



# University of Pretoria Yearbook 2022

## Adaptive computation and machine learning 803 (NEP 803)

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| <b>Qualification</b>          | Postgraduate   |
| <b>Faculty</b>                | <a href="#">Faculty of Natural and Agricultural Sciences</a> |
| <b>Module credits</b>         | 15.00  |
| <b>NQF Level</b>              | 09   |
| <b>Programmes</b>             | <a href="#">MSc (eScience) (Coursework)</a>                  |
| <b>Prerequisites</b>          | No prerequisites.  |
| <b>Language of tuition</b>    | Module is presented in English                               |
| <b>Department</b>             | Statistics   |
| <b>Period of presentation</b> | Semester 1 or Semester 2                                     |

### Module content

Introduction: Basic concepts. Supervised learning setup: Least means squares, logistic regression, perceptron, exponential family, generative learning algorithms, Gaussian discriminant analysis, naïve Bayes, support vector machines, model selection and feature selection. Learning theory: bias/variance tradeoff, union and Chernoff/Hoeffding bounds, VC dimension, worst case (online) learning. Unsupervised learning: clustering, k-means, expectation maximisation, mixture of Gaussians, factor analysis, principal components analysis, independent components analysis. Reinforcement learning and control: Markov decision processes, Bellman equations, value iteration and policy iteration, Q-learning, value function approximation, policy search, reinforce, partially observable Markov decision problems.

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