The lectures will provide an introduction to numerical relativity, which is concerned with solving the Einstein Equations with numerical methods, in particular for astrophysically interesting situations. I will discuss the initial value problem for the Einstein Equations, both regarding its geometrical aspects (in particular the 3+1 decomposition), and regarding its partial differential equation aspects (in particular well-posedness for hyperbolic systems of equations). I will introduce the basic principles finite difference methods as applied to the Einstein Equations, and I will discuss how numerical spacetimes are analyzed, e.g. to find horizons or compute the gravitational wave signal emitted. In the second half I will focus on the application to the binary black hole problem, and review some of the technical ingredients of the state of the art: gauge conditions, numerical methods, and available codes. Finally I will talk about how to use available numerical relativity data sets, the anatomy of waveforms, and simple concepts of waveform modelling for black holes. For the hands-on session, students will have the opportunity to write a simple numerical code, such as for the wave equation in 1+1 dimensions.