Probability III – 2009/10

Course Information JRJ

Lecturer: Robert Johnson (Maths 154, email: R.Johnson@qmul.ac.uk)

Lectures: Monday 14-15 (PP1)
Tuesday 10-11 (Queens EB1)
Tuesday 12-13 (FB 326)

Classes: Tuesday 17-18 (Queen's FB1) (surnames A-J)
Friday 15-16 (Maths 203) (surnames K-Z)
Please go to the class you are assigned to unless it clashes with another lecture or class.

Office Hours: Monday 15-16 (weeks 1,2,3 only)
Tuesday 11-12
Friday 13:30-14:30

Assessment: 10% coursework, 90% final examination

What is this module about? Imagine a maze of rooms numbered $1, 2, \ldots, n$ with passages joining some of them. A person starts in room 1 and moves around the maze choosing at each time a passage to move along at random (that is at each step they pick one of the passages leading from their current location at random with all choices equally likely). What happens?
Of course, on one level this is a silly question; since the moves are at random anything could happen! However, there are sensible questions we can pose (and maybe answer): What is the probability that we reach room 3 before room 7? What is the expectation of the number of steps needed to return to room 1? In the long run what proportion of time are we likely to spend in each room?
Our route through the maze is an example of a stochastic process (something that evolves randomly over time). In fact it is a special type of process called a Markov chain (roughly this is because our choice at each step depends only on the room we are in and not how we got there). This module is about Markov chains and develops techniques to answer questions like the ones above. The first half of the module covers discrete time Markov chains (where movement is at fixed time intervals) in some detail. The second half looks at special cases of continuous time Markov chain called birth-death processes. A nice example of this is the number of people in a queue. This is a stochastic process as it evolves randomly over time. It is in continuous time since people may join the queue or be served and leave at any time.

Coursework: I intend to produce between 8 and 10 exercise sheets. Exercise sheets will contain a mixture of routine examples and more challenging problems. A selected part of the sheet (probably one long question or two short questions) should be handed in for marking. However it is essential for your understanding of the course that you make a serious attempt to do all the coursework. The worst two marks will be ignored

and the rest will count towards the 10%. Persistent non-submission of coursework may lead to you being barred from the final exam. Instructions on where to hand in your coursework and when the deadline is will be on each sheet.

Examination: Information on the final exam including the rubric will be made avaialable by the end of the semester.

Books: All the material you need to know will be covered in lectures. However, if you do wish to use a text book then the following is recommended:

Taylor and Karlin, An Introduction to Stochastic Modelling

The lectures will cover material from this book at a similar level.
For enthusiasts,
Grimmett and Stirzaker, Probability and Random Processes

covers the material (and much more as well) in a rather more technical style, and is fairly readable.

If you find any other books to be useful then please let me know

Course webpage: http://www.maths.qmw.ac.uk/~jrj/MTH6130/
All handouts and exercise sheets will be put on the webpage.