LTCC Proposed Course

- Title: *Empirical Likelihood and Its Applications*
- Basic Details:
  - Core Audience: graduate students in statistics
  - Course Format: 10 hours lectures
- Course Description: The aim of this course is to introduce the statistical inference methods based on the empirical likelihood (EL). Those methods are nonparametric by nature, but they enjoy the convenience of the conventional parametric likelihood methods. Furthermore, the EL provides an alternative solution when the more traditional statistical methods do not apply. The course will focus on the main idea, methodology and applications. In fact we present two concrete applications for which empirical likelihood provides natural and feasible solutions while other methods seem not applicable. The course also contains a gentle introduction on nonparametric regression and deterministic chaos.

  - Keywords: empirical distribution, empirical likelihood, empirical likelihood ratio test, bootstrap calibration, estimation equations.
  - Syllabus:
    1. Introduction: why empirical likelihood: an illustration by example
    2. EL for means: empirical distribution, profile empirical likelihood for mean, empirical likelihood ratio tests, confidence regions.
    3. EL for random vectors: empirical likelihood for vector, computation and bootstrap calibration, empirical likelihood for smoothing functions.
    4. EL for estimation equations: estimation equations, tests and interval estimation with estimation equations.
    5. Estimation for conditional distributions: global fitting versus local fitting — an illustration by example, kernel methods, bias-variance tradeoff, local constant and local linear estimators for conditional distributions, estimation based on empirical likelihood.
    6. Tests for deterministic systems: chaotic deterministic systems, Lyapunov exponents, tests for Lyapunov exponents based on empirical likelihood.
  - Recommended reading: Owen, A.B. (2001). *Empirical Likelihood*. Chapman & Hall/CRC, London.
  - Prerequisites: a good knowledge in statistical inference methodology, especially in the likelihood based methods.

- Format:
  - A single problem sheet, containing comprehensive exercise for the first two sections of the course will be given, with solutions at the end of the course.
  - Lecturenotes will be made available for download.
  - Some relevant R codes will be available for download for those who are interested in having some hand-on experience. The course itself does not organise any computing sessions, neither requires the knowledge in R.
  - Proposed timing: November – December 2009.
- Lecturer Details:
  - Lecturer: Qiwei Yao
  - Lecturer home institution: London School of Economics