



Announcing an in-person course sequence:

**Using R for Bayesian Spatial and Spatio-Temporal Health Modeling
Parts I, II**

June 1st – 2nd 2023

COURSE CONTENT

These courses are designed to provide a comprehensive introduction to the area of Bayesian disease mapping using R in applications to Public Health and Epidemiology: Part I will run on June 1st and Part II on June 2nd, 2023.

Part I consists of sessions dealing with:

AM

- Basic concepts of Bayesian methods and disease mapping
- Bayesian computation: MCMC and alternatives

PM

- R graphics for spatial health data
- Bayesian Hierarchical Models for disease mapping (BHMs):
Simple models: Poisson-gamma; log-normal, convolution.
Variants: Leroux, mixture, BYM2.
- Model goodness of fit
- Demonstration of risk estimation and using BRugs/OpenBUGS

Part II consists of sessions dealing with

AM

- Nimble
- CARBayes
- INLA

PM

- Space-time modelling with McMC (Nimble)
- Space-time modelling with INLA
- Clustering in space and space-time
- Infectious disease modelling and surveillance

This workshop sequence is designed for those who want to cover mapping methods, and the use of a variety of software and variants in application to small area health data.

The course will include theoretical input, but also practical elements and participants will be involved in hands-on in the use of R, BRugs (OpenBUGS), Nimble, CARBayes and INLA in disease mapping applications. Both human and veterinary examples will be covered in the course as well as simple space-time modelling. Examples will range over congenital anomaly birth data, a lung, larynx and oral cancer example, foot and mouth disease in the UK, and influenza and Covid-19 space-time modeling in South Carolina.

THE SPEAKER

Andrew B. Lawson (Department of Public Health Sciences, College of Medicine, Medical University of South Carolina) is a MUSC Distinguished Professor Emeritus and a World Health Organization (WHO) advisor on Disease Mapping and organized with WHO an international workshop on this topic which has led to an edited volume "Disease Mapping and Risk Assessment for Public Health". He recently acted as chief editor of the CRC Handbook of Spatial Epidemiology (2016). He has published a number of books focused on disease mapping and spatial epidemiology. In particular, the 3rd edition of the book: Lawson, A. B. *Bayesian Disease Mapping* CRC Press, appeared in 2018.

The recent addition:

Lawson, A. B. (2021) *Using R for Bayesian Spatial and Spatio-Temporal Health Modeling*. CRC Press. will be a course text for the workshop. A copy of this book is included in the fee for the course.

WHO SHOULD ATTEND

The course is intended for epidemiologists and public health workers who need to analyse geographical disease incidence. In addition, the course sequence may be of interest to statisticians or geographers and planners who deal with spatial disease data. Some statistical/epidemiological background would be beneficial but not essential. Experience of basic R use is assumed.

WHY ATTEND

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 on R. They will gain insight into the detailed analysis of practical problems in risk estimation and cluster detection. The course is presented by an acknowledged expert in the field of disease mapping and spatial epidemiology.

COURSE FEE AND REQUIREMENTS

Booking of the two-day course sequence is \$1000.

Early Bird rate of \$600 before May 20th

Attendees are recommended to pre-load: OpenBUGS (most recent version). Datasets will be provided. R software can be downloaded from the following websites: <http://cran.wustl.edu>
OpenBUGS can be downloaded from <http://www.openbugs.net/w/Downloads>

A variety of R packages will be used in the workshop. The main R packages used will be BRugs, Nimble, CARBayes, and INLA. The graphics libraries mapproj, sp, spdep, sf, tmap, and ggplot2 will also be used.

INLA can be downloaded with the R command:

```
install.packages("INLA", repos=c(getOption("repos"), INLA="https://inla.r-inla-download.org/R/stable"), dep=TRUE)
```

BRugs, Nimble, CARBayes, can all be installed from CRAN repositories in standard way. Additional R packages will be needed, and notification of these will be sent to participants in the joining instructions.

VENUE

This workshop will be hosted by the Medical University of South Carolina, Department of Public Health Sciences, 195 Cannon Street, Charleston, South Carolina. The location of the workshop is TBA.

Registration queries can be made with Paula Talbot (talbotp@musc.edu).
Technical queries can be made to Andrew Lawson (lawsonab@musc.edu)