**MACQUARIE UNIVERSITY**  
**STATISTICS DEPARTMENT COLLOQUIUM SERIES**

**Speaker:** Ali Shariati (HDR Student at Department of Statistics)  
**Date:** Tuesday 24 April 2018  
**Time:** 1-2pm  
**Venue:** Room 264, 14 Sir Christopher Ondaatje Avenue

**Title:** Nonparametric Inference via Empirical Likelihood for Survival Data in Presence of Biased-sampling

**Abstract:**

Survival data collected in a cohort of prevalent cases may be used to draw statistical inference on survival functions. Since non-random sampling of subjects is involved, the survival data collected in this sampling scheme are biased. When the so-called stationarity of the incidence is satisfied, occurring when the incidence rate is constant, it is more practical and efficient to apply a prevalent cohort study for unconditional statistical inference in comparison to conduct analysis by conditioning on the observed truncation times. The data collected in this sampling scheme has been proven to be length-biased.

While prospective prevalent cohort studies are commonly performed to evaluate the natural history of a disease, observations of many other sampling schemes have been reported to be length-biased. Besides, although renewal theory originally arose from the study of some particular probability problems connected with failure and replacement of components, it has been developed in previous decades into the investigation of a quite wide range of practical probability problems, one of which is length-bias.

In this talk, I will discuss the different types of sampling schemes through which length-biased data arises. Then the link between backward and forward recurrence times in a renewal process with the truncation variable and the residual lifetime in survival analysis are discussed. The study of the length-biased observations and associated variables through renewal theory is reviewed. Then, the problem of making inference through empirical likelihood method for the survival data in presence of length-biased sampling is discussed. As the survival data of interest in practice is frequently associated with right censoring, another empirical likelihood method is proposed to study right censored length-biased survival data.

**Keywords:** Backward recurrence time, Empirical likelihood, Forward recurrence time, Length-bias, Prevalent cohort, Renewal theory, Right-censoring, Stationary Assumption, Survival data, Truncation.