F71SZ Stochastic Modelling

**COURSE DETAILS**

**Course Code:** F71SZ  
**Full Course Title:** Stochastic Modelling  
**SCQF Level:** 11  
**SCAF Credits:** 7.5  
**Available as Elective:** No

**DELIVERY LEVEL**

| Undergraduate: | Yes | Postgraduate Taught: | Yes | Postgraduate Research: | No |

**COURSE AIMS**

To introduce fundamental stochastic processes which are useful in insurance

**LEARNING OUTCOMES – SUBJECT MASTERY**

After studying this half course, students should be able to:

- Understand and use the Markov property
- Write down equations for the stationary distribution of a Markov chain and use, wherever possible, additional structure to solve them
- Write down first step equations and use them to compute the time to death, probability of absorption etc.
- Apply Markov chain modelling in several problems
- Understand long term behaviour and stationarity of a Markov chain
- Apply Chi-squared tests for contingency tables or goodness of fit.
- Carry out a one-way ANOVA.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

At the end of the half course, students should be able to:

- Demonstrate the ability to learn independently
- Manage time work to deadlines and prioritise workloads
- Present results in a way which demonstrates that they have understood the technical and broader issues of stochastic processes

**SYLLABUS**
F71SZ Stochastic Modelling

- Conditional expectation
- Sequences of random variables and the Markov property
- Review of matrix algebra
- Review of summation notation and other useful concepts
- Using the Markov property
- Absorbing Markov chains with finite state space
- First step (backwards) equations
- Basic examples
- Stationarity problem for finite state space chains
- Tricks for the computation of the stationary distribution
- Convergence to stationarity
- Markov chains with infinite but countable state space
- Examples
- Simple point processes, Poisson and compound Poisson processes
- Continuous time Markov processes
- Chi-squared test for contingency tables and goodness of fit.
- One-way ANOVA.

### COURSE RELATIONSHIPS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Level</th>
<th>Title</th>
<th>School</th>
<th>Type</th>
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<td>F71AE</td>
<td>11</td>
<td>Survival Models</td>
<td>School of Math and Comp Sci.</td>
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### LOCATION AND ASSESSMENT METHODS

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<th>Edi</th>
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<td>Semester 1</td>
<td>Exam</td>
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Examination will be at least 60% and no more than 80%.

Y | | | | | | | | | | Coursework | 40 | Assessment | Semester 1 |

Coursework will be at least 20% and no more than 40%.

Y | | | | | | | | | | Examination | 100 | 180 | Reassessment | Semester 1 |

Re-assessment in the next academic year.