Colloquium Series

School of Mathematical and Physical Sciences 30 May 2023

Date: Tuesday, 30 May 2023

Time: 11:00am – 12:00pm

Speaker: Professor Catherine Greenhill (University of New South Wales)

Venue: Hybrid – In-person at Macquarie University and Zoom

Title: Generating random networks with useful properties

Abstract: Graphs (also called networks) are very general mathematical objects which describe pairwise relationships between objects in a discrete system. The modern world is full of networks (social networks, traffic networks, contact networks), and many researchers use graphs to model real-world networks of interest. When studying a particular real-world network, it can be convenient to define a family (or ensemble) of graphs which are similar to the network in some way. Then a random element of the ensemble provides a null model against which the significance of a particular property of the real-world network can be tested.

When working with random graphs from a given ensemble, it is sometimes possible to analyse the probability of relevant properties mathematically, using probabilistic combinatorics. Where this is not possible, it is very convenient to have an algorithm which provides uniform random (or "nearly" uniformly random) graphs from the ensemble. Such an algorithm should be computationally efficient, as a large sample may be needed. I will discuss some approaches to the problem of efficient generation of graphs from certain families, including graphs where the number of relationships involving each object is pre-specified.