Spatial Analysis in Epidemiology

June 20-22, 2011, 9:30 to 17:00

Villa Gualino, Viale Settimio Severo 65, Turin, Italy

Organization:

INEQ-CITIES: project on Socio-economic inequalities in mortality: evidence and policies in cities of Europe

EPIWORK: project on developing the framework for an epidemic forecast infrastructure

Master of Epidemiology of Torino University and ISI Foundation

Course directors:

Prof. Annibale Biggeri
Department of Statistics 'G. Parenti', University of Florence, Italy

Prof. Marc Saez
Research Group on Statistics, Applied Economics and Health (GRECS), University of Girona, Spain and CIBER of Epidemiology and Public Health (CIBERESP)

Programme:

Monday, June 20, 2011

- Introduction to Spatial Analysis
- The role of Spatial analysis in Epidemiology
- Type of Spatial Data
  - Geostatistical data
  - Areal data
  - Point pattern data

- Disease Mapping
- Disease Atlases
- Maps and their use
- Heterogeneity and extra-variability
- Methods for small area mapping
- Bayesian approaches to Disease Mapping
- Spatial Autocorrelation

Tutorials:
- Introduction to R and GeoR commands.
- Mapping using different scales
- Bayesian approaches and autocorrelation

Tuesday, June 21, 2011

- Introduction to Bayesian Inference
- Frequentist vs. Bayesian approaches
- Bayes's theorem and Bayesian summary statistics
- Sampling from the posterior distribution - Laplace approximations
- Choosing the prior distribution

- Bayesian approaches to modelling areal and point pattern data
- Hierarchical models
- Areal data: Conditionally Autoregressive models
- Besag, York and Mollié model
- Bayesian Geostatistics
- Model checking and Multiple Inference in Descriptive Epidemiology

Tutorials:
- Introduction to WinBugs and R-INLA
- Bayesian Poisson-Gamma model
- CAR models and BYM convolution model
- Bayesian Geostatistics

Wednesday, June 22, 2011

- Ecological Regression Studies
- Examples of correlation studies.
- Interpretation of results from ecological regression studies.
- Confounding, effect modification and Ecologic Bias.
- Bayesian Ecological regression.

- Multilevel model and contextual effects
- Firebaugh and Cronbach's model.
- Interpretation of results from multilevel analysis.
- Bayesian approaches
- Examples.

Tutorials:
- Explore the relationship between material deprivation and mortality using a real data set. Fit a simple Poisson regression model, take into account confounding by location. Fit hierarchical regression models and Bayesian Ecological regression.
- Discuss the risk of over-adjustment.
- Define a multilevel analysis. Fit a Multilevel Poisson regression model. Fit hierarchical regression models and discuss the results.

Audience of the course:

The intended audience of the course are epidemiologists, biostatisticians, people who work in public health and master students in these fields. Prerequisites are a knowledge of statistics up to a basic understanding of regression models and of any statistical software, preferable R.

Why to attend:

This course is designed to provide advanced coverage of disease mapping applied to public health and epidemiology. Participants will gain an in-depth understanding of the basic issues, methods and techniques used in the analysis of spatial health data using a Bayesian approach.

Software:

R 2.10 (or an updated version) (please download from http://cran.r-project.org/)

INLA (please download from http://www.r-inla.org/)

WinBUGS 1.4.3
(please download from http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml)

Application procedure:

Please refer to the brochure at: www.isi.it
Please note the deadline for application has been extended to April 20th 2011