

# MATH5805 Special Topic in Statistics – Random Fields & Geometry

Prof. Robert Adler, Technion, Haifa

Semester 2 2008 – Day & Time TBA  
School of Mathematics & Statistics, UNSW

The course will, essentially, be in two parts, although the division will be informal.

The first part will treat the general theory of random (mainly Gaussian) fields, or processes on quite arbitrary parameter spaces: e.g. high dimensional Euclidean space, general metric spaces, and manifolds. Most of this theory (e.g. continuity and boundedness issues) is independent on the geometry of the parameter space. This will not be the main part of the course, but will be necessary to set the formal prerequisites for the main part.

The second part will treat various geometric problems related to random fields using techniques developed over the last three decades, but greatly expanded and developed over the last five years.

This is the main part of the course. Much of this (e.g. global behaviour) is specific to the geometry of the parameter space. On the theoretical side, it makes for a nice blend of probability and geometry and on the applied side it has immediate applications to areas such as brain mapping and astrophysics.

The course should be of interest to probabilists, statisticians, and geometers.

**If possible students should attend a short meeting on Tuesday 29<sup>th</sup> July at 1.00pm in Room 3085 Red Centre Central, Level 3 to decide an appropriate time and day for the course and a small discussion on the course content.**

For the last two and a half decades most of Prof. Robert Adler's work has concentrated on the study and application of stochastic processes which, in one form or another, have a strong spatial component. (As opposed to the usual study of temporal processes.) These are called random fields. In particular, he is interested in the geometrical properties of various structures generated by these processes.

His work on random geometry, the basis of which was done in the late 1970's, has been used in areas as diverse as astrophysics and mapping the structure of the brain.