## **Course Description**

# MEDD8932 Conducting quantitative research using secondary data with R software

## **Course description**

This course offers a comprehensive overview of essential practices and tips for conducting quantitative research using secondary datasets with R software. Participants will gain hands-on experience in analysing secondary quantitative datasets as well as in presenting and interpreting the results of basic quantitative data analyses. The topics covered in the course include: 1) Exploring publicly available secondary datasets, 2) R programming and data visualization, 3) Descriptive statistics, 4) Correlation analysis, 5) Hypothesis testing, 6) t-test, 7) Analysis of variance (ANOVA), 8) Simple regression, and 9) Multiple regression. Throughout the course, participants will learn how to use R software to perform various statistical analyses and create relevant visualizations for these topics.

#### **Course objectives**

This course aims to equip students with essential knowledge and skills needed to conduct basic quantitative analyses using publicly available secondary datasets with R software, to interpret the results of these analyses, to effectively present findings in tables and figures, and to apply suitable strategies to address questions that emerge in educational research and practice.

Course learning outcomes (CLOs)		Aligned programme
		learning outcomes (PLOs)
1.	Install, code, and use the R programming language in R Studio to perform	PLOs 1-3
	statistical analyses and create data visualizations.	
2.	Demonstrate a fundamental understanding of basic quantitative analysis in	PLOs 1-2
	educational research, including descriptive statistics, correlation analysis, t-	
	tests, and ANOVA.	
3.	Conduct statistical analyses and effectively present results while reflecting on	PLOs 1-4
	important educational values such as equity and social justice.	
4.	Read, interpret, and critically evaluate the statistical methodologies,	PLOs 4-5
	outcomes, and interpretations found in educational research.	
Course assessment methods		
٠	Individual homework	
٠	Group assignments	
٠	Individual final project	
Course content and topics		
٠	Basic terminology in quantitative research	
٠	Introduction to R language	
٠	Practices in using R programming	
٠	Practices in exploring diverse publicly available secondary education datasets	
٠	Practices in conducting and reporting descriptive statistics	
٠	Conducting and reporting correlation analysis	
٠	Exploring essential elements of quantitative research projects	
٠	p-values and hypothesis testing	
٠	Conducting and reporting t-test	
•	Conducting and reporting one-way analysis of variance (ANOVA)	
•	Conducting and reporting two-way ANOVA	
•	Understanding statistical interactions	
•	Conducting and reporting analysis of covariance (ANCOVA)	
•	Simple regression analysis	

- Coding qualitative variables
- Simple regression analysis using categorical predictors, focusing on the values of equity and social justice.

- Multiple regression analysis
- Developing clear and effective visualizations to present quantitative findings
- Examining, reporting, and visualizing interaction effects in multiple regression

#### Required / recommended readings and online materials

Azar, B. (2006) Discussing your findings. http://www.apa.org/gradpsych/ 2006/01/findings.aspx

Berkman, M. B., & Plutzer, E. (2004). Gray peril or loyal support? The effects of the elderly on educational expenditures. *Social Science Quarterly*, 85(5), 1–16.

- Chang, W. (2012). R graphics cookbook. O'Reilly.
- Cooper, H. (2010). *Reporting research in psychology: How to meet journal article reporting standards*. American Psychological Association.
- Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297-334.

Goodwin, L. D., & Leech, N. L. (2006). Understanding correlation: Factors that affect the size of r. *Journal of Experimental Education*, 74(3), 251–266.

Gopen, G., & Swan, J. (1990). The science of scientific writing: If the reader is to grasp what the writer means, the writer must understand what the reader needs. *American Scientist*, 78, 550–558.

- Jang, S. T. (2018). The implications of intersectionality on Southeast Asian female students' educational outcomes in the United States: A critical quantitative intersectionality analysis. *American Educational Research Journal*, 55(6), 1268-1306.
- Jang, S. T., Halse, C., Lee, D. H. L., & Hon, Q. C. K. (2021). Belongingness and national belonging among youth in Hong Kong. *Youth & Society*. Advance online publication. doi: 10.1177/0044118X211022393
- Jang, S. T. (2023). Sense of school belonging among Asian American and Pacific Islander students in U.S. high schools: A critical quantitative intersectionality analysis. *Teachers College Record*, 125(3), 289-318.
- Jang, S. T. (2023). The schooling experiences and aspirations of students belonging to intersecting marginalisations based on race or ethnicity, sexuality, and socioeconomic status. *Race Ethnicity and Education*, 26(7), 914-935.
- Kim, J., & Mueller, C. W. (1978). *Introduction to factor analysis: What it is and how to do it*. SAGE Series: Quantitative Applications in the Social Sciences #13.

Kutner, M., Nachtsheim, C., Neter, J., & Li, W. (2005). Applied linear statistical models. McGraw Hill/Irwin.

Nicol, A. A., & Pexman, P. M. (2010). *Displaying your findings: A practical guide for creating figures, posters, and presentations.* American Psychological Association.

Verbeke, G., & Mollenberghs, G. (2000). Linear mixed models for longitudinal data. Springer-Verlag.

Wendorf, C. A. (2004). Primer on multiple regression coding: Common forms and the additional

case of repeated contrasts. Understanding Statistics, 3(1), 47–57.

Other additional course information

Advanced Research Methods (ARM) course