Network science is an interdisciplinary field that uses graphs (in the graph theory sense) to model real-world systems and phenomena. The structure of an underlying network of connections (e.g. social network, transportation network, ecological food web, etc.) is essential to the behaviour of many systems (information spread, disease spread, ecosystem stability, etc.) After a brief introduction to networks and graph theory, we shall look at the statistical modelling of graphs. The exponential random graph model will be introduced as a parallel of the canonical ensemble known from statistical mechanics. Finally new results will be presented about the applicability of exponential random graph models. No prior familiarity with graph theory or network science concepts will be necessary.