Components Internal</i>	<i>Weightage</i>	Examination conducted for 100 Marks Weightage: 50%	Internal + External=100
Midterm exam	30%		
Continuous Evaluation* (examples see below)	20%		
Quizzes & Assignments	25 marks		
SPSS practice exercises	25 marks		
Total*			

Course Outcomes

By the end of this course, the students will be able to:

- Understand the basic concepts of statistical significance tests, such as levels of measurement, measures of central tendency and dispersion, the normal distribution, significance level Alpha, as well as Type I and Type II Errors
- Know how to apply statistical tests for hypothesis testing
- Perform and interpret quantitative statistical analyses with SPSS
- Develop the skills to use SPSS to summarize and present data, as well as to do inferential statistical tests for measuring differences between groups and for exploring the relationship between variables
- Understand and apply the concepts of effect size and test power in order to interpret the results of statistical tests
- Test the psychometric properties of the research instruments used in order to validate them for a specific population
- Report the results of statistical tests in a research paper

Resources

Books

Bryman, A. & Cramer, D. (2005). *Quantitative data with SPSS 12 and 13. A guide for social scientists*. London, UK: Routledge.

Bryman, A., & Cramer, D. (1999). *Quantitative data analysis with SPSS release 8 for Windows. A guide for social scientists*. London and New York: Taylor & Francis Group. Retrieved from <http://hcm2.trali.com.vn/upload/170/20131127/Quantitative%20analysis%20with%20SPSS.pdf>

Gaur, A. S. & Gaur, S. S. (2006). *Statistical methods for practice and research. A guide to data analysis using SPSS*. New Delhi, India: Response Books.

Other Resources

Bacon-Shone, J. H. (2013). *Introduction to quantitative research methods*. Hong Kong: Graduate School, The University of Hong Kong. Retrieved from <https://hub.hku.hk/bitstream/10722/191018/1/Content.pdf>

Bryman, A. (2016): *Social Research Methods (5th edition)*. Oxford, UK: Oxford University Press.

Creswell, J. W. (2014). *Research design. Qualitative, quantitative, and mixed methods (4th edition)*. Los Angeles, CA: Sage.

Ellis, S. M., & Steyn, H. S. (2003). Practical significance (effect sizes) versus or in combination with statistical significance (p-values): Research note. *Management Dynamics: Journal of the Southern African Institute for Management Scientists*, 12(4), 51-53. Retrieved from https://www.researchgate.net/profile/Suria_Ellis/publication/293182482_Practical_significance_effect_sizes_versus_or_in_combination_with_statistical_significance_p-values/links/574e76df0

