



Applied Structural Equation Modeling (SEM) Course

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Overview

Applied Structural Equation Modeling SEM Course is a five-day intermediate course for researchers, analysts, statisticians, doctoral candidates, evaluation specialists, and market researchers who leave with an SEM Analysis and Reporting Pack. Participants translate theory into path diagrams, test measurement models with confirmatory factor analysis, estimate structural relationships, evaluate fit, validity, mediation, moderation, and group differences, and document defensible interpretations. Agile Leaders Training Center connects SEM decisions with reproducible research evidence.

Who Should Attend

- Teams responsible for quantitative research design and latent-variable analysis
- Functions that develop or validate scales and measurement models
- Personnel who test mediation, moderation, and theoretical relationships
- Researchers who compare constructs and paths across groups
- Reviewers who assess model fit, validity, and reporting quality

The course assumes working knowledge of regression, correlation, factor analysis, and research measurement, and it leaves out introductory statistics, software certification, and advanced multilevel or mixture models.

Departments and Industries

The course supports departments that analyze relationships among measured and latent constructs.

- Academic research, education, psychology, and social sciences
- Market research, customer insight, and behavioral analytics
- Health research, program evaluation, and public policy
- Human resources, organizational research, and workforce analytics
- Data analytics, research methods, and quality assurance

Learning Objectives

By the end of this course, participants will be able to:



- Build theory-led path diagrams and SEM specifications
- Analyze identification, data quality, and estimation choices
- Evaluate confirmatory factor analysis and construct validity
- Apply fit assessment, diagnostics, and justified respecification
- Compare mediation, moderation, and multi-group models
- Build a reproducible SEM interpretation and reporting record

Course Agenda

Day 1: SEM Logic and Model Specification

- Observed and Latent Variable Concept Map
- Path Diagram Notation and Parameter Inventory
- Measurement and Structural Model Decomposition
- Model Specification and Theory-to-Equation Worksheet
- Degrees of Freedom and Identification Checklist

Day 2: Measurement Models and CFA

- Indicator Selection and Measurement Error Map
- Confirmatory Factor Analysis Specification Workflow
- Factor Loading and Residual Review Table
- Reliability, Convergent Validity, and Discriminant Validity Matrix
- Alternative Measurement Model Comparison Plan

Day 3: Estimation, Fit, and Diagnostics

- Data Screening, Missingness, and Distribution Checklist
- Estimator Selection and Assumption Decision Tree
- Global and Local Model Fit Evidence Dashboard
- Residual, Modification Index, and Influence Diagnostic Log
- Theory-Constrained Model Respecification Record

Day 4: Structural Effects and Group Comparison

- Direct, Indirect, and Total Effect Decomposition
- Mediation Model and Bootstrap Evidence Plan
- Moderation and Interaction Specification Matrix
- Multi-Group Model and Measurement Invariance Sequence
- Competing Structural Model Comparison Table



Day 5: SEM Practice and Capstone

- Exercise: Translate a Theory into an Identified SEM
- Exercise: Evaluate a Confirmatory Factor Model
- Exercise: Diagnose Fit and Respecify with Evidence
- Exercise: Interpret Mediation and Multi-Group Results
- Capstone Exercise: SEM Analysis and Reporting Pack

Practical Exercises

The course uses suggested activities to connect statistical output with defensible research decisions.

- Suggested activity: draw a path model, classify variables and parameters, and test identification before estimation.
- Suggested activity: evaluate loadings, residuals, reliability, convergent validity, discriminant validity, and model alternatives.
- Suggested activity: review fit evidence, diagnostics, theory constraints, indirect effects, and group comparisons.
- Suggested activity: assemble a reproducible record of specifications, decisions, results, limitations, and interpretations.

FAQs

Who suits the Applied Structural Equation Modeling SEM Course?

It suits researchers and analysts who test latent constructs and theoretical relationships, and assumes working knowledge of regression, correlation, factor analysis, and measurement.

How does structural equation modeling differ from ordinary regression?

SEM can represent measurement error, latent variables, multiple linked equations, indirect effects, and simultaneous tests of measurement and structural relationships.

What is confirmatory factor analysis in SEM?

Confirmatory factor analysis tests a theory-specified relationship between latent constructs and observed indicators before structural paths are interpreted.

How is SEM model fit evaluated?

Model fit is evaluated through multiple global and local evidence sources, residual patterns, parameter plausibility, assumptions, competing models, and alignment with the research theory.



When is multi-group SEM used?

Multi-group SEM is used to assess whether measurement properties or structural relationships are comparable across defined populations after a defensible invariance sequence.

Conclusion

Participants take back an SEM Analysis and Reporting Pack containing the path diagram, specification, identification check, measurement evidence, fit review, diagnostics, effect interpretation, group comparison, and reporting record. The pack makes analytical choices and limitations traceable. It supports reproducible interpretation without replacing subject-matter theory or statistical judgment.



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