From the microscale to the macroscale

Alan J. McKane, University of Manchester, UK

This lecture will be concerned with the setting up of individual-based models (IBMs), and the approximations which can be used to analyse these models. Since they involve the interaction of the basic entities of the system (individuals) they are termed `microscopic' and are typically in a good form to numerically simulate, but not to mathematically analyse. We discuss how a more coarse-grained description of the system can be obtained at the `mesoscale', and how the average behaviour is found on the `macroscale', and how these forms can be more easily analysed. The emphasis will be on simple, generic examples to illustrate the ideas and concepts, rather than on specific detailed models, and will provide an overview of the relationship between IBMs and population-level descriptions.