

Module Descriptor 2016/17
School of Computer Science and Statistics.

Module Code	ST3009
Module Name	Statistical Methods for Computer Science
Module Short Title	
ECTS weighting	5
Semester/term taught	Second Semester
Contact Hours	Lecture: 2 hours per week. Labs: 1 hour per week. Total: 33 hours.
Module Personnel	Doug Leith
Learning Outcomes	<p>When students have completed this module they should be able to:</p> <ol style="list-style-type: none"> 1. Describe the basic properties of random events and variables and to calculate probabilities. 2. Explain conditional probability, Bayes rule and use it to carry out Bayesian inference. 3. Understand the nature of common statistical assumptions/models, and the potential pitfalls when such assumptions are violated. 4. Explain the law of large numbers and understand the importance of the normal distribution. 5. Calculate and use confidence intervals 6. Use logistic and linear regression and apply them to noisy data.
Module Learning Aims	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.
Module Content	<p>Topics covered in this module include:</p> <ol style="list-style-type: none"> 1. Experiments, events, discrete random variables, probability of an outcome. 2. Independence, conditional probability and Bayes rule. 3. Summary statistics: mean, variance, covariance, correlation. 4. Markov, Chebyshev and Chernoff bounds 5. Law of large numbers and Normal distribution. 6. Confidence intervals obtained using bounds, bootstrapping, central limit theoremsh 7. Maximum likelihood and MAP estimates. 8. Logistic regression, linear regression
Recommended Reading List	A First Course in Probability, Sheldon Ross. Prentice-Hall Probability and Computing: Randomised Algorithms & Probabilistic Analysis, Michael Mitzenmacher & Eli Upfal. Cambridge.
Module Pre Requisite	None
Module Co Requisite	None

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Assessment Details	Examination 80%, coursework 20%. Supplemental assessment is by 100% examination.
Module approval date	
Approved By	
Academic Start Year	
Academic Year of Data	2016/17