**Random Processes (G1101)**
**Course Document, Spring 2009**

**Lecturer**

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**Office hours**

Mantell building, Room 2B32, Monday 14:00-16:00.

**Lectures**

There are 3 lectures per week during weeks 1, 3, 5, …, 9 and 2 lectures per week during weeks 2, 4, 6, …, 10. Lectures on Mondays (week 1, 3, 5, …, 9) and Thursdays (week 1,2, …, 10) will be given in Pevensey 1-2A12 from 12:00-to-13:00 and 11:00-to-13:00 respectively.

**Workshop**

There is a 1 hour workshop during weeks 2, 4, …, 10. Workshops will be given on Mondays in Pevensey 1-2A12 from 12:00-to-13:00.

**Assessment**

**Mid-term Test in Week 8**

There will be a Mid-term Test in Week 8 during the workshop on Monday, 2nd of March 2009. The test will be based on the material covered in lectures and workshops up to and including Week 6. The test will count for 10% of the final mark. 90% of the mark will be based on an unseen examination (~ sometime in May 2009).

**Lecture notes, exercise sheets and solutions**

Lecture notes will be posted on the course's Study Direct page and/or my personal webpage.

There will be 5 worksheets that will help you to better understand and apply theoretical aspects covered in the course and to prepare for the Mid-term Test. While the exercise sheets will not count towards the final mark, it is essential that you tackle all problems to ensure a good Mid-term Test result. Therefore, I strongly encourage you to work in groups of preferably three (or two if you find it difficult to find the third group member) and hand in one set of solutions per group. This will marked and returned to you with feedback on your work. If working in a group, remember that it is essential to solve problems together or at least discuss solutions to all problems before handing it in. This is far more beneficial than different members of the group

solving different problems without any further interaction between group members. You may want to check each others work before handing it in. In you prefer to work individually then please do so and hand in your work as such.

Solutions to all worksheets will be posted on Study Direct and/or my personal webpage soon after Workshops.

**Syllabus**

1. **Poisson processes**
2. **Birth processes, birth- and death- processes**
3. **Queues**
4. **Renewal processes**
5. **Epidemic models**

**Course outline**

The aim of this course is to present a systematic introductory account of several principal areas in stochastic processes. The course covers basic principles of model building and analysis with applications that are drawn from mainly biology and engineering.

**Learning outcomes**

At the end of the course a successful student should:

- have an understanding of the assumptions underlying the mathematical models and how they are formed
- be able to analyse the models and apply them to different examples

**Library**

**Main recommendation:**

J. Haigh, Probability Models, Springer 2002, ISBN 1-85233-431-2.

**Supplementary texts:**

1. E. Renshaw, Modelling Biological Populations in Space and Time, Cambridge University Press 1993, ISBN 0-521-44855-7.

2. P. W. Jones, P. Smith, Stochastic Processes: Methods and Applications, Arnold 2001, ISBN 0-340-80654-0.

3. G. R. Grimmett and D. Stirzaker, Probability and Random Processes, 3rd edition, Oxford University Press 2001, ISBN 0-19-857222-0.

4. S. Karlin and H. M. Taylor, A First Course in Stochastic Processes, 2nd edition, Academic Press 1975, ISBN 0-12-398552-8.

5. S. Karlin and H. M. Taylor, A Second Course in Stochastic Processes, Academic Press 1981, ISBN 0-12-398650-8.

The library has a large collection of books that focus on the topics of the course. It is often the case that some books are easier to read and understand than others. Therefore, I recommend that you browse through various books and find those that suit you best.