

Principles of Statistical Design

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This course covers the principles and practice of statistical design, paying attention to the setup and implementation of an experiment, and the underlying theory that allows valid inferences. Such details are important in obtaining the proper error terms for treatment inferences in complicated designs.

The course will begin with a review of the basic tools for statistical design. The more common designs will be covered (factorial completely randomized designs, randomized complete blocks) and their variations (such as Latin squares). Emphasis is on designing the experiment to obtain the best inference on treatment contrasts, and the designs are illustrated with real data problems taken from many areas: agriculture, engineering, public health, etc. There is a focus on microarray designs, and we will spend time on split plots and their variations (crossover and repeated measures), and then move to confounding (incomplete blocks). These designs are the basis of many microarray experiments. If time permits we can also discuss how to analyze data from these designs using the statistical package R.

The course is aimed at professional-level statisticians or interested faculty and graduate students. Attendees should have a working knowledge of statistical methodology and data analysis (for example from Rawlings et al. Applied Regression Analysis (1998, Springer-Verlag). The course is based on my textbook Statistical Design (2008, Springer-Verlag)