

University of Pretoria Yearbook 2023

Adaptive computation and machine learning 803 (NEP 803)

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| Qualification | Postgraduate |
| Faculty | Faculty of Natural and Agricultural Sciences |
| Module credits | 15.00 |
| NQF Level | 09 |
| Programmes | MSc (Mathematical Statistics) eScience (Coursework) |
| Prerequisites | No prerequisites. |
| Language of tuition | Module is presented in English |
| Department | Statistics |
| Period of presentation | 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.

Regulations and rules

The regulations and rules for the degrees published here are subject to change and may be amended after the publication of this information.

The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of

the aforementioned regulations.

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.