



## Statistics and Actuarial Science Seminar

**Title:** Reconstructing ecological networks: theory and experiments

**Speaker:** Tancredi Caruso (University College Dublin)

**Date:** Thu 5th October 2023 at 3:00PM

**Location:** E0.32 (beside Pi restaurant)

**Abstract:** The key feature of ecological networks is very high variability in space and time in the form of structural fluctuations of both global and local properties. In terms of structure, the most typical nodes of ecological networks are species. Fluctuations of species' properties can significantly affect higher-order network properties, with implications for the dynamics of the system, especially stability. Ecologists have a long tradition of using null models to detect structures in networks but their classical null models treat node-level properties as 'hard' constraints that cannot fluctuate. Here, I will review and synthesize a set of maximum-entropy methods that allow for fluctuating ('soft') constraints. I will illustrate the methods with some practical examples.

I will illustrate how a maximum entropy approach can be used by experimental ecologists to detect non-random patterns with null models that not only rewire but also redistribute interaction strengths by allowing fluctuations in the enforced constraints. More generally, I will illustrate the challenges network modellers face when dealing with ecological networks and experimental tests of theory and hypotheses on the structure and dynamics of these networks.