Active particles in suspension are currently the subject of much attention. This is due largely to their ability to model self-organisation phenomena in biological systems, but also because they provide new opportunities for fundamental research in nonequilibrium statistical mechanics; assemblies of active particles are intrinsically out-of-equilibrium systems. Several experimental model systems have been developed, such as catalytic Janus particles, colloids with artificial flagella and light activated particles. Theorists are thus challenged to develop first-principles theoretical approaches to describe these systems from microscopic starting points. In this talk we will consider recent theoretical approaches to describing a number of interesting active phenomena: motility-induced phase separation, the response to spatially dependent ‘activity fields’ and the influence of activity on liquid crystal phases.