Module Code: STU33009
Module Name: Statistical Methods for Computer Science
ECTS Weighting: 5 ECTS
Semester taught: Semester 2
Module Coordinator: Doug Leith

Module Learning Outcomes:
On successful completion of this module, students will be able to:

LO1. Describe the basic properties of random events and random variables and calculation of probabilities
LO2. Explain Bayes theorem and its use in Bayesian inference
LO3. Develop simple probabilistic models from application descriptions
LO4. Understand confidence intervals and how to calculate them
LO5. Use linear and logistic regression and apply it to noisy data

Module Content:
Topics covered in this module include:

- Experiments, events, probability of an outcome.
- Conditional probability and Bayes Theorem.
- Independence.
- Marginalisation.
- Mean, variance, covariance
- Law of Large Numbers, Central Limit Theorem and Normal distribution.
- Confidence intervals and their calculation using chebyshev bounds, central limit theorem, bootstrapping
- Maximum likelihood and MAP estimates.
- Linear and logistic Regression

Teaching and Learning Methods:
Lectures, tutorials.

Assessment Details:

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Brief Description</th>
<th>Learning Outcomes Addressed</th>
<th>% of total</th>
<th>Week set</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>2 hour written examination</td>
<td>LO1-LO5</td>
<td>70%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Class test</td>
<td>Mid-Term Test</td>
<td>LO1-LO3</td>
<td>20%</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Assignments</td>
<td>Weekly Assignments</td>
<td>LO1-LO4</td>
<td>10%</td>
<td>2-10</td>
<td>4-12</td>
</tr>
</tbody>
</table>

1 TEP Glossary
2 TEP Guidelines on Workload and Assessment
### Reassessment Details

Examination (2 hours, 100%)

### Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>33 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecture</td>
<td>22 hours</td>
</tr>
<tr>
<td>laboratory</td>
<td>0 hours</td>
</tr>
<tr>
<td>tutorial or seminar</td>
<td>11 hours</td>
</tr>
<tr>
<td>other</td>
<td>0 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent study (outside scheduled contact hours), broken down by:</th>
<th>83 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>preparation for classes and review of material (including preparation for examination, if applicable)</td>
<td>47 hours</td>
</tr>
<tr>
<td>completion of assessments (including examination, if applicable)</td>
<td>36 hours</td>
</tr>
</tbody>
</table>

**Total Hours** 116 hours

### Recommended Reading List

A First Course In Probability, Sheldon Ross, Prentice-Hall

### Module Pre-requisites

**Prerequisite modules:** None

**Other/alternative non-module prerequisites:** Basic algebra and programming (we will use Matlab in examples/labs)

### Module Co-requisites

### Module Website

www.scss.tcd.ie/doug.leith/ST3009/

### Last Update

17/06/2019 by Doug Leith