



## Specialist Course

# STATISTICAL ANALYSIS OF SOCIAL NETWORKS

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Aula Cucconi

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### Schedule

Monday	July 1	10.30 – 12.30 14.30 – 16.30
Tuesday	July 2	10.30 – 12.30 14.30 – 16.30
Wednesday	July 3	9.30 – 11.00 14.30 – 16.30

# Statistical Analysis of Social Networks

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## Abstract

This short course is an overview of (social) network modeling from the perspective of a statistician.

Network models are widely used to represent relational information among interacting units and the implications of these relations. In studies of social networks recent emphasis has been placed on random graph models where the nodes usually represent individual social actors and the edges represent a specified relationship between the actors.

The modeling of social networks is, and has been, broadly multidisciplinary with significant contributions from the social, natural and mathematical sciences. This has led to a plethora of terminology, and network conceptualizations commensurate with the varied objectives of network analysis. As a primary focus of the social sciences has been the representation of social relations with the objective of understanding social structure, social scientists have been central to this development.

Exponential-family random graph models attempt to represent the complex dependencies in networks in a parsimonious, tractable and interpretable way. A major barrier to the application of such models has been lack of understanding of model behavior and a sound statistical theory to evaluate model fit. This problem has at least three aspects: the specification of realistic models; the algorithmic difficulties of the inferential methods; and the assessment of the degree to which the network structure produced by the models matches that of the data.

In this course we will review the state of the art for networks observed in cross-section or longitudinally. We consider exponential-family and latent variable models for networks. We also consider the sampling of networks and inference based on partially-observed networks.

The course will involve the practical application of the ideas and their implementation through statistical software, particularly the "statnet" open-source software suite (<http://statnet.org>).

## Biographical

Mark S. Handcock is Professor of Statistics in the Department of Statistics at the University of California – Los Angeles. His research involves methodological development, and is based largely on motivation from questions in the social and epidemiological sciences. He has published extensively on network modeling, survey sampling, and network sampling methods. His recent focus has been on the development of statistical models for the analysis of social network data, spatial processes and demography. He received his B.Sc. from the University of Western Australia and his Ph.D. from the University of Chicago. For details, see his web page <http://www.stat.ucla.edu/~handcock>