

Module Descriptor

School of Computer Science and Statistics

Module Code	ST3009
Module Name	Statistical Methods for Computer Science
Module Short Title	
ECTS	5
Semester Taught	Second Semester
Contact Hours	Lecture: 2 hours per week. Labs: 1 hour per week. Total: 33 hours.
Module Personnel	Doug Leith
	When students have completed this module they should be able to:
Learning Outcomes	<ul style="list-style-type: none">• Describe the basic properties of random variables and calculation of probabilities.• Explain Bayes theorem and its use in Bayesian inference.• Understand confidence intervals and how to calculate them• Explain the law of large numbers and understand the importance of the normal distribution.• Use linear and logistic regression and apply it to noisy data.
Learning Aims	<p>The module provides an introduction to statistics and probability for computer scientists. The aim is to provide the basic grounding needed for machine learning and algorithm performance analysis.</p> <p>Topics covered in this module include:</p>
Module Content	<ul style="list-style-type: none">• 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/chernoff bounds, central limit theorem, bootstrapping)• Maximum likelihood and MAP estimates.• Linear regression• Logistic Regression
Recommended Reading List	A First Course in Probability, S.Ross.
Module Prerequisites	Basic algebra and programming (we will use Matlab in examples/labs)
Assessment Details	<p>Examination 70%, coursework 30%. Coursework: 10% weekly assignments and 20% mid-term exam.</p> <p>Supplemental assessment is by 100% examination.</p>
Module Website	www.scss.tcd.ie/doug.leith/ST3009/
Academic Year of Data	2017/2018