Quantitative Methods: Introduction Level

Instructor: Tony Bardo Email: bardoar@gmail.com

DESCRIPTION

This course is devoted to developing a conceptual and practical understanding of foundations that underly quantitative sociological research, with an emphasis on statistical inferential reasoning. This involves a mix of both abstract and applied approaches to reasoning, which center around in-class lessons and activities anchored by a critical stance surrounding strengths and limitations embedded in the scientific process. Although focused on sociological research, learning goals are broadly relevant for evaluating the efficacy of claims based on statistical constructs, as well as understanding and articulating important risks that these claims often address.

LEARNING GOALS / COURSE OBJECTIVES

After fully engaging in this course you should be able to…

1. connect the uncertainty of sampling variability with margins of error (MoE) and confidence intervals (CI)
2. demonstrate substantive understanding of statistical significance, p-values, in terms of null hypothesis testing
3. evaluate claims that arise from statistical procedures through the act of informal human inference

COURSE SCHEDULE

Date	Topic	Resource Link
Week 1	***Getting critical with the scientific process***	
Day 1:	Scientific perspectives and theories	PPT 1
Day 2:	Hypotheses and importance of conceptualization	PPT 2
Week 2	***Getting critical with the scientific process, continued***	
Day 3:	Hypotheses and importance of operationalization	PPT 3
Day 4:	Study design and data: review	PPT 4
Week 3	***Getting critical with the scientific process: Real-world application***	
Day 5:	Exercise 1: Identifying stakeholder needs	EX 1
Day 6:	Exercise 2: Measuring stakeholder needs	EX 2
Week 4	***Descriptive statistics***	
Day 7:	Central tendency	PPT 5
Day 8:	Central tendency with RStudio	PPT 5
Week 5	***Descriptive statistics, continued***	
Day 9:	Dispersion	PPT 6
Day 10:	Dispersion with RStudio	PPT 6
Week 6	***Descriptive statistics: Real-world application***	
Day 11:	Exercise 3: Preparing data for analysis Original Qualtrics survey designed based on Exercise 1 and 2	EX 3
Day 12:	Exercise 4: Summarizing data	EX 4
	Required data: RData based on above Qualtrics survey	EX 4 Data
	R script with solutions for Exercise 4	EX 4 R script

Week 7	***Inferential statistics: abstract***	
Day 13:	Probability	PPT 7
Day 14:	Central limit theorem	PPT 7
Week 8	***Inferential statistics: abstraction clarified***	
Day 15:	Exercise 5 preface: Reinforce probability and CLT	EX 5 Preface
Day 16:	Exercise 5: random sampling distributions (coin flip)	EX 5
	R script to show results from Exercise 5	EX 5 R script
Week 9	***Inferential statistics: CIs***	
Day 17:	Confidence intervals	PPT 8
Day 18:	Confidence intervals, revisited	PPT 9
Week 10	***Inferential statistics: Hypothesis testing***	
Day 19:	Hypothesis testing	PPT 10
Day 20:	Exercise 6: Assessing sample data quality	EX 6
	R script to show results from Exercise 6	EX 6 R script
Week 11	***CIs and Hypothesis testing: Real-world application***	
Day 21:	Uncertainty in sample data	PPT 11 instructions
	R script for PPT 11 instruction	PPT-11-Rscript
Day 22:	Univariate vs Bivariate statistics	PPT 11
Week 12	***Inferential statistics, bivariate***	
Day 23:	Exercise 7: exploratory analysis	EX 7
	Required data: RData based on above Qualtrics survey	EX 4 Data
	R script for Exercise 7	EX 7 R script
Day 24:	ANOVA and Pearson's r	PPT 12
Week 13	***Inferential statistics, bivariate continued***	
Day 25:	Simple linear regression, modeling	PPT 13
Day 26:	Simple linear regression, interpretation	PPT 13
Week 14	***Inferential statistics: applied, multivariate***	
Day 27:	Multivariate linear regression	PPT 14
Day 28:	Exercise 8: multivariate linear regression	EX 8
	Required data: RData augmented based on above Qualtrics survey	EX 8 Data
	R script for Exercise 8	EX 8 R script