Quantitative Research Methods

Literature

According to the syllabus it is

- Agresti, Alan and Barbara Finlay (2009), Statistical methods for the social sciences (Fourth Edition), Pearson Education International, Pearson, Prentice Hall, Upper Saddle River, New Jersey.
- Moore, David S. and William I. Notz (2006), Statistics – Concepts and controversies (Sixth edition), W.H. Freeman and Company, New York.

but Agresti is now in the fifth edition (and single authored) and Moore and Notz is in the 10th edition. Basically any recent edition of the books will do. Agresti seems to have gone through more reorganization than Moore and Notz. References to M&N below works for either edition, references to A works for both the fourth and fifth editions. Some material from the fourth edition is missing from the fifth and is referenced as A&F.

There will also be some supplementary material handed out during the course.

Teachers

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Examination

The examination consists of two individual assignments. One shorter assignment (2.5 credits) due on April 19 and one more ambitious in the format of a short research report/journal article (5 credits) due on May 24 with (mandatory) oral presentations on May 30/31.

Outline of the course

Part 1: Statistical Thinking

Date	Activity	Reading
Lecture 1 Feb 4, 10:15-12 L156	Introduction What is Statistics about? Randomness and variability	M&N ch 1-3, A ch 1.
Lecture 2 Feb 11, 10:15-12 L142	Descriptive statistics, data types Data ethics, Measurement, data types, statistical graphs, measures of location and variability	M&N ch 8, 10-13, 17-20, A&F ch 2-4.
Lab 1 Feb 12, 10:15-12 TBA	Introduction to Stata, sampling distributions, descriptive statistics	
Lecture 3 Feb 18, 10:15-12 L142	Estimation Point and interval estimation, confidence interval for mean and proportion	M&N ch 21, A ch 5.1-5.4.
Lab 2 Feb 20, 10:15-12 TBA	Managing data, estimation	
Lecture 4 Feb 25, 10:15-12 L142	Hypothesis testing The logic of hypothesis testing, tests for mean and proportion	M&N ch 22, A ch 6.
Lab 3 Feb 27, 10:15-12 TBA	Managing data, estimation, hypothesis testing	
Lecture 5 Mar 4, 10:15-12 L142	Thinking about statistics -- What does it all mean?	M&N ch 4-7, 23. Additional readings will be provided in Blackboard.

Part 2: Analyzing Causal Relationships

Date	Activity	Reading
Lecture 6 Mar 11, 10:15-12 L142	Causal inference, describing relationships Randomized experiments, observational data, Statistical modelling, Scatter plots, correlation	M&N ch 5, 6, 14, A ch 3.5.
Lab 4 Mar 14, 10:15-12 TBA	Describing relationships	
Lecture 7 Mar 18, 10:15-12 L142	Simple statistical models Comparison of groups, categorical data	M&N ch 24, A ch 7, 8 except starred sections.
Lab 5 Mar 12, 10:15-12 TBA	Analyzing relationships	

Lecture 8 Mar 25, 10:15-12 L142	Linear Regression The linear regression model, interpretation and inference, model building and diagnostics	M&N ch 15, A ch 9-11, 14 except starred sections.
Lecture 9 Mar 29, 10:15-12 L142	Regression continued	
Lab 6 Apr 3, 10:15-12 TBA	Regression	
April 22	Assignment 1 due	

Part 3: Statistical Analysis Methods

Social Science Track

Lecture 10 Apr 22, 10:15-12 L142	ANOVA One-way and Two-way ANOVA, relationship with regression	A ch 12-13 except starred sections.
Lecture 11 Apr 23, 10:15-12 L142	Nonparametric methods Sign test, Wilcoxon, Mann-Whitney, Spearman rank correlation	A 7.7, 8.5, (A&F 4th ed 8.6) , NCT ch 13 (in Blackboard)
Lab 7 Apr 25, 10:15-12 TBA	ANOVA, non-parametrics	
Lecture 12 Apr 29, 10:15-12 L142	Factor analysis Introduction to factor analysis, interpretation, rotations, PCA	A&F ch 16.5 (4th ed) + additional material in Blackboard.
Lecture 13 May 6, 10:15-12 L142	Latent variables and unobservable constructs Latent (unobservable) constructs, observable indicator (discrete choice), many constructs (confirmatory FA, a hint of SEM)	A ch 15.1-15.3, A&F ch 16.6 + additional material in Blackboard.
Lab 8 May 7, 10:15-12 TBA	Factor analysis, latent variables	
May 25	Assignment 2 due	
May 28, 10:15-17 L142	Seminar, presentation of assignment 2	

Computer Science Track

April 18 – May 25	Online lectures on data pre-processing, linear regression, linear classification, evaluation, clustering, neural networks, feature transformation, feature selection, bias-variance trade off, practical recommendations, and ensemble learning	Task: Self-study with study questions to hand in
May 25	Assignment 2 due	Task: Binary classification exercise
Week 22	Seminar, presentation of assignment 2	Location: Online

Link to on-line schedule reflecting any changes:
https://schema.oru.se/setup/jsp/Schema.jsp?startDatum=2024-12-09&intervallTyp=m&intervallAntal=6&sokMedAND=false&sprak=EN&resurser=k.1114-20KFM13-%2C