

# University of Pretoria Yearbook 2024

## MSc (Mathematical Statistics) *Advanced Data Analytics* (Coursework) (02250196)

**Department** Statistics

**Minimum duration of study** 1 year

**Total credits** 180

**NQF level** 09

### Programme information

Details of compilation of curriculum are available from the Head of the Department of Statistics as well as from the departmental postgraduate brochure.

A candidate must compile his/her curriculum in consultation with the head of department or his representative. Refer to the Departmental website for further information.

### Admission requirements

1. BScHons in Mathematical Statistics degree **or** relevant honours degree
2. A weighted average of at least 65% at honours level
3. At least 65% for the research component at honours level, **but** students with a weighted average of at least 70% or more will receive preference
4. An admission examination may be required

Note: Additional modules may be required in order to reach the desired level of competency

### Promotion to next study year

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 relevant head of department, and where applicable, a student may not enter for the master's examination in the same module more than twice.

## Curriculum: Final year

### Fundamental modules

#### Research orientation 899 (STK 899)

<b>Module credits</b>	0.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Economic and Management Sciences
<b>Prerequisites</b>	Admission to the relevant programme.
<b>Contact time</b>	Ad Hoc
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Statistics
<b>Period of presentation</b>	Year

#### Module content

A compulsory bootcamp must be attended as part of this module – usually presented during the last week of January each year. Details regarding the venue and specific dates are made available by the department each year. The bootcamp will cover the basics of research to prepare students for the research component of their degree. Students can be exempt from the bootcamp if it was already attended in a previous year or for a previous degree. Each year of registration for the master's degree will also require the attendance of three departmental seminars. Students should ensure that their attendance is recorded by the postgraduate co-ordinator present at the seminars. The department approves the seminars attended. Students are also required to present their mini-dissertation research proposal within the department or at a conference.

### Core modules

#### Mini-dissertation: Mathematical statistics 895 (WST 895)

<b>Module credits</b>	100.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	No prerequisites.
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Statistics
<b>Period of presentation</b>	Year

### Elective modules

#### Statistical and machine learning 880 (MVA 880)

<b>Module credits</b>	20.00
<b>NQF Level</b>	09

**Service modules** Faculty of Natural and Agricultural Sciences

**Prerequisites** Admission to the relevant programme.

**Contact time** 1 lecture per week

**Language of tuition** Module is presented in English

**Department** Statistics

**Period of presentation** Semester 1 or Semester 2

#### Module content

Unsupervised learning: deterministic clustering, model-based clustering, latent class and behavioural analytics, dimension reduction. Natural language processing and topic modelling; recommender systems. Organisation of data, data wrangling and data structure exploration.

### Capita selecta: Statistics 880 (STK 880)

**Module credits** 20.00

**NQF Level** 09

**Service modules** Faculty of Natural and Agricultural Sciences

**Prerequisites** Admission to the relevant programme.

**Contact time** 1 lecture per week, 1 other contact session per week

**Language of tuition** Module is presented in English

**Department** Statistics

**Period of presentation** Semester 1 or Semester 2

#### Module content

This module covers the most recent literature that discusses current and contemporary research topics in advanced data analytics.

### Analysis of time series 880 (TRA 880)

**Module credits** 20.00

**NQF Level** 09

**Service modules** Faculty of Natural and Agricultural Sciences

**Prerequisites** WST 321 or STK 320

**Contact time** 1 lecture per week

**Language of tuition** Module is presented in English

**Department** Statistics

**Period of presentation** Semester 1 or Semester 2

#### Module content

Difference equations. Lag operators. Stationary ARMA processes. Maximum likelihood estimation. Spectral analysis. Vector processes. Non-stationary time series. Long-memory processes.

## Data science: analytics and visualisation 880 (TRG 880)

<b>Module credits</b>	20.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	Admission to relevant programme.
<b>Contact time</b>	1 lecture per week
<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

Supervised learning and applications. Multicollinearity, ridge regression, the LASSO and the elastic net. Parametric and nonparametric logistic regression and nonlinear regression. Survival regression. Regression extensions: Random forests MARS and Conjoint analysis. Neural networks.

## Cyber analytics 802 (WST 802)

<b>Module credits</b>	20.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Contact time</b>	1 lecture per week
<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

Reviewing, from a statistical perspective, the cyber-infrastructure ecosystem including distributed computing, multi node and distributed file eco systems, such as Amazon Web Services. Structured and unstructured data sources, including social media data and image data. Setting up of large data structures for analysis. Algorithms and techniques for computing statistics and statistical models on distributed data. Software to be used include, Hadoop, Map reduce, SAS, SAS Data loader for Hadoop.

## General Academic Regulations and Student Rules

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. The G Regulations are updated annually and

may be amended after the publication of this information.

#### **Regulations, degree requirements and information**

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

#### **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 (HEQSF) 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.