Universiteit van Pretoria Jaarboek 2018

MSc e-Wetenskap (02250193)

Minimum duur van studie	2 jaar
Totale krediete	180

Programinligting

*Hierdie inligting is slegs in Engels beskikbaar.

The curriculum for the MSc (eScience) coursework degree programme comprises 180 credits of coursework and a research component. One of the key features of the curriculum is a capstone project that runs parallel with coursework modules in the first year of study. During the capstone project, students will go through the entire cycles of solving a real-world data science problem, collecting and processing real-world data, designing methods to solve the problem, and implementing a solution. The capstone project and coursework prepare the student for the mini-dissertation problem supervised by an expert.

Toelatingsvereistes

The admission requirements are:

- an honours degree in either statistics, mathematics, computer science, physics, or related fields; AND demonstrable knowledge of basic principles of probability and statistics, computing, calculus and linear algebra;

  OR
- passing an entrance evaluation designed by the academic advisory committee of the programme within the consortium. An average of 65% at honours level is the minimum for consideration, although admission will be competitive and an honours average of at least 70% is highly recommended.
- Student numbers are limited to a maximum of 30.
- Admission is additionally dependent on availability of supervisor/s and/or projects within the participating departments.
- Historical performance during prior studies will also be considered in selecting students. Specific attention will be given to modules repeated and duration of study.
- The research proposal of applicants should be in line with the research focus of the participating departments.
- Any further additional entrance requirements as specified by the head of department in consultation with the departmental postgraduate selection committee.
- The head of department, in consultation with the departmental postgraduate selection committee and participating departments reserves the right to prescribe additional modules.

Ander programspesifieke inligting

Candidates are required to familiarise themselves with the General Regulations regarding the maximum period of registration and other requirements for master's degrees.

Bevordering tot volgende studiejaar

The progress of all master's candidates is monitored biannually by the supervisor and the postgraduate coordinator. A candidate's study may be terminated if the progress is unsatisfactory or if the candidate is unable to finish his/her studies during the prescribed period.

Subject to exceptions approved by the dean, on recommendation of the head of department, and where applicable, a student may not enter for the master's examination in the same module more than twice.

Slaag met lof

The MSc degree is conferred with distinction to candidates who obtain a final average mark of at least 75%, with a minimum of 65% in each module, and a mark of at least 75% for the mini-dissertation from each of the members of the examination panel. Where a member of the examination panel awards a mark of less than 75% for the mini-dissertation, that member of the examination panel must offer, in writing, support for his/her decision, or indicate in writing that he/she supports the examination committee's decision to confer the degree with distinction.

Kurrikulum: Jaar 1

Minimum krediete: 90

Kies 4 modules uit die lys keusemodules ter waarde van 60 krediete.

Kernmodules

Navorsingsmetodes en dekklip projek in datawetenskap 801 (NEP 801)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Scientific writing styles; layouts for assignments, projects, theses or publications; research methodologies; scientific assignments; integration of all the aforementioned content items for a capstone project in data science.

Dataprivaatheid en -etiek 802 (NEP 802)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Technical processes of data collection, storage, exchange and access; Ethical aspects of data management; Legal and regulatory frameworks in South Africa and in relevant jurisdictions; Data policies; Data privacy; Data ownership; Legal liabilities of analytical decisions and discrimination; and the Technical and algorithmic approaches to enhance data privacy, and relevant case studies.

Keusemodules

Aanpasbaarheidsverwerking en masjienleer 803 (NEP 803)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek

Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

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.

Datavisualisering en -bestudering 804 (NEP 804)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Data and image models; visualisation attributes (colour) and design (layout); exploratory data analysis; interactive data visualisation; multidimensional data; graphical perception; visualisation software (Python & R); and types of visualisation (animation, networks and text).

Grootskaalse verwerkingstelsels en wetenskaplike verwerking 805 (NEP 805)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Introduction to scientific computing architectures in Python, introduction to distributed systems, introduction to distributed databases, introduction to parallelism, large-data computation and storage models, introduction to well-known distributed systems architectures, and programming large-data applications on open-source infrastructures for data processing and storage systems.

Wetenskaplike grondslae van datawetenskap 806 (NEP 806)

Modulekrediete	15.00

Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

High-dimensional space, best-fit subspaces and singular value decomposition, random walks and Markov chains, statistical machine learning, clustering, random graphs, topic models, matrix factorisation, hidden Markov models, graphical models, wavelets, and sparse representations.

Besondere temas in datawetenskap 807 (NEP 807)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Specialised and applied concepts and trends in data science.

Statistiese grondslae van datawetenskap 808 (NEP 808)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

An understanding of multivariate statistics, hypothesis testing and confidence intervals. The ability to model data using well-known statistical distributions as well as the ability to handle data that is both continuous and categorical. The ability to perform statistical modelling including multivariate linear regression and adjust for multiple hypotheses. Forecasting, extrapolation, prediction and modelling using statistical methods. Bayesian statistics, an understanding of bootstrapping and Monte Carlo simulation.

Grootskaalse optimalisering vir datawetenskap 809 (NEP 809)

Modulekrediete	15.00
Voorvereistes	Geen voorvereistes.

Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 1 of Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Introduction to convex optimisation, subgradient methods, decomposition and distributed optimisation, proximal and operator splitting methods, conjugate gradients, and nonconvex problems.

Kurrikulum: Finale jaar

Minimum krediete: 90

Fundamentele modules

Miniverhandeling: e-Wetenskap 800 (NEP 800)

Modulekrediete	90.00
Voorvereistes	Voltooiing van die gedoseerde programme
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Jaar

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

This is the research component of the MSc (eScience) degree and comprises a mini-dissertation which develops the research skills and bridges the gap between theory and practice.

Die inligting wat hier verskyn, is onderhewig aan verandering en kan na die publikasie van hierdie inligting gewysig word.. Die Algemene Regulasies (G Regulasies) is op alle fakulteite van die Universiteit van Pretoria van toepassing. Dit word vereis dat elke student volkome vertroud met hierdie regulasies sowel as met die inligting vervat in die Algemene Reëls sal wees. Onkunde betrefffende hierdie regulasies en reels sal nie as ‘n verskoning by oortreding daarvan aangebied kan word nie.