

In this lecture, we will give an overview of some techniques which can be used to reason about higher-order probabilistic programs, focusing on two aspects. On the one hand we will talk about termination, which in a probabilistic context can be defined in at least two ways, namely almost-sure termination and its sibling positive almost sure termination. We show how it is possible to check whether higher-order programs terminate, and in some case even to characterize termination, through type systems. We will then deal with relational reasoning and with program equivalences and distances in particular. There, coinductive techniques can be of help, and we will hint at how this is possible.