Many systems of interest involve processes taking place on widely separated time scales. For an efficient modeling one usually focuses on the slower degrees of freedom and it is of great importance to accurately eliminate the fast variables in a controlled fashion, carefully accounting for their net effect on the slower dynamics. Multiple-scale techniques provide a systematic approach to this task. I will present such procedures and discuss their application to some stochastic systems of physical, biological and chemical relevance. I will then consider functionals of the stochastic trajectories such as residence times, counting statistics, fluxes, entropy production, etc.. For such functionals, the elimination of the fast degrees of freedom can present additional difficulties and naive procedures can lead to blatantly inconsistent results. These difficulties can be overcome by systematic multiple-scales approaches, which are less covered in the literature but can be seen as natural extensions of the ones employed for the trajectories.

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