Course Description

MEDD8904 Introduction to Factor Analysis and Structural Equation Modeling

Course description
This course is designed to introduce the theory and practice of factor analysis (FA) and structural equation modeling (SEM). Technically, FA and SEM cover a family of multivariate statistical techniques to analyse structural and causal models with observed and latent variables. Methodologically, they offer a quantitative framework for empirical research from the exploratory to confirmatory ends. The course focuses on both theoretical knowledge to understand a variety of topics and practical skills that can be widely applied in social and behavioral sciences. General topics include the exploratory factor analysis, confirmatory factor analysis, path analysis, and general structural equation models. Many special topics and similar variants will be briefly introduced.
Course objectives
This course will adopt a more methodological, rather than statistical, approach towards understanding FA and SEM. The main objective is to introduce FA and SEM as a methodological framework from both the perspectives of research design and data analysis. For the design perspective, it focuses on general knowledge and conceptual theories that can aid in research design; for the analysis perspective, it focuses on specific skills and practical techniques that can be illustrated with real-data examples. Thus, the course is bound with conceptual understanding, statistical analysis, and computational exercise. The goals are to help students: 1) understand the concepts, theory and methodological foundations of FA and SEM; 2) understand the appropriate practice and applications of FA and SEM when conducting empirical research; 3) develop skills to conduct FA and SEM with computer software and procedures of implementation; and 4) develop skills in interpreting, communicating, and reporting results of the analysis.

Course learning outcomes	**Aligned programme learning outcomes (PLOs)**
1. Understand the concepts, theory and methodological foundations of FA and SEM	PLOs 1, 2
2. Understand the appropriate practice and applications of FA and SEM when conducting empirical research	PLOs 1, 3
3. Develop skills to conduct FA and SEM with computer software and procedures of implementation	PLOs 1, 2
4. Develop skills in interpreting, communicating, and reporting results of the analysis.	PLOs 4, 5

Course assessment methods
Homework assignments Class and online discussions
Course content and topics
• From Latent Variable Models to Factor Analysis • Exploratory Factor Analysis • Confirmatory Factor Analysis: Research Design • Confirmatory Factor Analysis: Data Analysis • Path Analysis: Research Design • Path Analysis: Data Analysis • General Structural Equation Models: Research Design • General Structural Equation Models: Data Analysis
Required / recommended readings and online materials
• Chen, J. (2023). Factor Analysis and Structural Equation Modeling in Methodology. Handouts.

- Bollen, K. A. (1989). Structural equations with latent variables. New York, NY: Wiley.
- Hancock, G. R., & Mueller, R. O. (Eds.). (2013). Structural equation modeling: A second course. Information Age Publishing.
- Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). New York: Guilford.
- Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. Washington, DC, 10694(000).

Other additional course information

Prerequisite: Previous enrolment in MEDD8815 Introduction to Statistical Methods