Hong Kong WSC 2013 - Short Course programme

COURSE TITLE

An Introduction to Meta-Analysis

DURATION

1.5 days

INSTRUCTOR 1

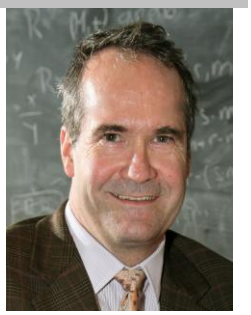
Elena KULINSKAYA, Professor, University of East Anglia, UK

BIOGRAPHICAL SKETCH

I graduated in Mathematics from Moscow University and earned my Ph. D. in Statistics from University of Vilnius in 1987. I worked in a number of Russian academic institutions before moving to Australia in 1992, where I joined La Trobe university in Melbourne. I moved to UK in 1998 to take up the Readership in Statistics from the University of Hertfordshire. In 2004-2010 I was the director of Statistical Advisory Service at Imperial College London. I took up my current position as the Aviva Chair in Statistics at the University of East Anglia, in March 2010. I am involved in research, teaching and consulting.

INSTRUCTOR 2

Stephan MORGENTHALER, Professor, EPFL, Switzerland



BIOGRAPHICAL SKETCH

I studied Mathematics at ETH in Zurich and then enrolled as a Ph.D. student at Princeton University. I earned a Mathematics Diploma in 1979 and a Ph.D. in Statistics in 1983. My first academic job was an instructorship in the Mathematics Department of M.I.T. in Cambridge (USA). This was followed by a position of Assistant and later Associate Professor in the Statistics Department of Yale University (New Haven, USA). In 1989 I returned to Switzerland and took up my current position at the Ecole polytechnique fédérale in Lausanne (Switzerland). I teach, do research and consult.

INSTRUCTOR 3

Robert STAUDTE, Emeritus Professor of Statistics, La Trobe University, Australia

BIOGRAPHICAL SKETCH

Professor Staudte received his PhD in Statistics from the University of Illinois, Urbana-Champaign in 1968, and began his career at Michigan State University. He joined La Trobe University in 1974. He is a past Associate Editor of the *J. Statist. Plan. & Inf. and Statist. & Prob. Letters*. His research is in robust statistics and biostatistics, with 4 books and more than 60 research articles. He has been a visiting scholar at the Swiss Federal Institutes of Technology in Zurich and Lausanne, Carlos III U. of Madrid, Queen's U. in Kingston, U. Paris VII, UC Berkeley, U. Geneva and Cornell U.

COURSE DESCRIPTION

This course explains how data from different sources, all relevant to a common problem, can be combined. The simplest form of combination happens when K individual estimates of a treatment effect are combined to compute a meta-estimate. The individual

estimates are often of varying quality and some kind of weighing is essential. Finally, an assessment of the meta-estimate's quality is necessary, most often in the form of a confidence interval. The statistical tools of meta-analysis will be presented in detail. They are the choice of effects (risk difference, relative risk and log-odds ratios for rates and difference or ratio of means and standardized difference of means for continuous data), the computation of meta-estimates (mainly inverse variance weighing, but also variance stabilizing transformations), random effect models versus fixed effect models, meta regression and graphical techniques (forest and funnel plots).
The course will also discuss the consequences of source biases and how to counter them through meta-regression and censored models.

SYLLABUS

A catalogue of effect sizes and the possible benefits of a meta-analysis or meta-regression, presented in the context of real data sets from the medical and ecological literature dealing with substantive questions to do with health or conservation.
Classical inverse variance weights (IVW) applications for fixed effects models (FEM).
Extension to random effects models (REM) and meta-regression.
How variance stabilization of effect sizes leads to a simple to understand, unified theory of meta-analysis and why it can be expected to overcome the failings of the standard methodology.
Graphical means of diagnostics and bias detection. Bias modeling and adjustment. Introduction to advanced topics of meta-analysis. Examples and practice sessions will use R statistical language for analysis of the data.

TARGET AUDIENCE

The course is open to any statistician or professional with some knowledge of estimation and assessment of uncertainty. Some knowledge of R would be beneficial. The examples will mainly be drawn from medical statistics, epidemiology, and ecology but the extension to other areas such as education, environmental engineering, quality and risk assessment, etc. are straightforward.

The participants will get more from this course, if they bring their own laptop with the free software package R installed and with the R-package metafor installed as well.