<table>
<thead>
<tr>
<th>Academic Year</th>
<th>2011-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Code</td>
<td>ST2004</td>
</tr>
<tr>
<td>Module Title</td>
<td>Applied Probability</td>
</tr>
<tr>
<td>Pre-requisites</td>
<td>-</td>
</tr>
<tr>
<td>ECTS</td>
<td>5</td>
</tr>
<tr>
<td>Chief Examiner</td>
<td>Prof J Haslett</td>
</tr>
<tr>
<td>Teaching Staff</td>
<td>Prof J Haslett and demonstrators</td>
</tr>
<tr>
<td>Delivery</td>
<td>24 lectures, 6 labs, 6 tutorials</td>
</tr>
</tbody>
</table>

**Aims**
Understanding Uncertainty in Systems. More specifically, making precise statements about uncertainty using probability
- Uncertainty as lack of information
- Making decisions
- Modelling, discussing, evaluating random systems

**Learning Outcomes**
- Ability
  - to build a model in a spreadsheet using random numbers
  - to analyse via summaries of many replications
  - in some circumstances to bypass these steps by using probability
  - to use the formal language of random variables, their expected values, and their probability distributions

**Syllabus**
Specific topics addressed in this module include:
- The concepts underlying probability, including
  - the basic rules
  - probability mass functions, density functions and cumulative distribution functions for discrete and continuous univariate random variables
  - bivariate probability distributions for discrete random variables
  - expected values, variances and standard deviations,
  - covariances
- The use of Monte Carlo methods in modelling systems of random variables
  - for discrete random variables, the Binary (Bernoulli) , Discrete Uniform, Binomial, Poisson, and
  - for continuous random variables, the Uniform, Normal and Exponential
  - The implications for approximations of the Central Limit Theorem
- The concept of likelihood will be introduced and confidence intervals will be mentioned, but formal study of statistical inference will not be covered.

**Assessment**
Exam, two compulsory group projects (5% and 10%) and one optional project (30%)

**Bibliography**
Main text Tijms, “Understanding Probability”, Cambridge 2007

**Website**