



# University of Pretoria Yearbook 2021

## MSc Advanced Data Analytics (Coursework) (02250195)

**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.

The MSc degree is conferred on the grounds of a dissertation and such additional postgraduate coursework as may be prescribed.

### Renewal of registration

As long as progress is satisfactory, renewal of the registration of a master's student will be accepted for the second year of the study. Registration for a third and subsequent years will only take place when the Student Administration of the Faculty receives a written motivation that is supported by the relevant head of department and Postgraduate Studies Committee.

### General

Candidates are required to familiarise themselves with the General Regulations regarding the maximum period of registration and the requirements on the submission of a draft article for publication.

### 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



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## Other programme-specific information

As long as progress is satisfactory, renewal of registration of a master's student will be accepted for a second year of study in the case of a full-time student. Renewal of registration for a third and subsequent years for a full-time student will only take place when Student Administration of the Faculty receives a written motivation (the required form can be obtained from the relevant head of department) that is supported by the head of department and Postgraduate Studies Committee. (Also see the General Regulations.)

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.

## 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.

## Pass with distinction

The MSc degree is conferred with distinction to candidates who obtain a final average mark of at least 75% and a mark of at least 75% for the dissertation/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 dissertation/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.



## Curriculum: Final year

### Minimum credits: 180

All master's students in Statistics/Mathematical Statistics should enrol for STK 899 which is a compulsory but non-credit-bearing module. The satisfactory completion of this module is a prerequisite for embarking on the research component of the degree programme.

Students should choose any four (4) of the elective modules from the list, to the maximum value of 80 credits.

## 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
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	Admission to the 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

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)

<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 the relevant programme.
<b>Contact time</b>	1 lecture per week, 1 other contact session 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

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)

<b>Module credits</b>	20.00
<b>NQF Level</b>	09
<b>Service modules</b>	Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	WST 321 or TRA 720
<b>Contact time</b>	1 lecture per week
<b>Language of tuition</b>	Module is presented in English



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<b>Department</b>	Statistics
<b>Period of presentation</b>	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.

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The information published here is subject to change and may be amended after the publication of this information. The

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**General Regulations (G Regulations)** apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the **General Rules** section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.