UW SISCER 2025
Module 9: Joint Modeling of Longitudinal and Survival Data
July 17–18, 2025

Longitudinal studies follow individuals over time and repeatedly measure health status. Analyses of longitudinal data are often complicated by several factors that can threaten the validity of standard analysis methods. First, missing data in longitudinal outcomes can arise when individuals are lost to follow-up, either due to drop-out (e.g., in randomized trails) or death (e.g., in long-term observational studies). Second, when modeling intermittently measured time-dependent covariates in a survival analysis, biological variation can lead to measurement error. Joint modeling of longitudinal and survival outcomes has emerged as a novel approach to handle these issues.

We will detail the use of mixed-effects models for the analysis of repeated longitudinal measures, Cox regression models for the analysis of event-time outcomes with longitudinal measures as time-dependent covariates, and their combination in a joint modeling framework. An in-depth data analysis (conducted in R) will be used to discuss analysis strategies, the application of appropriate analysis methods, and the interpretation of results.

This course is targeted toward individuals with some prior experience with statistical methods for longitudinal data analysis and survival analysis. Individuals with no prior experience with longitudinal data analysis should consider Module 7: Generalized Estimating Equations and Mixed-Effects Models for Longitudinal Data Analysis. Individuals with no prior experience with survival analysis should consider Module 4: Introduction to Survival Analysis.

Overview and Schedule
* All times are Pacific Daylight Time (PDT)

Thursday, July 17

8:30 – 8:45	Introductions, motivation, examples	Live lecture
8:45 – 9:30	Longitudinal data analysis	Live lecture
9:30 – 9:45	Break	
9:45 – 10:15	Data analysis and discussion	Live lecture + on your own
10:15 – 10:45	Survival data analysis	Live lecture
10:45 – 11:00	Break	
11:00 – 11:15	Survival data analysis	Live lecture
11:15 – 11:45	Data analysis and discussion	Live lecture + on your own
11:45 – 12:00	Wrap-up and questions	Live lecture

Friday, July 18

8:30 – 8:45	Review and questions	Live lecture
8:45 – 9:30	Joint regression models	Live lecture
9:30 – 9:45	Break	
9:45 – 10:15	Joint regression models	Live lecture

10:15 – 10:45	Data analysis and discussion	Live lecture + on your own
10:45 – 11:00	Break	
11:00 – 11:30	Data analysis and discussion	Live lecture + on your own
11:30 – 12:00	Discussion and summary	Live lecture

Resources
- All course materials and links are posted on the SISCER Module 9 webpage (access for module registrants only).
- All live lectures will take place via Zoom.
    - Links to live sessions are posted on the SISCER Module 9 webpage and Slack.
    - Please keep your audio muted unless you are speaking.
    - Please feel free to interrupt and ask questions!
    - The chat is unlikely to be closely monitored.
    - Live lectures will be recorded, with access to recordings provided via the SISCER Module 9 webpage.
- A Slack channel in the UW Biostatistics SISCER Slack workspace is available for discussion and questions outside of live lectures.
- All data analyses will be conducted using the current version of R (www.r-project.org) within RStudio (www.rstudio.com). Please have the `JM`, `ggplot2`, `survminer`, and `dplyr` extension packages installed in advance.
- R commands will be provided in both an R script file (.R) and an R Markdown file (.Rmd). If you wish to execute the R Markdown file, please install the necessary extension packages in RStudio.
- After the course, please complete the course evaluation through your SISCER account. I appreciate your feedback! (After you complete the evaluation, you will be able to download a certificate of completion.)