ST 790-002, Advanced Survival Analysis, Fall 2012
Monday & Wednesday 3:00 - 4:15PM, Riddick Hall 314

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Course Prerequisite: ST 521, 522.

Course Resources:


- Additional Online Materials: Please refer to my homepage, teach section. The contents will be updated regularly.

Course Description: Censored survival data are commonly encountered in many disciplines such as economics, public health, medicine and industrial engineering. Examples include the duration of unemployment, the lifespan of system components, and the time to cancer recurrence or death, among many others. A key feature in survival data analysis is that the event times of interest, namely the failure times, may not always be observed due to censoring, which makes it a typical missing data problem. Since the introduction of the counting process and the associated martingale theory (Aalen, 1975) into its framework, modern survival analysis has advanced enormously in the last three decades.

This course will give a comprehensive review of a variety of statistical concepts, methods and theories in censored survival data analysis. The topics include basic concepts of censoring, hazard, survival function, counting process and its associated martingale theory, the Kaplan-Meier estimator, the weighted log-rank test, the Cox proportional hazards (PH) model, the proportional odds model, the additive hazards model, the linear transformation model, and the accelerated failure (AFT) time model. Focus will be on the development of statistical methods and theory for various semi-parametric regression models, such as the partial likelihood principal for the Cox PH model and its associated counting process based martingale theory, the estimating
equations for the linear transformation model, the rank estimation for the AFT model. If time is allowed, the modeling and inference of multivariate survival data, such as the marginal model and the frailty model, will also be introduced.

**Grading:** Letter grade will be given based on homework (30%), class participation (20%), mid-term exam (25%) and the final project (25%).

**Disability Regulation:** Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

**Online evaluation:** Online class evaluations will be available for students to complete during the last two weeks of class. The website is https://classeval.ncsu.edu. Any comments and suggestion on this course are greatly appreciated.