

# LTCC Basic Statistics Course

**Title:** Stochastic Processes

**Basic Details:**

- Core Audience: students in statistics
- Course Format: extended (5 x 2hr lectures)

**Course Description:**

**Syllabus:**

The course aims to introduce the main ideas and methods of simple applied probability, together with examples of a variety of applications. Main topics:

1. A brief review of prerequisites (see below) and further discussion of Markov chains in discrete and continuous time; to include random walks, embedded chains. Examples of use of forward and backward decompositions, reversibility arguments and embedded chains.
2. Point processes in time; Poisson-based processes.

**Recommended Reading:**

- Grimmett and Stirzaker (2001) *Probability and Random Processes*. 3rd ed. OUP.
- Norris (1997) *Markov Chains*. Cambridge University Press

**Additional Optional Reading:**

- Daley and Vere-Jones (2003) *An Introduction to the Theory of Point Processes Volume 1: Elementary Theory and Methods*. Springer,
- Cox and Isham (1980) *Point Processes*, Chapman and Hall.
- Ross (2010) *Introduction to Probability Models*. 10<sup>th</sup> ed. Academic Press.

**Prerequisites:**

Knowledge of Markov processes with discrete state spaces at a level typical of introductory undergraduate courses in applied probability – to include, in discrete time, transient and equilibrium behaviour, first passage times and classification of states; in continuous time, Poisson and birth-death processes.

Recommended texts:

- Ross (2010), Sections: 4.1-4.4, 5.3, and 6.1-6.5
- Norris (1997), Chapters 1, 2 and 3.

**Format:**

- No. of discussion/problem sheets: 4
- Electronic lecture notes: yes
- Necessary support facilities: none
- Necessary software requirements for computing facilities: none
- Lecture/computer session/tutorial/discussion split (hours of each): 8/2. Part of each 2-hour session will be set aside to discuss issues arising from the current lecture or from the problems and/or reading set the previous week.

**Lecturer Details:**

- Lecturer: Ardo van den Hout
- Lecturer home institution: Dept. of Statistical Science, University College London
- Lecturer e-mail: ardo.vandenhout@ucl.ac.uk
- Lecturer telephone number: 020 3108 3243