COMM7660 Statistical Analysis in Communication

Instructor: Dr. Charles Feng

E-mail: charlesfeng@hkbu.edu.hk

Course Location: CVA516
Course Schedule: Thursdays, 12:30-15:20
Office Hours: Friday, 2:30-5:20

Course Description

This course provides an in-depth introduction to classical statistical methodologies that are fundamental to research in the field of communication. Utilizing the **R programming language** as the principal analytical tool, the course also introduces students to a range of artificial intelligence (AI) instruments designed to augment traditional data analysis techniques. Completion of this course is mandatory for enrolment in the advanced course COMD7100 Advanced Quantitative Communication Research Methods (Covering a variety of methodologies, including but not limited to multilevel modelling, MANOVA, logistic regression, Structural Equation Modeling (SEM) with M*plus*, meta-analysis, network analysis, and time-series analysis; the course employs **M*plus*** and **R** for hands-on applications.) offered in the subsequent academic semester.

Course Goals

- To familiarize students with classical statistical methods pertinent to research in communication.
- To establish a high level of proficiency in utilizing the R programming language for performing a range of statistical analyses.
- To provide foundational knowledge and skills required for enrolment in the advanced course COMD7100 Advanced Quantitative Communication Research Methods.

Course Intended Learning Outcomes (CILOs)

This course seeks to impart both a rigorous grounding in traditional statistical methodologies and a familiarity with emergent artificial intelligence tools, thereby offering a comprehensive pedagogical approach to the study of data analysis in the field of communication research.

- Conceptual Understanding: Develop a nuanced comprehension of the core theories and methods in classical statistics through "**manual calculations"** and acquire an

introduction to artificial intelligence tools employed for data analysis in communication research.

- Technical Proficiency: Achieve proficiency in employing the R programming language for classical statistical methods, while gaining foundational familiarity with artificial intelligence tools designed to augment data analysis.
- Analytical Skills: Demonstrate the capability to select and apply suitable statistical methods in R, enhanced by artificial intelligence tools, for the resolution of varied research questions in communication.
- Critical Thinking: Evaluate the constraints, assumptions, and appropriateness of diverse statistical methodologies and the functionalities of artificial intelligence tools, ensuring methodological rigor in research endeavors.
- Foundational Competency: Fulfill the foundational skill set and knowledge base essential for enrolment in the advanced course COMD7100 Advanced Quantitative Communication Research Methods.
- Effective Communication: Articulate the implications of results derived from both classical statistical and artificial intelligence-augmented data analyses in a manner that is comprehensible to a diversified audience.

Textbook

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.

Supplemental readings

install.packages("swirl")
library(swirl)
install_course("Statistical Inference")
swirl()

- Welkowitz, J., Cohen, B. H., & Ewen, R. B. (2006). *Introductory statistics for the behavioral sciences*. John Wiley & Sons.
- Kline, P. (1994). *An Easy Guide to Factor Analysis (1st ed.)*. Routledge.
- Wickham, H., Çetinkaya-Rundel, M., & Grolemund, G. (2023). *R for data science*. O'Reilly Media, Inc.

Class Materials (subject to change)

Week	Date	Topic & Description	Reading
1	Sept. 7	Engaging with Statistics: Features of R, RStudio, and Initial Exposure to AI Tools	• Cohen et al., Introduction • Wickham, H. & Grolemund, G. (2023). "R for Data Science". Chapter on Getting Started.
3	Sept. 14	Descriptive Statistics and Correlation Analysis: Basic Measures and Visualization in R	• Welkowitz et al. on Descriptive Stats • Cohen et al., on Correlation analysis
2	Sept. 21	Introduction to Hypothesis Testing: Null and Alternative Hypotheses, Significance Levels	Cohen et al., Chapter on Hypothesis Testing
4	Sept. 28	t-Tests and Chi-Square Tests: Implementation in R	• Welkowitz et al. Chapter on t-tests, chi-square • Agresti, A. (2007). "An Introduction to Categorical Data Analysis". Chapter on Chi-Square Tests.
5	Oct. 5	One-way Analysis of Variance (ANOVA): Interpretation in R	Welkowitz et al., Chapter on ANOVA
6	Oct. 12	Two-way and Interaction Effect ANOVA: Exploration and Interpretation in R	• Cohen et al., Chapter on ANOVA • Maxwell, S.E., Delaney, H.D., & Kelley, K. (2018). "Designing Experiments and Analyzing Data". Chapter on Factorial ANOVA.
7	Oct. 19	Linear Regression (Part 1): Simple Linear Regression and Diagnostics in R	Cohen et al., Chapters on Linear Regression
8	Oct. 26	Linear Regression (Part 2): Multiple Linear Regression, Further Diagnostics and Interpretation in R	Cohen et al., Chapters on Linear Regression
9	Nov. 2	Midterm Exam Covering Weeks 1-8	N/A
10	Nov. 9	Mediation and Moderation (Part 1): Process scripts of Hayes, Introduction and Application in R	• Cohen et al., Chapters on moderation, mediation • Hayes, A.F. (2013). "Introduction to Mediation, Moderation, and Conditional

Week	Date	Topic & Description	Reading
			Process Analysis". Chapter on Mediation and Moderation.
11	Nov. 16	Moderated Mediation and Path Analysis (Part 2): Advanced Topics in R	Cohen et al., Chapter on path analysis
12	Nov. 23	Factor Analysis (Part 1): Introduction, Basic Concepts, Types and Applications in R	Kline, P. (1994). An Easy Guide to Factor Analysis (1st ed.). Routledge.
13	Nov. 30	Factor Analysis (Part 2): Deepening Understanding with Focus on Principal Component Analysis in R, scale development, reliability test	• Kline, P. (1994). An Easy Guide to Factor Analysis (1st ed.). Routledge. • Jolliffe, I.T. & Cadima, J. (2016). "Principal component analysis: a review and recent developments". Philosophical Transactions of the Royal Society A. • Hayes, A. F., & Coutts, J. J. (2020). "Use omega rather than Cronbach's alpha for estimating reliability. But…". Communication Methods and Measures, 14(1), 1-24.

Assessment

Midterm exam	30%
Assignments	30%
Final exam	40%
Total	100%

Academic Honesty & Rules

Plagiarism and Free Rider

- Sharing and group discussion are encouraged but Plagiarism (DIRECT COPYING or copying from generative AI tools without integration) is NOT allowed (from your colleagues or from books / journal papers / web pages)
- Marks for free riders on term papers will be adjusted by the Early Alert System and Peer Review System (i.e., marks for subgroup members need not be equal) - depends on the contribution of individuals.

Class participation:

To maintain an active-learning environment, your participation and active involvement are both welcome and crucial to the success of this course. Lectures will also include material that is not referenced in the textbook. Moreover, you will be graded not only on your on-time attendance but also on your attention in class. Therefore, it is in your best interest to show up to every class.

Course policies:

Deadlines are firm and sacred. No late assignment or project will be accepted. A missing and late assignment, test, or project will lower your final course grade significantly based on the weight of a given item in the grading scheme. All assignments must be typed and double-spaced with 12-point Times New Roman font. The APA style is required.

Rules for naming your electronic files for submission (very important)

Please Note: in the filenames below,

"xx" = group code (G1, G2, G3, etc.)

x Group project report: (G1.doc)