

# Applied Statistics Workshops

Spring 2026

The **Center for Statistical Computing** (CSC) invites all graduate students, staff, and faculty to participate in our Applied Statistics Workshops designed to support research, teaching, and professional growth. Workshops are offered in person in **Lab C** (Upper Level, Healey Library) or online via **Zoom**. These workshops emphasize recently developed statistical methods and use software tools including SPSS, SAS, Stata, R, G\*Power, and AMOS. Participants will receive handouts, program files, and example data sets. Workshop descriptions, schedules, and registration links are provided below.

**Introduction to HLM (Mixed Models) (SPSS):** This workshop provides an overview of the fundamental concepts of multilevel (hierarchical) linear models, also known as mixed effects models. It focuses on why specialized methods are needed to account for data dependencies, such as the clustering of students within schools or repeated observation within individuals. Participants will learn how to formulate and interpret two-level multilevel models, understand fixed and random effects, variance components, and intraclass correlation (ICC), and use SPSS Mixed Models to estimate and interpret model parameters. Basic knowledge of linear regression is recommended.

**Sample Size Estimation and Power Calculations (SAS and G\*Power):** This workshop introduces the principles and practice of sample size determinations and statistical power analysis for common research designs. Using SAS PROC POWER and G\*Power, participants will learn how to calculate required sample sizes, estimate power, and examine the impact of key design assumptions such as effect size, significance level, and group allocation. Examples will focus on mean and proportion comparisons commonly encountered in thesis, dissertation, and grant proposal planning. No prior experience with power analysis is required. Basic statistical knowledge is recommended.

**Introduction to Statistical Learning (R):** This is an introductory workshop that provides an overview of statistical learning methods that are central to modern data analysis, with a focus on regression, classification, and model evaluation. Topics include linear and logistic regression, linear discriminant analysis, tree-based methods such as decision trees, and random forests. Participants will also learn how to evaluate classification models using cross-validation. Dimension reduction and unsupervised learning methods, including principal component analysis (PCA) and clustering, are briefly introduced. All examples are demonstrated using R, with an emphasis on practical implementation and interpretation of results.

**Missing Data Analysis (SAS & Stata):** This workshop introduces the key concepts and practical methods for handling missing data in applied research. Topics include mechanisms of missingness (MCAR, MAR, and MNAR), assessment of potential non-random selection bias, and the use of single imputation and multiple imputation (MI) strategies. Participants will learn how missing data are typically handled by default in statistical software often through complete case deletion and why this approach can lead to reduced sample size and biased results. Hands-on examples using SAS and Stata will

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demonstrate how to implement and interpret imputation procedures and appropriately analyze imputed datasets. Basic familiarity with regression analysis is recommended.

**Introduction to Time Series Analysis (R):** This workshop emphasizes the practical aspects of time series analysis, focusing on commonly used methods for business and applied forecasting. Topics are introduced hierarchically, beginning with basic terminology and exploratory visualization, followed by descriptive statistics, model diagnostics, and concluding with practical modeling and forecasting procedures. Participants will learn how to select an appropriate forecasting method, fit time series models, evaluate model performance, and generate forecasts. The workshop focuses on widely used approaches, including regression-based models, smoothing methods (moving average and exponential smoothing), and autoregressive (AR) models. Practical implementation in **R** is illustrated at each stage of the workshop.

**Predictive Modeling in Data Science: Logistic Regression and Random Forest (R):** This workshop introduces supervised machine-learning classification methods commonly used in data science, with focus on Logistic Regression and Random Forest implemented in R. Participants will learn how to prepare data, build predictive models, tune parameters, and evaluate performance using metrics such as confusion matrices, ROC curves, and AUC. The session aims to equip students with the analytical skills needed to critically evaluate and apply classification methods in research and applied data analysis projects across a wide range of academic disciplines.

**Structural Equation Modeling I (AMOS & R):** This workshop introduces techniques for structural equation modeling (SEM). SEM is employed to test complex relationships between observed (measured) and unobserved (latent) variables. Topics covered include fundamentals underlying SEM, SEM notation, path diagrams, data preparation, mediation analysis, path analysis, parameter estimation, and assessment of model fit. AMOS and R are used to demonstrate examples.

**Structural Equation Modeling II (AMOS & R):** The second SEM workshop delves into advanced topics including measurement error, latent variables analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), development of structural equation models with estimation, and model testing. Additionally, this workshop introduces latent growth models for longitudinal data. An R program and AMOS are utilized to demonstrate model structures, parameter estimation, and model modification.

**Event History Analysis (Survival Models) in SPSS:** This workshop introduces statistical methods for event history (survival) analysis using SPSS, focusing on studies in which the outcome of interest is a time-to-event variable. Topics include estimating survival time using the life table and Kaplan-Meier Methods, modeling survival risk, and assessing the relationship between risk factors and survival time using the Cox proportional hazards regression model. All data analysis and demonstrations are conducted in SPSS, with an emphasis on practical implementation and interpretation of results.

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**Spatial Regression (R):** This workshop introduces spatial data analysis and spatial regression modeling using R, with a focus on applied methods for handling spatial dependence. Participants will learn how to work with spatial data, visualize geographic patterns, and assess spatial autocorrelation. The workshop covers the construction of spatial weights matrices and statistical methods for modeling spatial dependence, culminating in the estimation and interpretation of spatial regression models. All examples are demonstrated using widely used R spatial packages, including exploring *maptools*, *sp*, *sf*, and *spdep*.

**Event-Study Regression using R:** Event-study is a causal inference research design method for analyzing the impact of a specific event on a particular outcome or variable of interest over a defined time period. The event can be considered as the treatment in a Difference-in-Difference (DiD) analysis, and the dynamics of the impact can be assessed by comparing the changes in outcomes over the time between the treated and control groups. This workshop will make use of a variety of R packages, specifically, *fixest*, *plm*, and *did* for event-study regression. Topics covered include data preparation, DiD analysis, dynamic DiD model, and the graphic display of the dynamic event effects.

## Registration Procedures:

Seats and handouts are limited. Please register in advance.

1. Click the 'In-person Register' or 'On-Zoom Register' under Registration.
2. Fill out all the information requested and submit your registration.
3. Join the workshops via Zoom link in the confirmation email or attend in-person sessions for in-person workshops.

All in-person workshops will be held in **Lab C** on the upper level (UL) of Healey Library.

Please contact Mr. Inal Mashukov at [inal.mashukov001@umb.edu](mailto:inal.mashukov001@umb.edu) for any questions regarding the workshops.

**Web:** [https://www.umb.edu/academics/graduate/info\\_for\\_graduate\\_students/center\\_for\\_statistical\\_computing](https://www.umb.edu/academics/graduate/info_for_graduate_students/center_for_statistical_computing)

**Location:** **Healey Library, Gold Lab.** From the main elevators in Healey Library, take the Upper level (UL). Turn right out of elevator, and you'll find Gold Lab on the left in the hallway)

## Spring 2026 Applied Statistical Workshop Schedule:

Topic	Date	Day	Time	Registration
Intro to HLM (Mixed Models) (SPSS)	Feb. 11	Wednesday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>

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Sample Size Estimation & Power Calculations (SAS)	Feb.25	Wednesday	11:00-1:00 P.M.	<a href="#">In-Person Register</a>
Intro to Statistical Learning (R)	Feb. 27	Friday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>
Missing Data Analysis (SAS & Stata)	Mar. 03	Tuesday	11:00-1:00 P.M.	<a href="#">In-Person Register</a>
Intro to Time Series Analysis (R)	Mar. 05	Thursday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>
Logistic Regression and Random Forest in R	Mar. 26	Thursday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>
Structural Equation Modeling I (AMOS & R)	Mar. 31	Tuesday	11:00-1:00 P.M.	<a href="#">In-Person Register</a>
Structural Equation Modeling II (AMOS & R)	Apr. 07	Tuesday	11:00-1:00 P.M.	<a href="#">In-Person Register</a>
Event History Analysis (Survival Models) in SPSS	Apr. 9	Thursday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>
Spatial Regression (R)	Apr. 10	Friday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>
Event-Study Regression using R	Apr. 13	Monday	11:00-1:00 P.M.	<a href="#">On-Zoom Register</a>