

Universiteit van Pretoria Jaarboek 2018

MIT Big Data Science (12254017)

Minimum duur van studie 2 jaar

Totale krediete 180

Programinligting

Hierdie inligting is slegs in Engels beskikbaar.

This degree programme is presented in English only.

Also consult G Regulations G.30 to G.54

The curriculum is determined in consultation with the programme organiser.

A student will have to apply to the Dean of the Faculty of Engineering, Built Environment and Information Technology if he/she requires more than three years to complete the degree.

Toelatingsvereistes

- i. Subject to the stipulations of Gen. Reg. G.1.3, G.30 and G.62, an appropriate honours or bachelor's degree is a requirement for admission.
- ii. Selection of candidates will take place.
- iii. The result of the selection is final and no correspondence will be entered into.
- iv. A minimum pass mark of 65% for the previous degree AND
- v. Successful completion of higher education modules, or other modules with similar content, as part of the previous degree in:
 - Statistics,
 - Calculus I,
 - Linear Algebra I,
 - Programming,
 - Database systems, and
 - Research methods; AND
- i. Success in the selection process based on:
 - previous education;
 - passing an English test; and
 - passing a proficiency test in Databases, Programming, Mathematics and Statistics.

Ander programspesifieke inligting

Discontinuation of studies

The Dean may, on the recommendation of the admissions committee, cancel the studies of a student who fails more than one module. A module may only be repeated once.

Deregistration of modules

Deregistration of modules is only allowed before the early deadline.

Eksamens en slaagvereistes

A minimum semester mark of 40% is required in order to be admitted to the final examinations in all the prescribed modules of the degree. A final mark of 50% is required to pass all coursework modules and the mini-dissertation.

Slaag met lof

The degree is conferred with distinction on students who have obtained at least 75% for the mini-dissertation and a minimum of 75% weighted average final mark for the coursework modules.

Kurrikulum: Jaar 1

Kernmodules

Inleiding tot grootdatawetenskap 800 (MIT 800)

Modulekrediete	5.00
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Kwartaal 1

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

This is the first and introductory module for the MIT degree in Big Data Science. Big Data and Data Science will be defined and students will be exposed to different application domains within the participating academic departments in the MIT degree. These departments include: Computer Science, Electrical, Electronic and Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, Statistics, and Health Science departments. The presentation of this module will be in the format of a two-day workshop.

Inleiding tot masjien- en statistiese leer 801 (MIT 801)

Modulekrediete	15.00
Voorvereistes	First year level higher education modules in Computer Science, Mathematics and Statistics.
Kontaktyd	16 kontakure per semester
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Semester 1

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

In this module students will be exposed to different categories of machine and statistical learning algorithms that can be used to manipulate big data, identify trends from the data, modelling trends for prediction purposes as well as modelling for the detection of hidden knowledge. Students will be exposed to various machine and statistical learning algorithms/methods and they will learn how to make the right choice with regard to these. Learning, in a supervised and unsupervised mode will be covered. Furthermore students will develop a practical understanding of methods that can aid the learning process, such as, new developments in regression and classification, probabilistic graphical models, numerical Bayesian and Monte Carlo methods, neural networks, decision trees, deep learning and other computational methods. This module also includes a visualisation component focusing on the encoding of information, such as patterns, into visual objects.

Inleiding tot dataplatforms en -bronne 802 (MIT 802)



Modulekrediete	5.00
Voorvereistes	First year level higher education modules in Computer Science and Statistics.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Kwartaal 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Students will obtain hands-on experience on the following technologies such as: Python, Spark, Hadoop, R and SAS, Streaming, Data fusion, Distributed file systems; and Data sources such as social media and sensor data.

Inleiding tot inligtingetiek vir grootdatawetenskap 803 (MIT 803)

Modulekrediete	5.00
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Kwartaal 1

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

The focus in this module is on Information Ethics and its place within the disciplines of Ethics and Philosophy. The following topics will be covered: Information Ethics and PAPAS (privacy, accuracy, property, access, security); Information ethics and the life cycle of big data; Information ethical dilemmas within big data in different disciplines, e.g. science, technology, engineering and mathematics (STEM), health sciences, economics and management sciences, social sciences and the humanities; and Case studies.

Inleiding tot wiskundige optimalisering vir grootdatawetenskap 804 (MIT 804)

Modulekrediete	5.00
Voorvereistes	First year level higher education modules in Computer Science, Mathematics and Statistics.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Kwartaal 2



Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

In this module students will be introduced to Mathematical Optimization through gaining knowledge about the theory and algorithms to solve optimisation problems. Topics will include: Linear programming, unconstrained optimization, equality constrained optimization, general linearly and nonlinearly constrained optimization, quadratic programming, global optimization, Theory and algorithms to solve these problems.

Grootdata 805 (MIT 805)

Modulekrediete 10.00

Voorvereistes First year level higher education modules in Computer Science.

Kontaktyd 10 kontakure

Onderrigtaal Module word in Engels aangebied

Departement Skool vir Inligtingtegnologie

Aanbiedingstydperk Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

This module focuses on tools for Big Data processing. The focus is on the 3 V- characteristics of Big Data namely volume, velocity and variety. Students will learn about the different architectures available for Big Data processing. The map-reduce algorithm will be studied in detail as well as graphical models for Big Data. The module will include a significant component of practical work (hands-on) where students will be exposed to real use cases that are or can be implemented on Big Data platforms.

Grootdatabestuur 806 (MIT 806)

Modulekrediete 10.00

Voorvereistes First year level higher education modules in Computer Science.

Onderrigtaal Module word in Engels aangebied

Departement Skool vir Inligtingtegnologie

Aanbiedingstydperk Kwartaal 4

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Big data management is the governance, administration and organization of large volumes of both structured and unstructured data. Aspects included in big data management are: big data as organizational asset, harnessing big data as disruptive technology for competitive advantage, big data quality and accessibility; management strategies for large and fast-growing internal and external data, big data infrastructure and platform management, and big data policy, strategy and compliance.

Navorsingsmetodes vir grootdatawetenskap 809 (MIT 809)

Modulekrediete 5.00

Onderrigtaal Module word in Engels aangebied



Departement Skool vir Inligtingtegnologie

Aanbiedingstydperk Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Similar to MIT 862; which has the following description: Research methodologies applicable to the IT field as preparation for the mini-dissertation for the A Stream students.

Keusemodules

Grootdatawetenskap-keusemodule 801 (COS 801)

Modulekrediete 5.00

Voorvereistes Geen voorvereistes.

Kontaktyd 5 kontakure

Onderrigtaal Module word in Engels aangebied

Departement Rekenaarwetenskap

Aanbiedingstydperk Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 802 (COS 802)

Modulekrediete 5.00

Voorvereistes Geen voorvereistes.

Kontaktyd 5 kontakure

Onderrigtaal Module word in Engels aangebied

Departement Rekenaarwetenskap

Aanbiedingstydperk Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Example courses, amongst others, may include: Cyber-security, Digital Forensics, Deep Machine Learning, Image and sound analysis, Feature extraction, and Graph Modelling. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 801 (ERZ 801)

Modulekrediete 5.00



Voorvereistes	Geen voorvereistes.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Elektriese, Elektroniese en Rekenaaringenieurswese
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 802 (ERZ 802)

Modulekrediete	5.00
Voorvereistes	Geen voorvereistes.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Elektriese, Elektroniese en Rekenaaringenieurswese
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Example courses may include: Intelligent systems and Internet of Things. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 801 (INF 801)

Modulekrediete	5.00
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Informatika
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 802 (INF 802)

Modulekrediete	5.00
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Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Informatika
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

See existing electives from MIT modules in Stream A and B. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 820 (INL 820)

Modulekrediete	5.00
Onderrigtaal	Module word in Engels aangebied
Departement	Inligtingkunde
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Five credits of an elective course can be drawn from Information Science. A course in Research Data Management (RDM) is available as an elective course. The following topics would typically be covered: Open Science and the dependency on open (big) data, The research process and the life cycle of big data (data management plans to publishing derivative data sets, licensing and legal implications), Managing (curating) big vs long tail data; Solving problems with research data vs the business value of big data (data-intensive decision making); Managing data as an asset (also data citation); Issues and challenges involved in the management of big data (principles and best practices for effective big data governance); Trusted data repositories; Data stewardship frameworks for big data; and The data steward's tool box.

Statistiek keusemodule 801 (STK 801)

Modulekrediete	5.00
Voorvereistes	Soos bepaal deur die Departement Statistiek.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.



Statistiek Keusemodule 802 (STK 802)

Modulekrediete	5.00
Voorvereistes	Soos bepaal deur die Departement Statistiek.
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Statistiek
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Five 5 credits of an elective course can be drawn from the Department of Statistics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 801 (WTW 801)

Modulekrediete	5.00
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Wiskunde en Toegepaste Wiskunde
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.

Grootdatawetenskap-keusemodule 802 (WTW 802)

Modulekrediete	5.00
Kontaktyd	5 kontakure
Onderrigtaal	Module word in Engels aangebied
Departement	Wiskunde en Toegepaste Wiskunde
Aanbiedingstydperk	Semester 2

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Five 5 credits of an elective course can be drawn from Mathematics and Applied Mathematics. In addition to study-leader approval, elective course selection may be subject to course pre-requisites, course availability, and internal departmental regulations as decided by the Head of the Department.



Kurrikulum: Finale jaar

Kernmodules

Miniverhandeling in grootdatawetenskap 807 (MIT 807)

Modulekrediete	90.00
Voorvereistes	Alle kernmodules moet geslaag wees.
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Jaar

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

Students may choose a supervisor/co-supervisor from any of the participating departments, which includes, but are not limited to: Electrical, Electronic & Computer Engineering (EECE), Informatics, Information Science, Mathematics and Applied Mathematics, and Faculty of Health Science departments (Computational biology, Family Medicine, Radiology). Additionally to the last mentioned, a supervisor/co-supervisor will also be allocated to all students from a department in the School of Information Technology. It is expected that a submission to a relevant journal is made during the course of the study. All the other faculty and university regulations for a master's degree will also be applicable over and above those listed at the beginning of this paragraph.

Grootdatawetenskap 808 (MIT 808)

Modulekrediete	20.00
Voorvereistes	Alle kernmodules moet geslaag wees.
Kontaktyd	8 kontakure per semester
Onderrigtaal	Module word in Engels aangebied
Departement	Skool vir Inligtingtegnologie
Aanbiedingstydperk	Semester 1

Module-inhoud

*Hierdie inligting is slegs in Engels beskikbaar.

This module provides the opportunity to students for demonstrating the application of the theoretical Big Data Science knowledge gained in the core part of this degree. Students are expected to identify and work with a collaborator who is taking ownership for the project. This collaborator can either be an industry partner or a researcher within one of the participating departments. Projects will be based on the entire big data lifecycle as discussed in this degree programme. This includes the gathering of data of a significant size as well as a final technical report describing the process followed and the deliverables. Depending on the complexity of the project, students can apply to work in groups with a maximum of two members. The proposed project will be subject to approval by the Department Computer Science.

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 vertrouwd met hierdie regulasies sowel as met die inligting vervat in die [Algemene Reëls](#) sal wees. Onkunde betreffende hierdie regulasies en reëls sal nie as 'n verskoning by oortreding daarvan aangebied kan word nie.