Course Title

Modeling and analysis of cancer screening data

Category

methodology

Target Audience

graduate students, applied statisticians, researchers

Prerequisites for Participants

A mathematical statistics course at the senior undergraduate level

Computer and Software Requirements

R/SPLUS or Visual C/C++

Course Description

Abstract

Screening is widely used in our daily life: in the early detection of chronic disease. Using cancer screening as an example, we will provide a concise account of probability modeling and statistical analysis of screening data. The progressive model for tumor growth will be introduced, with probability calculation of different events. Four topics will be covered: 1). Estimating the three key parameters: sensitivity, the time duration in the preclinical state, and the disease-free state; 2). Estimating the distribution of lead time, the early diagnosis time gained by screening. 3). Evaluating the long-term outcomes, i.e., percentage of over-diagnosis,

true early-detection, no-early-detection, and symptom-free-life. 4). Scheduling of the first and the upcoming screening exams based on one's screening history. Some open problems in screening will be presented. The intended level is for applied statisticians/researchers/graduate students. The prerequisite is having taken a probability course at the senior undergraduate level, and some basic computing
skills using R/S-PLUS.