Changes in the new edition.

Chapter 1. Erdos-Renyi.

This was chapter 2 in the previous version, RGD. There are only minor changes. Section 1.2 which looks at the growth of the cluster as an epidemic has been rewritten. There is a little bit more on Aldous’ results in Section 1.7. Section 1.8 on critical exponents is new.

Chapter 2. General degree distributions.

This was chapter 3 in RGD. Section 2.2 has been extensively rewritten to follow the approach pioneered by Molloy and Reed, Janson and Luczak, and appear in serious books like the ones by Remco van der Hofstad. Rather than focus on one algorithm called the configuration model, one makes assumptions about the degree distribution of a sequence of graphs. Section 2.3 proves a result of Janson on cluster sizes in the subcritical phase. The next two sections that discuss distances between random chosen points on the giant component are largely unchanged from Sections 4.5 and 4.6 of RGD. Section 2.6 gives Aldous type results for the critical regime proved by Dhara et al. Section 2.7 considers percolation which greatly extends the material in Section 4.7 of RGD.

Chapter 3. Inhomogeneous random graphs

Is almost completely new, although the CHKNS model, also known by the more dignified name the randomly grown random graph, was the subject of Chapter 7 in RGD, and the Chung-Lu model appeared in Sections 3.3 and 4.6. The first section on the case with finitely many types prepares for the developments that follow. Section 3.2 describes some important examples. Section 3.3 describes the machinery introduced in a 120 page paper of Bollobas-Janson-Riordan. Section 3.4 gives results for the survival probability that are applied to examples in Section 3.5. Section 3.6 studies the subcritical case in the cases of exponential and power law tail.