



Spatio-Temporal Statistical Modelling

**A Short Course in Sydney presented by
Noel Cressie and Andrew Zammit Mangion
(NIASRA, UOW)**

**Monday, 7 December 2015
Sydney Business School
Gateway Building, 1 Macquarie Place, Circular Quay**

Overview

Good scientific data collection involves a protocol that specifies where (i.e., spatial locations) and when (i.e., temporal instants) measurements are taken. Scientists want to answer “why” questions, and often space and time play critical roles. This short course offers an intermediate-level introduction to spatio-temporal statistical modelling, with case studies drawn from the environmental and ecological sciences.

The Course

This one-day course considers a systematic approach to key quantitative techniques for the analysis of spatio-temporal data, with a particular emphasis on hierarchical (empirical and Bayesian) statistical modelling. The course is divided into four subsections, each motivated by environmental and ecological case studies.

- Overview of Statistical Modelling of Spatial Data and Processes (key concepts of hierarchical modelling; overview of requisite background in spatial statistics).
- Descriptive Analysis of Spatio-Temporal Data (exploratory techniques for spatio-temporal data including visualisation and empirical dimension-reduction).
- Fundamentals of Spatio-Temporal Statistical Modelling (spatio-temporal covariance functions and spatio-temporal kriging; relationship between processes and covariance functions; non-Gaussian and non-linear mixed-effects models).
- Dynamical Spatio-Temporal Models (Bayesian hierarchical and empirical hierarchical modelling perspectives; data, process, and parameter models for dynamical spatio-temporal systems; parameterisation approaches for dealing with the curse of dimensionality; computation)

Participants will receive a printed copy of the slides used in the presentations. No text is required but references and examples will be drawn from the book, *Statistics for Spatio-Temporal Data* by Noel Cressie and Christopher K. Wikle (Wiley, 2011). There will be no computer-lab sessions but software demonstrations and sources will be given.

Target Audience

This course is aimed at researchers and students with a Bachelor-level understanding of probability, statistical inference, and matrix algebra.

Instructors



Noel Cressie is Distinguished Professor in the National Institute for Applied Statistics Research Australia (NIASRA) and the School of Mathematics and Applied Statistics at the University of Wollongong, Australia. He is the author of three books including *Statistics for Spatio-Temporal Data* by Noel Cressie and Christopher K. Wikle (Wiley, 2011). Among many honours, Noel has received the 2014 Pitman Medal from the Statistical Society of Australia.



Andrew Zammit Mangion is Statistical Computing Scientist in the National Institute for Applied Statistics Research Australia (NIASRA) at the University of Wollongong, Australia. He obtained his PhD from the University of Sheffield, UK on spatio-temporal modelling, and he has subsequently applied his work in several contexts within the social and environmental sciences. In 2013 Andrew was awarded a National Academy of Sciences prize for his work on the modelling and prediction of armed conflicts.

Related Conference

This workshop takes place the day before the Eco-Stats '15 conference at the University of New South Wales (UNSW), 8-10 December.

See <http://www.eco-stats.unsw.edu.au/ecostats15.html> for more information about the UNSW conference.

Fees and Information

Course	Date	Fee	SSAI Members	Students
Spatio-Temporal Statistical Modelling	7 December 2015	\$700	\$600	\$400

Location: Sydney Business School, Gateway Building, 1 Macquarie Place, Circular Quay

Schedule: Monday 7 Dec: Registration 9-9:20; course from 9:30 to 4:30

Breaks: Morning and afternoon coffee/tea and a sandwich lunch are included in the course fee.

Contact: Anica Damcevski, anica@uow.edu.au or 02 4221 5435, to register and for further information.

Other NIASRA Short Courses in 2015 (visit niasra.uow.edu.au)

The Questionnaire Revealed: Questionnaire Design & Testing

Pamela Campanelli

Sydney Business School, Circular Quay

Thursday and Friday, 15-16 October 2015

\$1400 (\$1200 SSAI members, \$800 students)

Internet Surveys: Visual Design and Implementation

Pamela Campanelli

Sydney Business School, Circular Quay

Friday, 23 October 2015

\$700 (\$600 SSAI Members, \$400 Students)