# Appendix A

# Assignments

Assignment sheets are issued on Wednesdays of weeks 1-7. They are made available on the website of the course at

http://www.stats.ox.ac.uk/∼winkel/ms3b.html.

Two or three sets of classes take place in room 104 of 1 South Parks Road (Department of Statistics) in weeks 2 to 8, probably on Wednesdays 9am, Wednesdays 10am (or 10.15am), Thursdays 3pm (or 3.15pm). The class allocation can be accessed from the course website. Only undergraduates and MSc students in Mathematical and Computational Finance can sign up for classes. All others should talk to me after one of the first two lectures.

There will be no lectures (but the usual classes) in week 3. To compensate, lectures in weeks week 1 (Wednesday), weeks 2 and 4 (Mondays and Wednesdays), and in week 5 (Monday) will be extended by 20 minutes, so they will still start at 12.05pm, but finish at 1.15pm.

Scripts are to be handed in at the Department of Statistics, 1 South Parks Road.

Exercises on the problem sheets vary in style and difficulty. If you find an exercise difficult, please do not deduce that you cannot solve the following exercises, but aim at giving each exercise a serious try. **Solutions will be provided on the course website.**

**There are lecture notes available.** Please print these so that we can make best use of the lecture time. I will not update the online version during the term, but post a list of typos or other additional explanation if necessary (i.e. if you spot them and let me know).

Below are some comments on the recommended Reading and Further Reading literature.

**Kyprianou: Introductory lectures on fluctuations of Lévy processes with applications. Springer 2006**

This is the treatment that is closest to the course. It is based on a Masters course and has been written for Masters students. The book assumes a background in measure-theoretic probability, but is written in a friendly way suitable for a wide range of different backgrounds. The text contains some worked examples and exercises.

**Kingman: Poisson processes. OUP 1993**

This is a gentle introduction to (general, higher-dimensional) Poisson processes and contains a thorough discussion of the tools leading up to and including the study increasing Lévy processes (Section 8.4). Measure-theoretic arguments are isolated in a few proofs, and the reader can take the measure theory for granted. For consistency of terminology with other Oxford courses and most of the literature, in our course, we will reserve the term "Poisson process" to the one-dimensional process. What Kingman calls "Poisson process" is the associated counting measure, which we call "Poisson counting measure".

**Schoutens: Lévy processes in finance. Wiley 2003**

This is not a textbook, but a monograph advertising Lévy process for finance applications. All models for financial stock prices that we study in our course, are discussed in detail, both their properties and how they can be calibrated to fit financial market data. There are also sections on simulation and option pricing.

**Sato: Lévy processes and infinitely divisible distributions. CUP 1999**

This is a graduate textbook on Lévy processes. The focus is on distributional properties and analytic methods.

**Bertoin: Lévy processes. CUP 1996**

This is a research monograph on Lévy processes. The approach is sample path based.

**Grimmett and Stirzaker: Probability and Random Processes. OUP 2001**

This is the standard probability reference book used in Oxford, overarching 1st, 2nd and 3rd year probability courses and more. It contains a section on spatial Poisson processes, a treatment of martingales.

**Williams: Probability with Martingales. CUP 1991**

This is the standard reference on measure theory and martingales used in Oxford.

**Ross: Applied Probability Models. Academic Press 1989**

We only use the simulation chapter.

**Durrett: Probability – Theory and Examples. Duxbury 2004**

This is a good graduate textbook on Probability. We essentially refer to Durrett only for a proof of Donsker's theorem, but there is also a section on infinite divisibility.

**Kallenberg: Foundations of Modern Probability. Springer 1997**

This is a standard reference on Probability. The presentation is extremely concise and economical and the amount of material is encyclopaedic. We only refer to it for rigorous statements and proofs of convergence theorems of random walks to Lévy processes.