

Isaac Newton Institute for Mathematical Sciences: Preliminary announcement

Infectious disease dynamics: a 4-week programme to be held in the summer of 2013.

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Programme:

On January 1, 2013, it will be twenty years since *Epidemic Models* started as a 6-month programme in the first year of the Isaac Newton Institute for Mathematical Sciences. Since then, the field has grown enormously, in topics addressed, methods and data available (e.g. genetics/genomics, immunological data, social, contact, spatial, and movement data were hardly available at the time). As far as mathematical approaches are concerned, many methods currently used were either not available twenty years ago, or stayed firmly within mathematics and statistics because we could not recognise their importance for lack of the right data, or for lack of asking the right questions. One can think of MCMC, Bayesian analysis, bioinformatics, individual-based modelling, structured population modelling (both deterministic and stochastic), and much more. Apart from these advances, there has also been an increase in the need for these approaches because we have seen the emergence and re-emergence of infectious agents worldwide, and the complexity and non-linearity of infection dynamics, as well as effects of prevention and control, are such that mathematical and statistical analysis is essential for insight and prediction, now more than ever before. Where in 1993 there was hardly any link to public health policy and decision making in infectious disease control, nowadays this link is firmly established. Much research is no longer devoted to generic insights into dynamics, as it was prior to 1993, but rather to very precise insights into focussed questions regarding specific infectious diseases.

The four-week programme Infectious Disease Dynamics will:

- take stock of progress in the last twenty years, following on from the original Newton meeting; to assess where we are today and provide a synthesis;
- take a systematic look at the use of models to inform public health decisions, and to analyse where and why models fail in their predictions;
- set the agenda for future research and in particular determine the main challenges, both in understanding & public health needs and in methodology; and
- foster collaboration and a new generation of young talented researchers with the aim of starting to address some of the challenges identified above, through a programme of concrete research activities.