# COURSE SPECIFICATION FORM

<table>
<thead>
<tr>
<th>Department/School:</th>
<th>Mathematics</th>
<th>Academic Session:</th>
<th>2017-18</th>
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<tbody>
<tr>
<td><strong>Course Title:</strong></td>
<td>Applied Probability</td>
<td><strong>Course Value:</strong></td>
<td>(UG courses = unit value, PG courses = notional learning hours) 200 hr</td>
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<td><strong>Course Code:</strong></td>
<td>MT5436</td>
<td><strong>Course JACS Code:</strong></td>
<td>G330</td>
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<td><strong>Availability:</strong></td>
<td>Term 2</td>
<td><strong>Status:</strong></td>
<td>Optional</td>
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<td><strong>Pre-requisites:</strong></td>
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<td><strong>Co-requisites:</strong></td>
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**Aims:**
This is a graduate level course intended familiarise students with the principal methods of the theory of stochastic processes and to introduce a range of examples of probabilistic methods used to model systems that exhibit random behaviour.

**Learning Outcomes:**
On completion of the course the student should be able to:
- use the method of conditioning and the method of conditional expectation;
- use the method of generating functions;
- understand the structure and concepts of discrete and continuous time Markov chain with countable state space;
- construct a probability model for a variety of problems;
- understand the structure of diffusion processes;
- understand the concept of Brownian motion.

**Course Content:**
Preliminaries: Conditional expectation; generating functions; Distribution of random sums; Stochastic processes - basic Notions. Poisson Process: Inter-arrival and waiting times; Conditional distribution of the waiting times; Nonhomogeneous processes; Compound Poisson process. Renewal theory: Renewal processes; Some limit theorems; Alternating renewal processes; Delayed renewal processes; Cumulative renewal processes. Markov processes: Markov chains, classification of states, Some limit theorems; Stationary distributions; Absorption probabilities. Diffusion Processes: Forward and backward diffusion equations; Brownian motion, Wiener processes, Ito's Formula.

**Teaching & Learning Methods:**
44 hours of lectures and examples classes. 156 hours of private study, including work on problem sheets and examination preparation. This may include discussions with the course leader if the student wishes.

**Key Bibliography:**
- Stochastic Processes – S M Ross (Wiley 1996) Library Ref. 519.2

**Formative Assessment & Feedback:**
Formative assignments in the form of 8 problem sheets. The students will receive feedback as written comments on their attempts.

**Summative Assessment:**
- **Exam:** Written exam 100% Two hour exam.
- **Coursework:**

The information contained in this course outline is correct at the time of publication, but may be subject to change as part of the Department’s policy of continuous improvement and development. Every effort will be made to notify you of any such changes.