Chapter 1
This chapter presents some basic steps for performing a good statistical analysis, all summarized in about one page.

Chapter 2
This short chapter introduces the basics of probability theory in an intuitive fashion using simple examples. It also illustrates, again with examples, how to propagate errors and the difference between marginal and profile likelihoods.

Chapter 3
This chapter introduces the computational tools and methods that we use for sampling from the posterior distribution. Since all numerical computations, and Bayesian ones are no exception, may end in errors, we also provide a few tips to check that the numerical computation is sampling from the posterior distribution.

Chapter 4
Many of the concepts of building, running, and summarizing the results of a Bayesian analysis are described with this step-by-step guide using a basic (Gaussian) model. The chapter also introduces examples using Poisson and Binomial likelihoods, and how to combine repeated independent measurements.

Chapter 5
All statistical analyses make assumptions, and Bayesian analyses are no exception. This chapter emphasizes that results depend on data and priors (assumptions). We illustrate this concept with examples where the prior plays greatly different roles, from major to negligible. We also provide some advice on how to look for information useful for sculpting the prior.

Chapter 6
In this chapter we consider examples for which we want to estimate more than a single parameter. These common problems include estimating location and spread. We also consider examples that require the modeling of two populations (one we are interested in and a nuisance population) or averaging incompatible measurements. We also introduce quite complex examples dealing with upper limits and with a larger-than-expected scatter.
Chapter 7
Rarely is a sample randomly selected from the population we wish to study. Often, samples are affected by selection effects, e.g., easier-to-collect events or objects are over-represented in samples and difficult-to-collect are under-represented if not missing altogether. In this chapter we show how to account for non-random data collection to infer the properties of the population from the studied sample.

Chapter 8
In this chapter we introduce regression models, i.e., how to fit (regress) one, or more quantities, against each other through a functional relationship and estimate any unknown parameters that dictate this relationship. Questions of interest include: how to deal with samples affected by selection effects? How does a rich data structure influence the fitted parameters? And what about non-linear multiple-predictor fits, upper/lower limits, measurements errors of different amplitudes and an intrinsic variety in the studied populations or an extra source of variability? A number of examples illustrate how to answer these questions and how to predict the value of an unavailable quantity by exploiting the existence of a trend with another, available, quantity.

Chapter 9
This chapter provides some advice on how the careful scientist should perform model checking and sensitivity analysis, i.e., how to answer the following questions: is the considered model at odds with the current available data (the fitted data), for example because it is over-simplified compared to some specific complexity pointed out by the data? Furthermore, are the data informative about the quantity being measured or are results sensibly dependent on details of the fitted model? And, finally, what about if assumptions are uncertain? A number of examples illustrate how to answer these questions.

Chapter 10
This chapter compares the performance of Bayesian methods against simple, non-Bayesian alternatives, such as maximum likelihood, minimal $\chi^2$, ordinary and weighted least square, bivariate correlated errors and intrinsic scatter, and robust estimates of location and scale. Performances are evaluated in terms of quality of the prediction, accuracy of the estimates, and fairness and noisiness of the quoted errors. We also focus on three failures of maximum likelihood methods occurring with small samples, with mixtures, and with regressions with errors in the predictor quantity.